

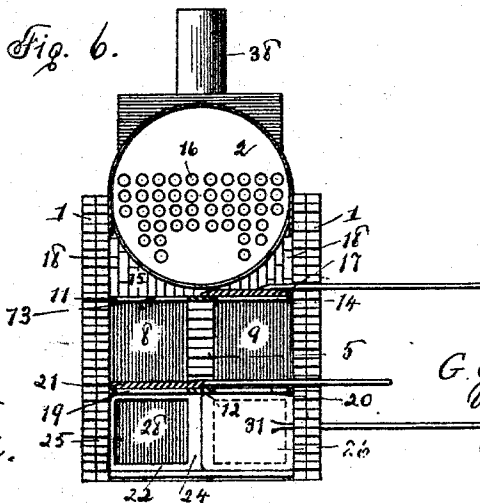
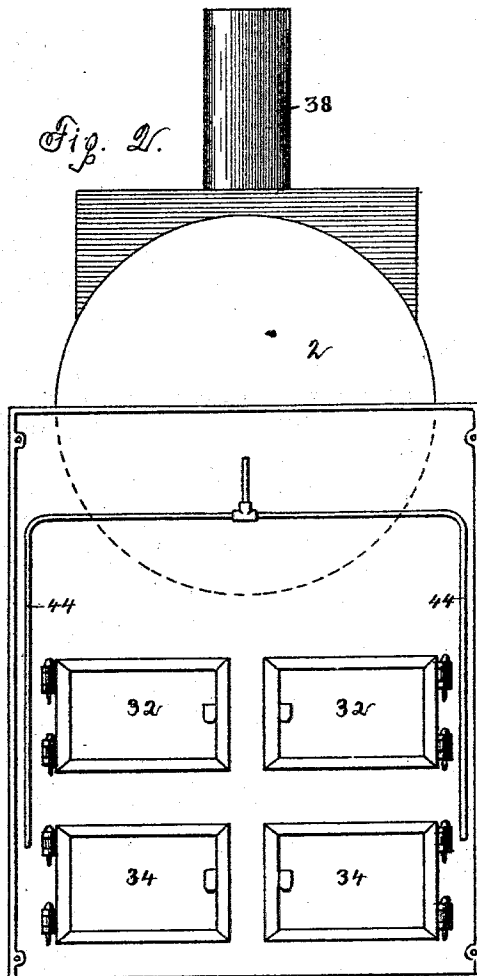
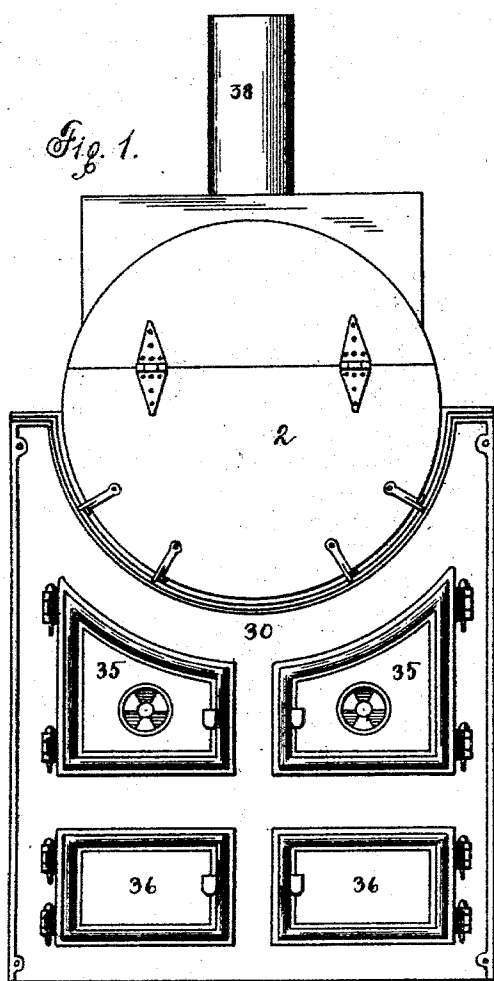
(No Model.)

2 Sheets—Sheet 1.

G. E. McCASKEY.
SMOKE AND GAS CONSUMING FURNACE.

No. 515,441.

Patented Feb. 27, 1894.



WITNESSES

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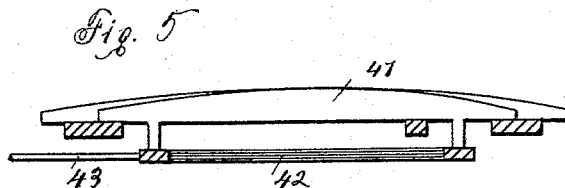
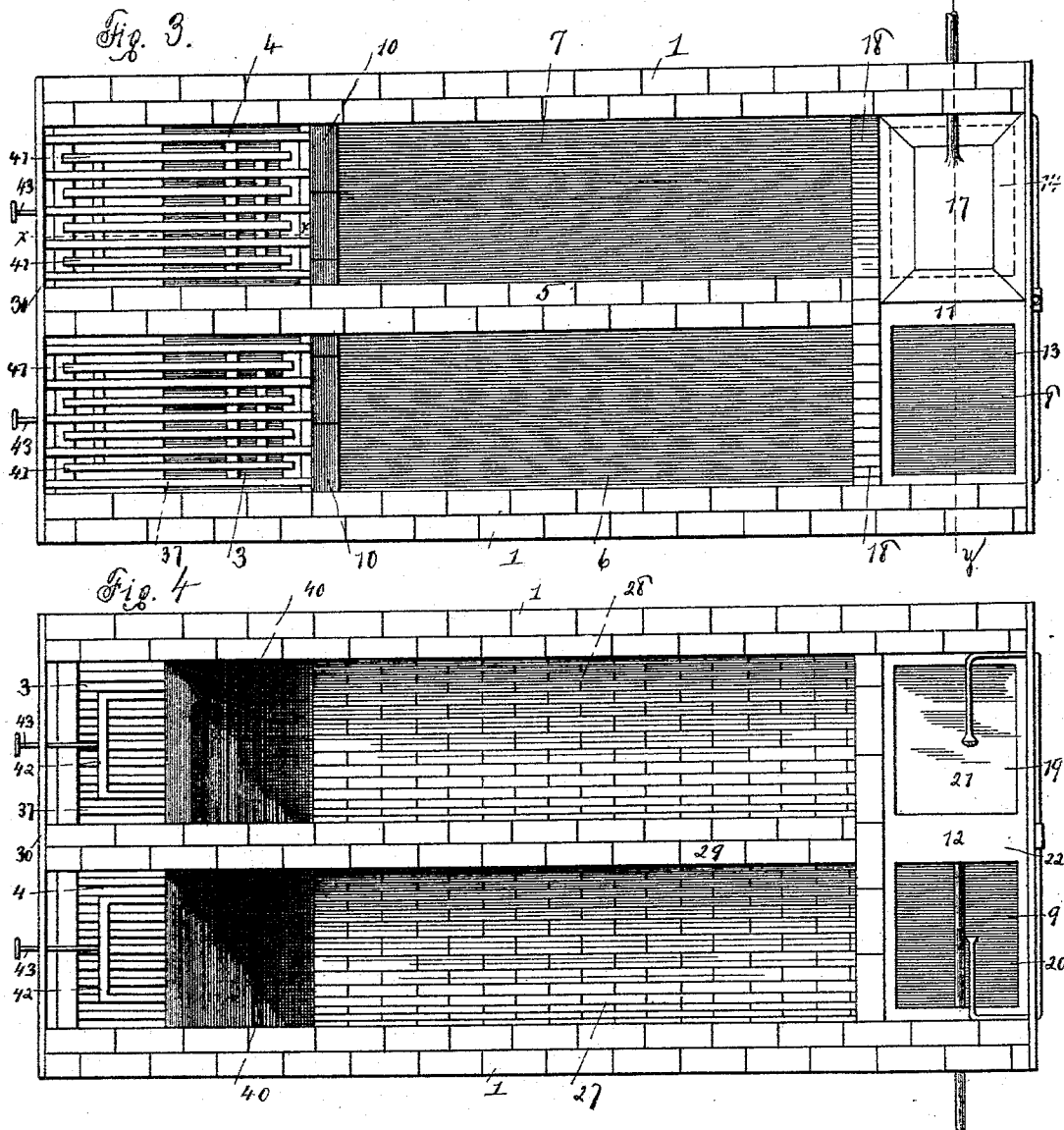
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UNITED STATES PATENT OFFICE.

GEORGE E. McCASKEY, OF MATTOON, ILLINOIS.

SMOKE AND GAS CONSUMING FURNACE.

SPECIFICATION forming part of Letters Patent No. 515,441, dated February 27, 1894.

Application filed November 21, 1893. Serial No. 491,566. (No model.)

To all whom it may concern:

Be it known that I, GEORGE E. McCASKEY, a citizen of the United States, residing at Mattoon, in the county of Coles and State of Illinois, have invented certain new and useful Improvements in Furnaces; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the figures of reference marked thereon, which form a part of this specification.

Figure 1 of the drawings is a front elevation of a furnace embodying the invention. Fig. 2 is a rear elevation of the same. Fig. 3 is a top plan view with the boiler removed. Fig. 4 is a bottom plan view. Fig. 5 is a detail view in section of the grate and shaker on line *x x* Fig. 3, and Fig. 6 is a transverse vertical section on line *y y* Fig. 3.

This invention has relation to certain new and useful improvements in smoke and gas consuming furnaces, and is designed to provide means in a furnace for effecting a more perfect combustion of the fuel, a large percentage of which in the ordinary furnaces passes off unconsumed; and the invention consists in the novel construction and combinations of parts, all as hereinafter described and pointed out in the appended claims.

Referring to the accompanying drawings the numeral 1 designates the furnace wall, and 2 the horizontal boiler supported by said wall in the usual manner.

In carrying out my invention, I divide the fire box of the furnace into two compartments 3 and 4, by means of a vertical partition wall 5. This wall I extend longitudinally underneath the boiler the entire length of the furnace with its upper edge in contact with the boiler, forming underneath the latter two longitudinal parallel flues 6 and 7 which at their rear ends open respectively into chambers 8 and 9 at the rear of the boiler, said chambers being separated from each other by the partition wall 5 above described.

10, 10 are the usual bridges, one at the rear of each of the fire boxes 3 and 4.

The upper and lower walls of the chambers 8 and 9 consist respectively of the transverse horizontal damper plates 11 and 12. In the

upper plate 11 is formed an opening 13 over the chamber 8, and an opening 14 over the chamber 9, said openings leading into a common transverse chamber 15 above said chambers 8 and 9, and into which also open the boiler flues 16. By means of a sliding damper 17 either one of these openings 13 and 14 may be opened or closed at pleasure.

18, 18 are walls closing the spaces at each side between the flues 6 and 7, and the chamber 15, and compelling all the smoke and gases to pass into the chambers 8 and 9 from the said flues.

In the lower flue plate 12 are formed two openings 19 and 20, situated respectively below the openings 13 and 14, and controlled by a sliding damper 21. Said openings 19 and 20 lead into a common, lower, transverse chamber 22 the forward wall of which consists of a vertical damper plate 24 having therein openings 25 and 26 which communicate respectively with parallel, lower longitudinal flues 27 and 28, separated from each other by a partition wall 29 which extends to the front wall 30 of the furnace. Controlling the openings 25 and 26, is a sliding vertical damper 31.

32, 32 are doors in the rear wall 33 of the furnace and giving access to the chambers 8 and 9 for cleaning, or other purposes, similar doors 34, 34 being provided for the chamber 22.

35, 35 are the front doors to the respective fire boxes 3 and 4, and 36, 36 are the doors to the ash boxes.

The operation is as follows:—Suppose a fire to be built in the left-hand fire box 4, the dampers being arranged to close the opening 14, into the upper chamber 15, the opening 19 into the chamber 22, and the opening 26 into the lower flue 28, and to expose the opening 20 into the lower chamber 22, the opening 13 into the chamber 15 and the opening 25 into the lower flue 27. The smoke and gases pass rearwardly through the flue 7 into the chamber 9, when, being prevented by the damper 17 from going into the chamber 15, they pass down through the opening 20 into the chamber 22, and across to the opposite side and through the opening 25 into the flue 27. Passing forwardly through this flue 27, they enter underneath the grate 37 of the fire box

3, passing up through said grate and through the previously built and hot fire in said fire box where a second combustion ensues. The remaining non-combustible parts together
 5 with those from the second fire pass rearwardly through the flue 6, into the chamber 8, up through the opening 13 into the chamber 15, thence into the boiler flues 16, and forwardly to the stack 38. By simply reversing the
 10 dampers, the smoke and gases may be made to pass from the fire box 3, around and through the fire in box 4 in a similar manner, so that by alternately feeding the two fires and reversing the dampers, a large saving of fuel
 15 may be effected. Or in one fire box I may maintain a hot fire of coke, or other material burning with little smoke or gas, and arranging the dampers to pass the smoke and gases from the other fire to which coal is fed
 20 through this fire. In order to cause the returning smoke and gases to pass up through the central portion of the grate where the fire is hottest so that it is not necessary to keep a hot fire at the rear portion of the grate, the
 25 upper walls of the flues 27 and 28 are extended forwardly underneath the grate as seen at 40, 40, said extensions being preferably inclined downward and forward as shown, and terminating underneath about the
 30 central portion of the grate.

In order to keep the grates from becoming choked with ashes to such an extent as to interfere with the passage of the smoke and gases upward therethrough, suitable devices
 35 may be employed. An effective device for this purpose is shown in the drawings and consists of a bar 41 placed between each pair of grate bars and capable of a limited endwise sliding movement. These bars are all
 40 connected to a common frame 42 to which is attached a handle 43 which may be operated from the front of the furnace.

The openings in the damper plates should be about the same size as the flues, and the
 45 distance between the dampers 21 and 31 should be equal to the height of the flue.

44, 44 are small steam or water pipes arranged to discharge a spray onto the smoke and gases at the rear as they descend into the

chamber 22. Said pipes if desired might be 50 placed at the front under the fire box.

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

1. In a furnace, a longitudinally divided 55 fire box and smoke flue, separate chambers at the rear into which the respective portions of the divided flue open, a common chamber above said separate chamber, and into which the boiler flues open at the rear, a common 60 chamber below said separate chambers, passages from said separate chambers into said common chambers, dampers for controlling said passages, longitudinal return passages or flues leading from the lower common cham- 65 ber forwardly underneath the grates, and means for closing either one of said return passages or flues, this arrangement of flues and dampers providing means whereby the smoke and gases of combustion from either 70 fire box may be made to pass three times the length of the furnace and through the other fire before passing to the boiler flues, substantially as specified.

2. In a furnace, the combination of the fire 75 boxes 3 and 4, flues 6 and 7, chambers 8 and 9 into which the respective flues 6 and 7 open at the rear, the common chamber 15 above the chambers 8 and 9 and with which both said chambers communicate, a damper for 80 controlling such communication, a common chamber 22 underneath the chambers 8 and 9, and with which they also communicate, a damper for controlling the openings into said lower chamber, the walls 18, 18, the lower 85 flues 27 and 28 underneath the flues 8 and 9 and opening at the rear into the chamber 22 and at the front extended underneath the grates, and a damper arranged to control the communication between said flues 27 and 28 90 and the chamber 22, substantially as specified.

In testimony whereof I affix my signature in presence of two witnesses.

GEORGE E. MCCASKEY.

Witnesses:

HORACE S. CLARK,
 W. H. CRUM.