

D. J. McKENZIE.

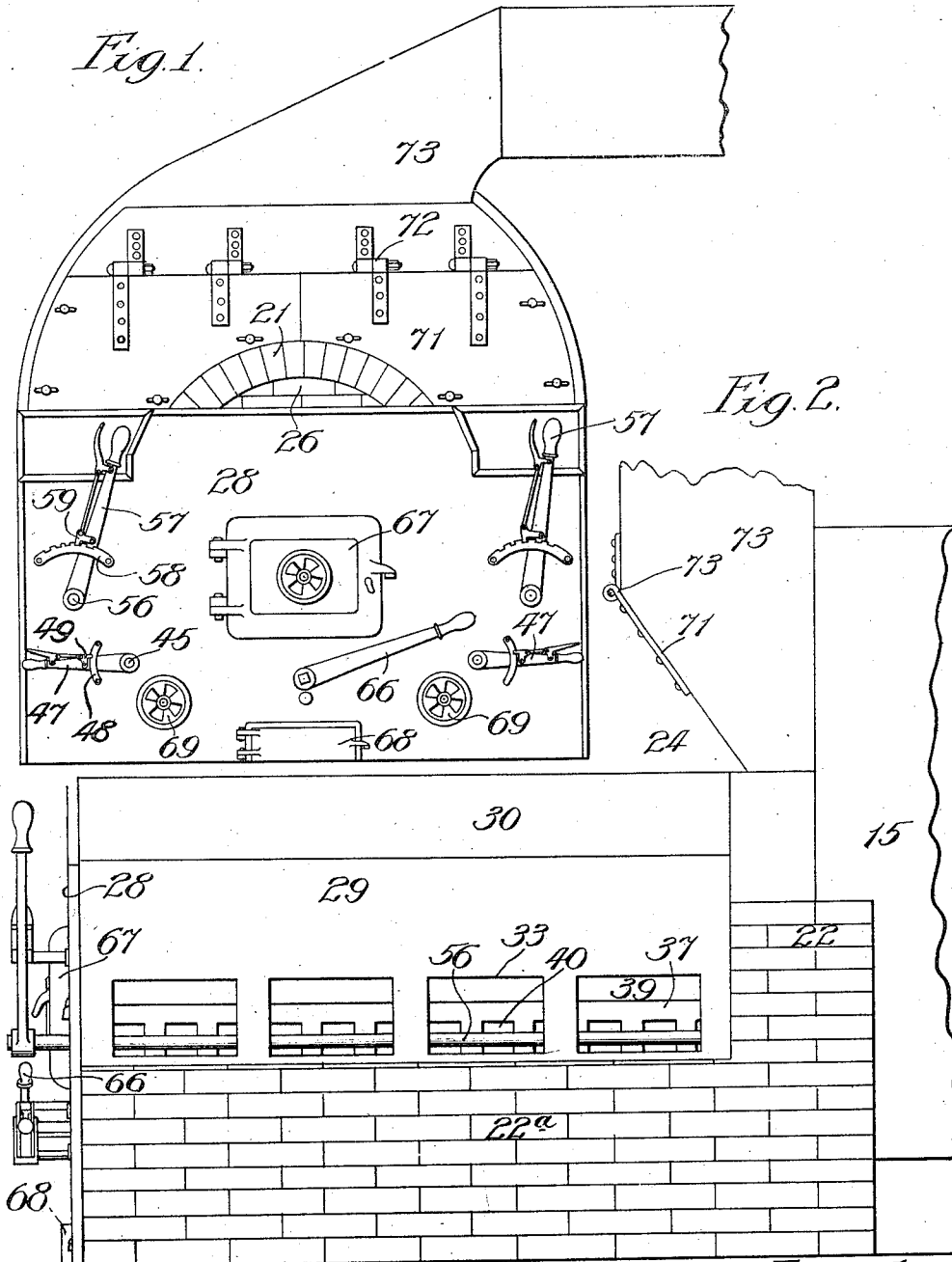
FURNACE.

APPLICATION FILED OCT. 20, 1908. RENEWED JAN. 2, 1912.

1,019,508.

Patented Mar. 5, 1912.

3 SHEETS—SHEET 1.



Witnesses:
John Anders
Chas. A. Buell.

Inventor:
Dougal J. McKenzie
By Sheridan & Wilkinson
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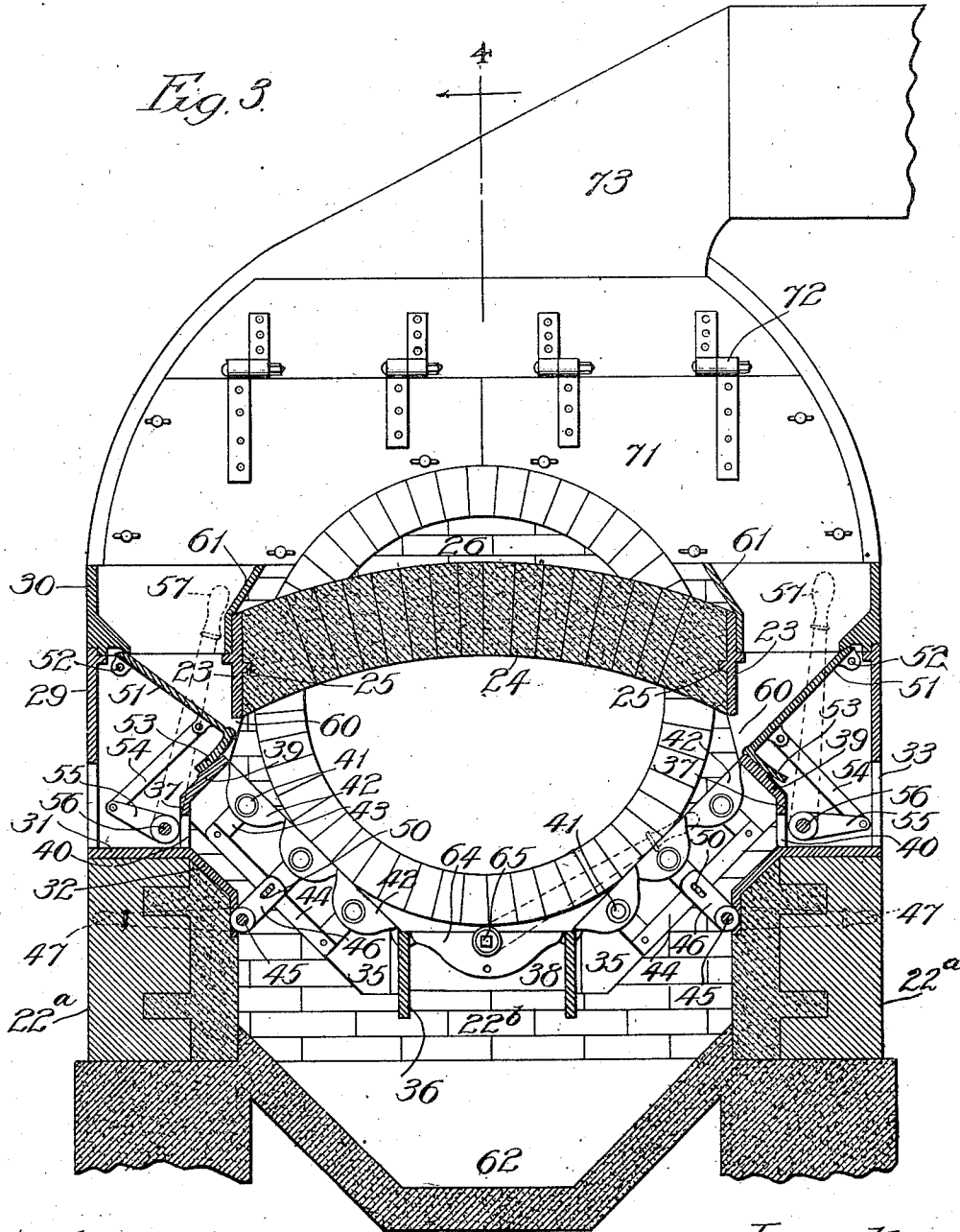
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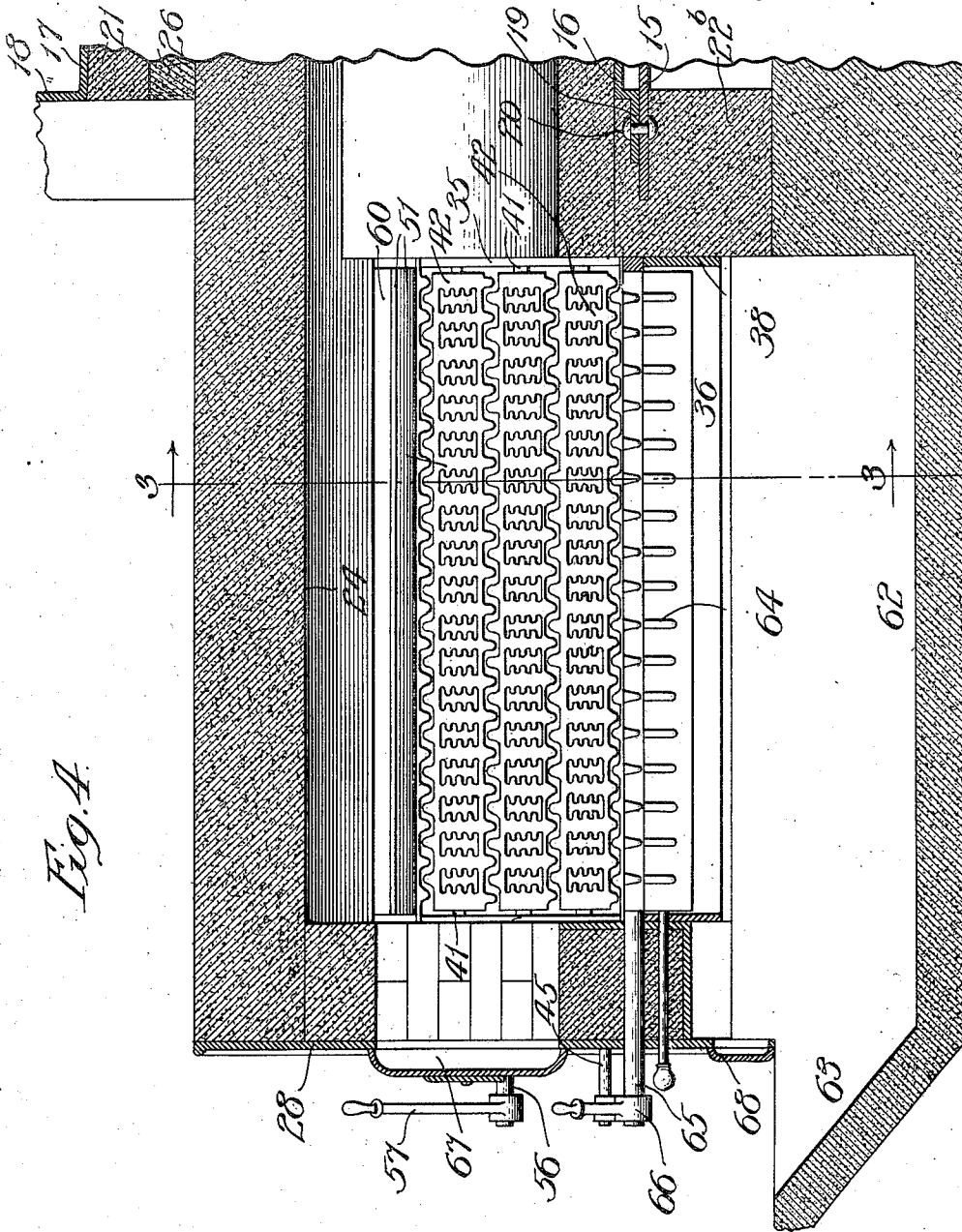


Fig. 4.

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UNITED STATES PATENT OFFICE.

DOUGAL J. MCKENZIE, OF CHICAGO, ILLINOIS.

FURNACE.

1,019,508.

Specification of Letters Patent.

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Application filed October 20, 1908, Serial No. 458,636. Renewed January 2, 1912. Serial No. 689,129.

To all whom it may concern:

Be it known that I, DOUGAL J. MCKENZIE, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Furnaces, of which the following is a specification.

The object of my invention is to provide a new and improved furnace for heating steam boilers or for other purposes.

More particularly my invention is an improved Dutch oven furnace having an improved fuel feeding mechanism.

My invention also relates to details of a fuel magazine for such a furnace, to the arrangement of the grate bars and the mechanism for operating them, to the ash-pit, to the air supply openings of the furnace, and various other details and features.

The objects of my invention will be made further apparent in the following specification and claims taken in connection with the accompanying drawings.

My invention may be embodied in a wide variety of forms, but I have shown in the drawings one particular design which is one of those at present preferred by me, but I claim the invention in its broad aspect as well as in the specific form disclosed.

Referring to the drawings—Figure 1 is a front end elevation of the furnace. Fig. 2 is a side elevation. Fig. 3 is a transverse section on the line 3—3 of Fig. 4, and Fig. 4 is a longitudinal vertical section on the line 4—4 of Fig. 3.

In the drawings I have shown my improved furnace in conjunction with a steam boiler of the type having a horizontal cylindrical outer shell 15, a large inner cylindrical flue 16—17 and an end flue sheet 18 with a flange 19 attached to the outer shell 15 by means of rivets 20. In Fig. 4 the lower part of the flue 16—17 is seen in section as indicated by the reference numeral 16, and the upper part of this same flue has its section indicated by the reference numeral 17. At its front end the flue 16—17 is lined on the inside with fire-brick 21. A brick wall 22 is built up at each side of the front end

of the boiler and extends across beneath the front end of the boiler, as indicated by the reference character 22^b. This wall also extends forward on each side of the furnace, as indicated by the reference numeral 22^a. Metal beams 23 extend horizontally on each side of the furnace being supported at their rear ends by the wall 22 and at their front ends by the furnace front wall, which will be described presently. These metal beams 23 have inside ledges 25 which support the top arch 24. At the rear end of the furnace and the front end of the boiler, the brick work 26 is filled in between the top of the arch 24 and the upper part of the cylindrical fire-brick lining 21. The cast metal furnace front is indicated by the reference numeral 28. On each side standing above the side walls 22^a are the cast metal side plates 29 above which are superposed side plates 30. Each side wall 22^a is surrounded by a cast metal cap plate 31 having an inclined inside edge portion 32. The side plates 29 have air inlet openings 33 at intervals. At the rear end of the furnace are inclined plates 35 on each side joined across by the horizontal plate 38 and having their extremities connected to the longitudinal plates 39, which rest upon the cap plates 31. Extending forwardly from the frame plate 35—38—35 are the two parallel beams 36. The inclined side frame members 39 have their lower sides or edges in a vertical plane and through these edges air inlet openings 40 are made at frequent regular intervals. The frame 39—35—38 just described rests its weight upon the cap plates 31 and supports the shafts 41 on which the grate bars 42 are mounted. Each shaft 41 carries a short crank 43 and all the cranks on one side of the furnace have their extremities connected together by a link 44. The shaft 45 is journaled below the grate bars 42 in the cap plate 31 and carries a short projecting crank arm 46, which has a pin and slot connection 50 with the link 44. This shaft projects through the front wall 28 of the furnace and carries a hand lever 47 on the front end. A notched quadrant 48 and a

co-acting dog 49 on the lever 47 facilitate locking the grate bars in normal position, or unlocking them when it is desired by means of the lever 47 to shake the grate bars 42 as will be more fully explained later.

Between the outside wall 29—30 and the supporting beam 23 is a space which is utilized to form a fuel magazine. The leaf 51 spans across this space, one edge being pivoted at 52 adjacent to the side wall 29—30 and the other edge being bent in the arc of a circle and being adapted to swing about the axis 52 in opposition to the lower edge of the supporting beam 23. The link 54 connects this leaf or closure 51 to the extremity of the crank arm 55, which projects from the shaft 56, this shaft 56 extending through the furnace front 28 and carrying a hand lever 57 at its end. A notched quadrant 58 and a co-acting pawl on the lever 57 permit adjustment of said lever and a consequent adjustment of the opening 60 between the lower edge of the supporting beam 23 and the edge of the leaf 51. Above the supporting beam 23 and carried thereby is an inclined plate 61, which acts as a wall to retain and guide fuel.

The ash-pit 62 has an inclined floor 63 at the front, thus providing ready access for removing ashes. The transverse grate bars 64 are carried on the single central longitudinal shaft 65, which projects through the furnace front 28 carrying a hand lever 66 on its extremity. The door 67 is provided to give access to the furnace above the grates in case it is desired to feed the furnace by shoveling in fuel in the ordinary manner, or in case access to this part of the furnace is desired for any other reason. An ash-pit door 68 is provided in the furnace front and adjustable air inlets 69 are also provided as shown. At the rear end of the furnace and the front end of the boiler the smoke-box is closed by the pendant hinged doors 71, the hinges being designated as 72. From this smoke-box the chimney 73 leads away as shown.

The magazine walls 30 and 61 are preferably joined together at their front and rear ends so as to form removable boxes at the sides of the beams 23. Each box 30—61 can be lifted up and set aside when this is needful for cleaning the boiler or for any other purpose.

In ordinary operation the fuel magazines between the walls 30 and 23—61 are filled with a quantity of coal or other suitable fuel. The lever 57 is fixed so as to give the outlet opening 60 from each fuel magazine the desired adjustment. The fuel spreads down evenly on the grate bars 42 and on the bars 64. The air for combustion purposes feeds in through the side openings 33 and 40, through the grate bars 42, and also through

the furnace front openings 68 and 69 and up through the grate bars 64 and 42. The air passes through the grate bars and the fuel thereon and the gases from the fuel pass back under the top arch 24 directly into the main flue 16—17 with its fire-brick lining 21. After passing through this flue into a combustion chamber at the rear end of the boiler they return through a plurality of small flues above and around the main flue 16—17 and discharge into the smoke-box covered by the doors 71. It is obvious that by shaking the lever 47 the crank arm 46 is oscillated, thus by reason of the pin and slot connection 50 causing the link 44 and the grate bars 42 to oscillate. This will obviously cause the fuel to descend over the grate bars 42, the fine ashes meanwhile shaking through. Clinkers and ashes upon the grate bars 64 may be dumped into the ash-pit 62 by throwing over the lever 66.

It is obvious that a supply of fuel having become accumulated in the two fuel magazines at the sides of the top arch 24, the labor necessary for feeding this fuel to the furnace, and for keeping the grate clear of the ashes and clinkers, will be very small so that a single fireman can readily attend to a large number of these furnaces. This saving of the labor of attendance is one of the many advantages of my invention. Another advantage lies in the fact that the furnace is smoke consuming. At no time are large bodies of fuel thrown upon the fire and thus the heat of the fire is always intense enough to insure complete combustion, thus preventing smoke. Still another advantage lies in the perfect distribution of the air fed under the grates with the fuel thereon. I also desire to call attention to the ease with which clinkers may be removed and to the fact that there may be a considerable accumulation of clinkers on the grate bars 64 without obstructing the fuel on the sloping grate bars 42. These advantages and many others will be readily appreciated by those skilled in the art and familiar with the actual working of the apparatus as claimed.

Having described one specific form of my invention, and having pointed out the principal objects thereof and principal advantages realized, I claim:

1. A furnace having masonry side walls bounding the ash pit, grates sloping downwardly and inwardly from said side walls, fuel magazines adjacent to the upper edges of said grates, hinged closures for the bottom of said fuel magazines, shafts lying above the masonry side walls, operating levers connected to said shafts, and crank and link connections from the shafts to the respective closures.

2. A furnace having masonry side walls bounding the ash pit, grates sloping down-

wardly and inwardly from said side walls, fuel magazines adjacent to the upper edges of said grates, hinged closures for the bottom of said fuel magazines, the free edges of said closures lying directly adjacent the top edges of the grates, shafts lying above the masonry side walls, operating levers connected to said shafts, and crank and link

connections from the shafts to the respective closures.

In testimony whereof, I have subscribed my name.

DOUGAL J. McKENZIE.

Witnesses:

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ANNIE C. COURTENAY.