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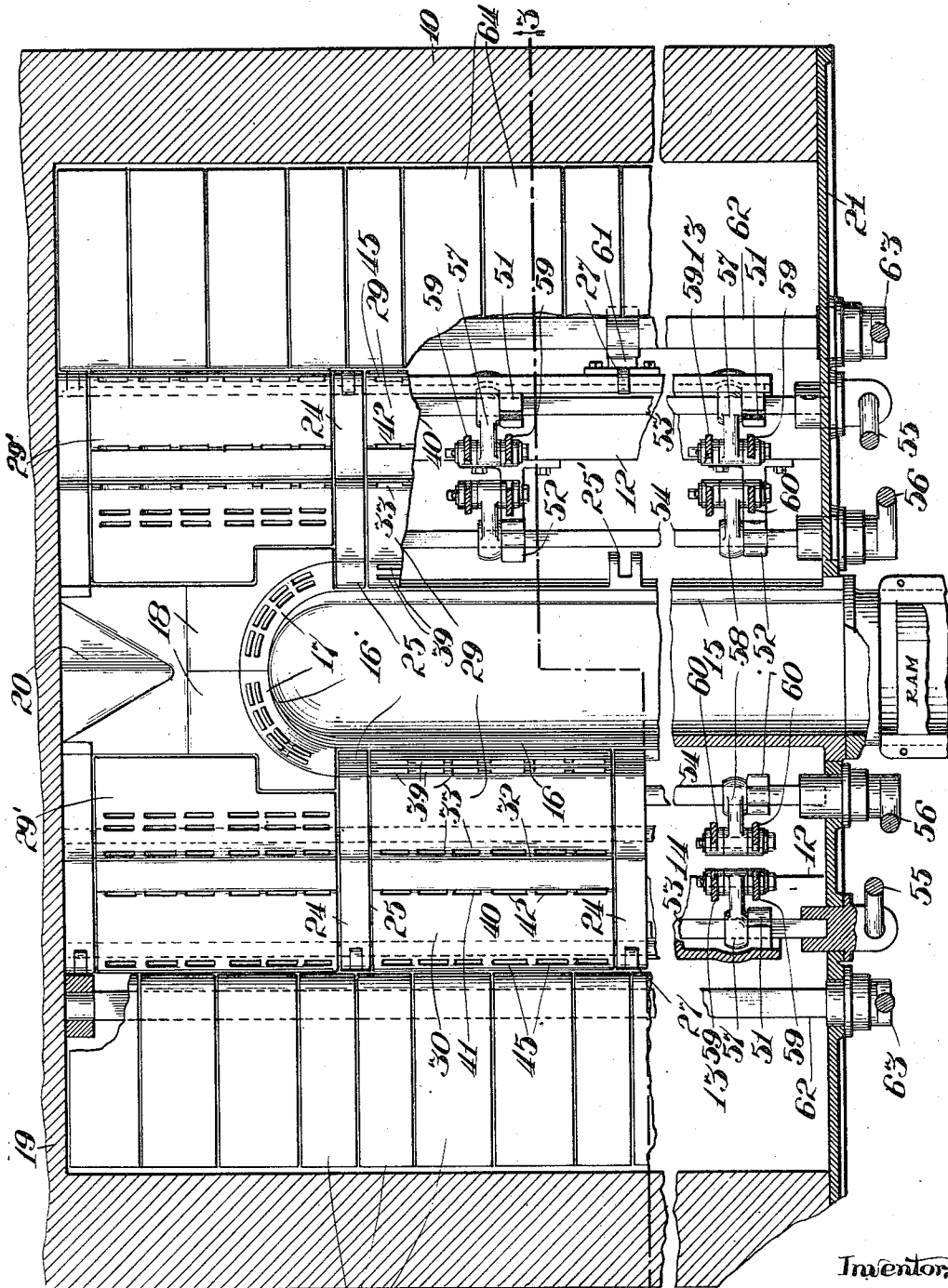
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SIDE DUMP UNDERFEED FURNACE

Filed Nov. 12, 1918

3 Sheets-Sheet 1



Witness
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Fig. 1.

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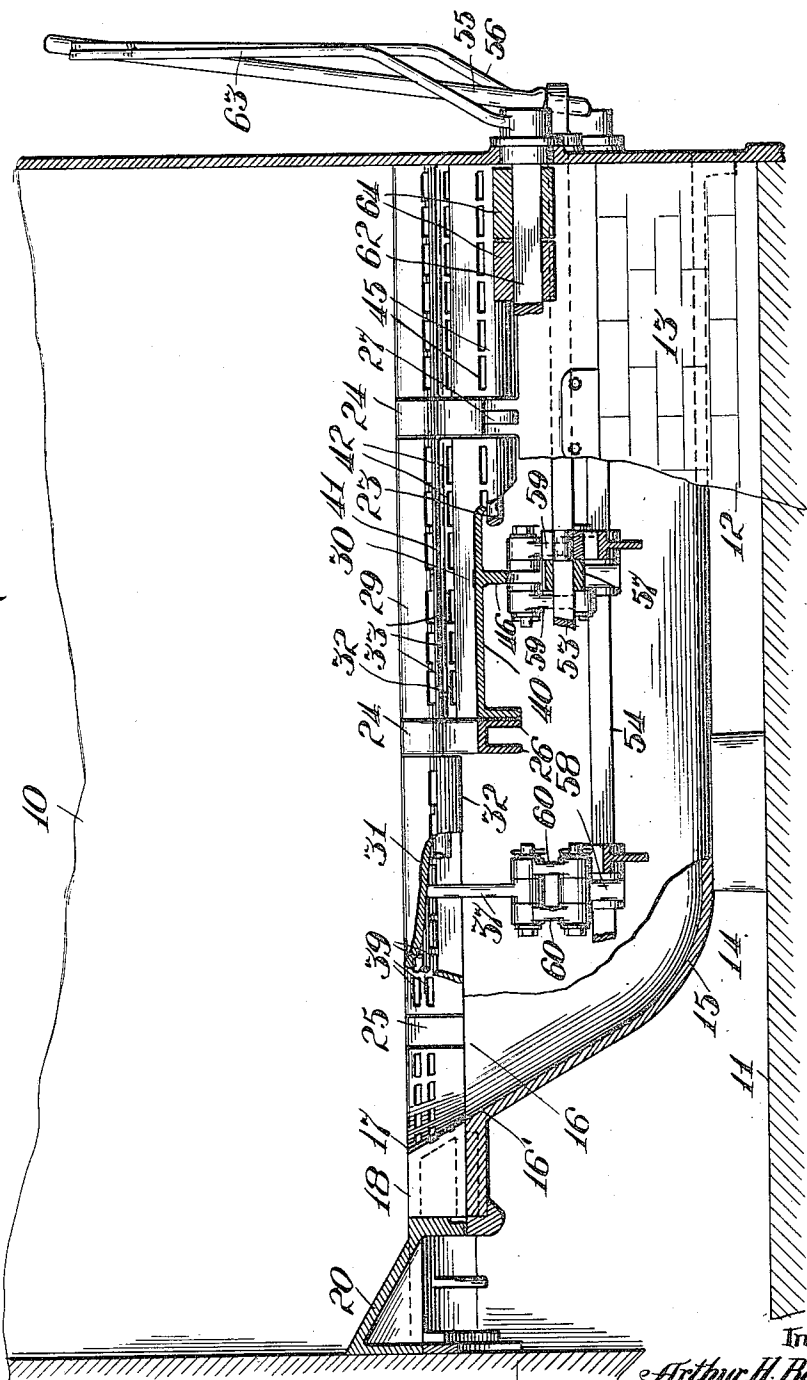
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Fig. 2.



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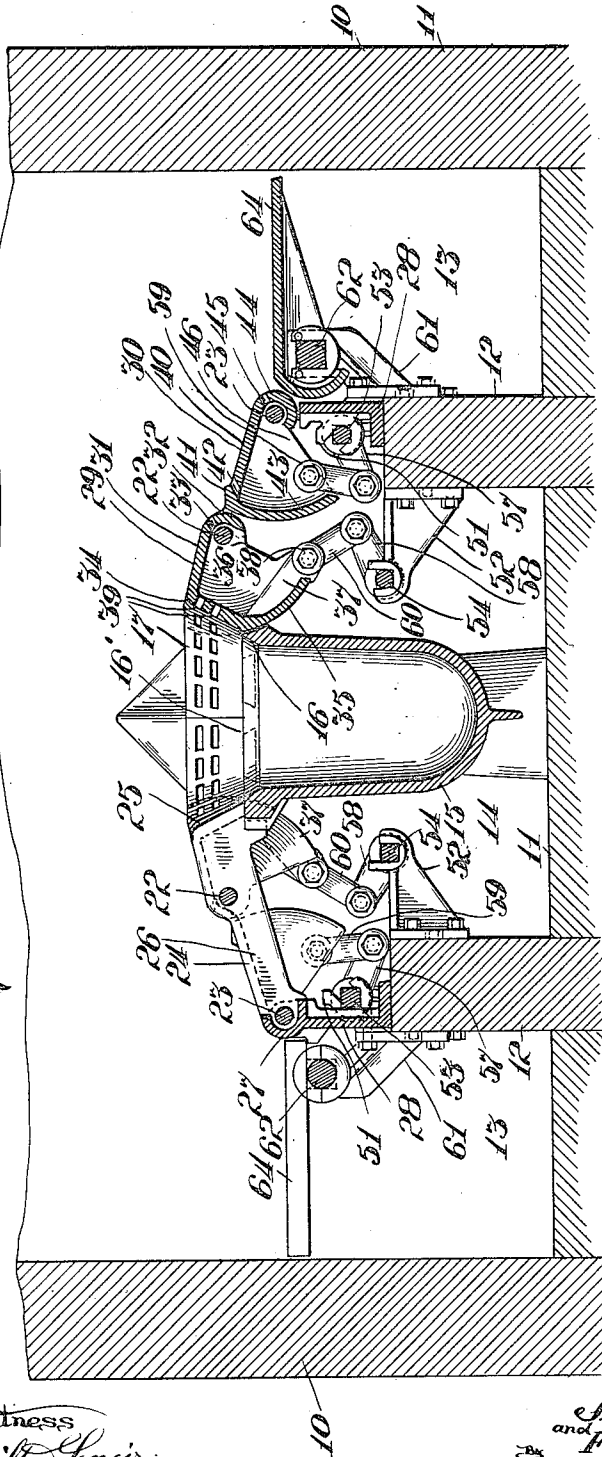
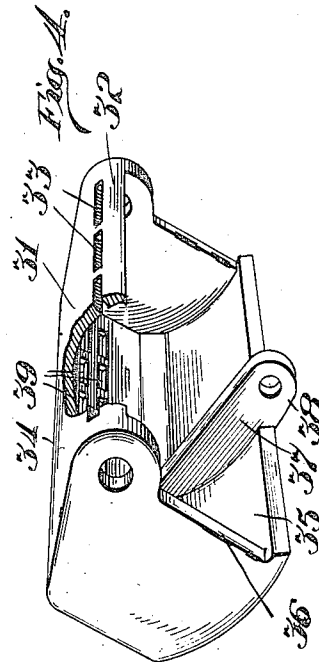
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3 Sheets-Sheet 3

Fig. 3.



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UNITED STATES PATENT OFFICE.

ARTHUR H. BLACKBURN, OF DOWNERS GROVE, AND FRANK E. FLEMING, OF CHICAGO, ILLINOIS, ASSIGNORS TO THE UNDERFEED STOKER COMPANY OF AMERICA, OF CHICAGO, ILLINOIS, A CORPORATION OF NEW JERSEY.

SIDE-DUMP UNDERFEED FURNACE.

Application filed November 12, 1918. Serial No. 262,252.

To all whom it may concern:

Be it known that we, ARTHUR H. BLACKBURN, a subject of the King of Great Britain, and FRANK E. FLEMING, a citizen of the United States, residing at Downers Grove, in the county of Du Page and State of Illinois, and at Chicago, in the county of Cook and State of Illinois, respectively, have invented certain new and useful Improvements in Side-Dump Underfeed Furnaces, of which the following is a specification.

The present invention relates to improvements in side-dump underfeed furnaces and has for its object to provide an improved self-cleaning structure of such type. It has heretofore been proposed to provide an underfeed furnace with a fire-box floor, the portion of which intervening between a retort or retorts and a horizontal side-dump closure or door, includes in its span a single longitudinally-extending series of floor-plate-sections sidewise tiltable to raise their inner edges and spill their load toward and into the side-dump door. The present invention is directed toward the improvement of furnaces operating for side delivery of the ash, and it consists in the features of construction and combinations of parts hereinafter more fully described as set forth in the appended claims.

In the drawings wherein we have illustrated a single embodiment of our invention for purposes of disclosure, Figure 1 is a plan view with parts broken away; Figure 2 is a longitudinal vertical section, with parts broken away; Figure 3 is a transverse vertical section on line 3—3 of Figure 1, and Figure 4 is a perspective detail of a movable floor-member.

In the particular construction shown, the side walls 10 and foundation 11 of the furnace are supplemented by low partition walls or solid footings 12 on which operating parts may be mounted and which are arranged to divide the space between the fire-box floor and the foundation into longitudinally extending side ash-receptacles 13 and a central wind-box 14 wherein a suitable air pressure may be maintained, as is well understood in this art. As shown, the construction may be symmetrical with respect to the longitudinal vertical plane, so that only one side of the construction

need be described. The retort 15, extending centrally through the furnace, is suitably supported at its front and rear ends preferably with its open mouth substantially horizontal, suitable means (such as a ram, fragmentarily shown in Fig. 2) of course being provided for introducing fuel into the front end of the retort and forcing it lengthwise thereof. Part of the under-fed material is advanced towards and past the upsloping rear end of the retort, and part is crowded up to spill laterally from the open mouth of the retort. Near its open mouth or top the retort flares, preferably, as at 16, such flaring lip portions having inwardly directed tuyeres 17. Preferably also the rear end of the lip, curved in plan, is rigid with the body of the retort. At the floor-level this rigid rear part of lip 16 (indicated as 16') joins a rigid rear floor-plate 18 that extends back to the bridge wall 19 of the furnace, and has surmounting it, close to the bridge wall, a flaring deflector or fuel divider 20, by which such material as is forced lengthwise along the plate will be diverted laterally to the movable floor-plates to be described.

From the rigidly-mounted retort body and the rear floor-plate of the central zone, to the side-dump doors that are adjacent the walls 10, we form the firebox floor structure to include a plurality of parallel zones of laterally tiltable floor-plates. This intervening floor structure preferably slopes from the central floor level downward to the dump-closures, but not at enough of a declination to cause immediate gravity slippage or avalanching of fuel or ash material that is spilled thereon from the retort. In the specific construction shown 22 and 23 are parallel rods or shafts mounted in the front wall and bridge wall and passing through fixed frame bars 24 which span from above the footings 12 to the proximate edges of the retort 15. The rear one of these bars 24 may conveniently adjoin and abut against the forward end of the rigid rear portion 16' of lip 16 of the retort. From this point forward the integral part of the retort-lip is preferably restricted to a level lower than that of the floor-plate 18, as shown in Figure 2, the flaring, tuyere-containing lips

of the retort, along these side stretches, being provided by the inward end portions of the frame bars 24 and of the movable floor-plates. As shown in Figure 3, each frame member 24 may be cast with a top and inner end surface substantially conforming to the contour assumed by the movable floor sections when the latter are closed or dropped, the inner end 25 of the casting interfitting with a notch 25' on the retort-lip 16 and the bar being provided with a downwardly extending rib 26 through which the rods 22 and 23 pass. The outer end of this bar preferably fits into a curved flange 27' cast on a frame iron 28 that is mounted on the footing 12 to form a partition-extension and a support for some of the parts.

The movable floor-plates are arranged in two tiers or courses, the upper course of plates 29 being pivoted on rod 22, and the lower course 30 pivoted on rod 23. The rear members 29' of this upper course will be shaped accordantly with the side contour of the fixed floor-plate 18, but otherwise the several elements of each tier may be duplicates. Each element of tire 29 is a casting presenting these structural features: a sloping floor-plate portion 31; an outer curve 32 coaxial with the rod 22 and preferably provided with outwardly directed tuyères 33; a sloping lip portion 34 to constitute an effective side continuation of the fixed rear lip-portion 16' of the retort, and a skirt portion 35 curved on an arc coaxial with shaft 22 to keep substantially in contact with the retort edge when the floor-plate is rocked or tilted on its shaft. For strength each of these floor-plates may have side walls 36 and a central rib 37, the latter projecting to afford a lug 38 for attachment of the plate-rocking means. Suitably inwardly-directed tuyères 39 are formed in the wall 34.

Each plate 30 of the outer course is a casting having an outwardly-down-sloping floor-portion 40 provided near its inner edge with a shoulder 41 below which there open outwardly a row of tuyères 42, the upper edge of the plate being skirted as at 43 to maintain substantial contact with the corresponding plate of the upper tier when the outer plate 40 is raised. The outer edge of the plate 40 is curved as at 44 around rod 22 and preferably is provided with a line of outwardly directed tuyères 45. The plate may be provided centrally, or at any point in its length, with a web 46 to receive the plate-moving means.

The partition wall 12 and frame iron 28 are equipped with a series of brackets 51 and also there is a second bracket series 52, these brackets supporting rock shafts 53 and 54 for the outer and inner floor plate courses, respectively, these rock shafts extending through the front wall of the furnace and

equipped with operating handles 55 and 56, manually or automatically operable. Each shaft has connection with all of the plates of its course by appropriate cranks, respectively, 57, 58 and pivoted connecting links 59 and 60.

Brackets 61 on the partitions 12 carry a rock shaft 62 operable by a handle 63 at the front of the furnace and carrying the dump-plate 64 of integral or multiple-section construction, this dump-plate or door, when raised, substantially spanning the space above the ash pit 13 and, when lowered, dumping its contents therein. It will be understood, however, that other forms of ash-disposal means than the dump-doors 64 may be used in suitable location to receive ash from the tilting floor-plates.

It will be observed that the construction described enables the fuel and ash to be very efficiently handled. Air is supplied through the floor-plate structure in sufficient quantity to insure completion of the combustion of any partly-consumed fuel that may be forced laterally from the retort, combustion being completed within the area above the wind-box and the zonal arrangement of the multiple courses enables the fuel to be distributed by lateral displacement to spread the burning coal and the ash as desired between the two courses. Any desired depth of the fuel-bed above the floor-plates can be very uniformly maintained and the shaking effect obtainable by manipulation of the floor-plates tends to keep a protective layer of fine ash in contact with the floor surfaces. Of course, as either tier of floor plates is rocked, to an angle permitting the fuel to avalanche, it tends to break up clinkers, as well as to spill its load laterally, and the raising and lowering of the tuyère-equipped edge of the retort tends with especial advantage not only to break the clinkers, but prevent air holes at the zone of initial combustion and also to loosen the burning fuel and thus enhance combustion in the central zone. The arrangement of the diverting plate construction at the rear end of the furnace beyond the rear tuyères, and the maintenance of the tuyère-equipped area laterally beyond the central rear dead plate 18, insures proper handling of such fuel as is forced directly aft through the retort.

While we have herein described in some detail a particular embodiment of our invention for purposes of full disclosure, it will be understood that many changes in construction and arrangement may be made without departure from the spirit of our invention within the scope of the appended claims.

What we claim is:

1. In an underfeed furnace, the combination of a retort extending longitudinally, means for feeding fuel along said retort

from its front end toward its rear end, ash-disposal means extending longitudinally in substantial parallelism with a side of the retort but spaced laterally therefrom, and a floor structure intervening between said side of the retort and said ash-disposal means, which floor structure includes a plurality of courses of floor members, arranged normally to present a substantially solid floor-surface, each said course of floor members being independently tiltable to elevate that edge of its floor members which is toward the retort, for laterally feeding fuel and ash from adjacent the retort toward the ash-disposal means, and means for so tilting said courses of members independently.

2. In an underfeed furnace, the combination of a retort extending longitudinally of a fire-box, means for feeding fuel into and along said retort from front to rear thereof, a floor-plate arranged in rear of the retort and provided with a laterally-deflecting fuel-divider rising from said plate, ash disposal means parallel with the longitudinal axis of the retort but spaced from said retort and said rear floor plate, a floor structure intervening between said ash-disposal means and the rear floor plate and comprising members pivoted on longitudinally extending axes so as to be tiltable to elevate their edges that are nearest to the retort thereby to dump material laterally toward the ash-disposal means, and means for so tilting said members.

3. In an underfeed furnace, the combination of a retort, of ash-disposal means substantially parallel with the longitudinal axis of the retort and laterally spaced from the retort, for disposing of the ash that is laterally delivered from the retort, a floor structure interposed between the retort and the ash-disposal means and comprising pivotal members tiltable to elevate the edges thereof that are toward the retort, thereby to deliver material laterally away from the

retort and toward the ash-disposal means, said tiltable members including a tuyère-containing portion along the retort-facing edge thereof, said tuyère-containing portion forming a lip of the retort.

4. In an underfeed furnace, the combination with a fire-box having walls, of a retort body spaced from one of said walls, and combined tuyère-block-and-floor-members arranged in the space between the said retort body and said wall and supplementing said retort body, such members comprising tuyère-containing portions normally forming the mouth of the retort and floor portions extending sidewise from the retort mouth, pivotal supports for said members, and means for sharply elevating the tuyère-containing portions of said members to feed material sidewise from the retort toward the said fire-box wall.

5. In an underfeed furnace, the combination with a fire-box having side walls, of a retort body extending longitudinally between said walls, means for feeding fuel into the front end of said retort body and along the same to its rear end, ash dumping means arranged close to and parallel with a side wall of the fire-box, and a floor structure interposed between said ash-disposal means and the adjacent edge of the retort body, said floor structure comprising a plurality of courses of floor members, the members of each course being pivoted adjacent that edge thereof which is closest to the ash-disposal means in arrangement permitting tilting of said members to elevate their edges which are closest to the retort body, those floor members of the course which is closest to the retort body having portions arranged normally to constitute a lip above the retort body, and having tuyère-openings through said lip, and means for pivotally tilting the members of each said course.

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