

L. JOHNSON.
CLINKER GRINDER,
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1,234,904.

Patented July 31, 1917.

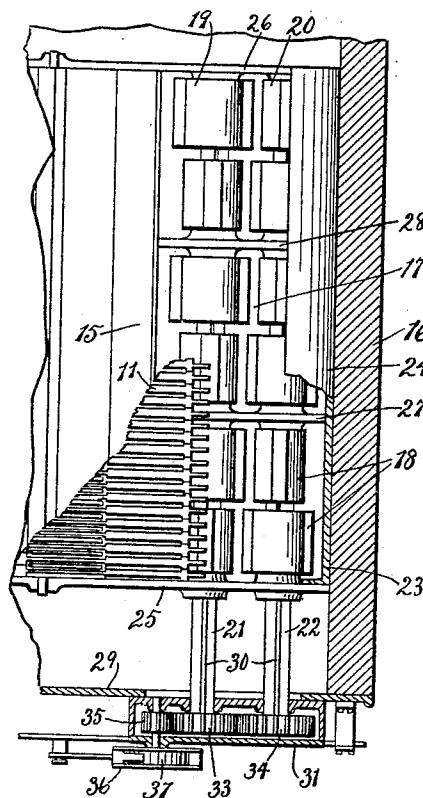


Fig. 1.

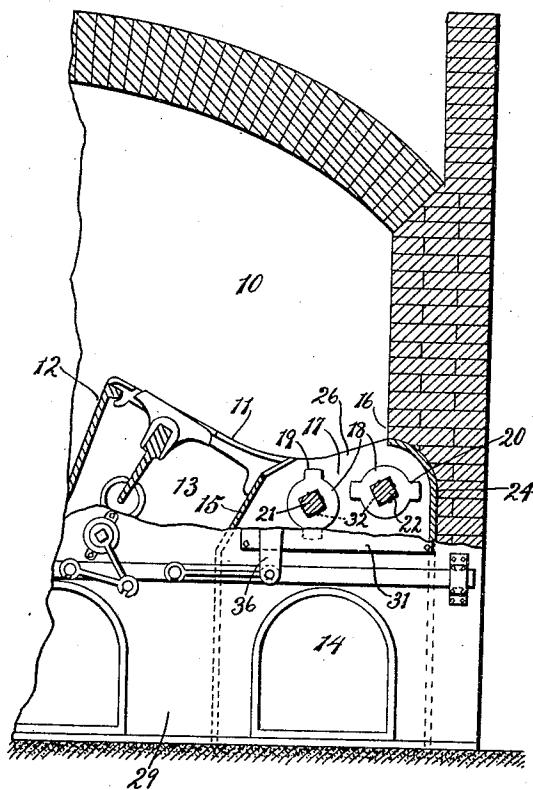


Fig. 2.

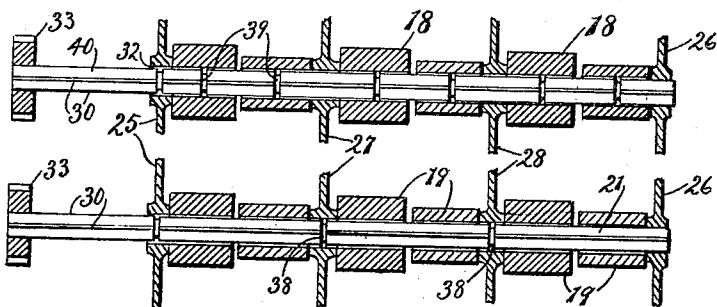


Fig. 3.

Fig. 4.

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UNITED STATES PATENT OFFICE.

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CLINKER-GRINDER.

1,234,904.

Specification of Letters Patent. Patented July 31, 1917.

Original application filed November 2, 1915, Serial No. 59,200. Divided and this application filed March 3, 1916. Serial No. 81,866.

To all whom it may concern:

Be it known that I, LANE JOHNSON, a citizen of the United States, and resident of Kokomo, county of Howard, and State of Indiana, have invented certain new and useful Improvements in Clinker-Grinders, of which the following is a specification, and which are illustrated in the accompanying drawings, forming a part thereof.

10 The invention relates to furnaces and has been divided out of my application for patent on mechanical stoker, Serial No. 59,200, filed November 2, 1915. The object of the invention is to provide an improved 15 form of clinker grinder for effecting a regulated discharge of the ash from mechanically fired furnaces. The invention accordingly contemplates a set of coöperating grinding rolls and shafts for supporting the 20 same, the feature of improvement residing more especially in a construction and arrangement of the parts which greatly reduce the tendency to distortion upon exposure to heat from one side.

25 In the accompanying drawings,

Figure 1 is a detail plan sectional view of a steam boiler furnace equipped with the improved clinker grinder, the parts of the clinker grinder being principally shown in 30 plan,

Fig. 2 is a detail transverse sectional view of the furnace shown in Fig. 1, and

Figs. 3 and 4 are detail plan views, partly 35 in section, showing two slightly different forms of construction.

The improved clinker grinder will usually be associated with a mechanically fired steam boiler furnace of the so-called under-feed type. The drawings show one side of 40 the fire box of such a furnace at 10, there being a laterally sloping fuel gate at 11 and a central fuel hopper at 12. The furnace also has a central air supply chamber 13, below the grate, as 11, and an ash pit 45 chamber 14 at each side, only one of the said ash pit chambers being shown. The lower edge of the sloping grate 11 is spaced apart from the adjacent side wall, as 16, of the fire box. An opening or throat 17, which 50 extends from front to rear of the fire box and communicates with the corresponding ash pit chamber 14 is thus provided at each side of the furnace. When this form of construction is used a solid longitudinal

partition 15 preferably extends from the 55 floor of the air supply and ash pit chambers 13, 14 to the lower edge of the grate 11 for confining the air supply to the under side of the grates.

The improved clinker grinder preferably 60 comprises a plurality of short rolls 18, arranged in two coöperating sets, as 19 and 20. These two sets of rolls extend horizontally through the throat 17 from front to rear, the rolls 18 of each set being sleeved 65 upon a shaft, as 21 and 22. A construction which is entirely independent of the masonry walls, as 16, of the furnace is provided, if a cast iron frame, generally designated 23, is employed for supporting the 70 parts. As shown, this frame comprises the partition 15, a side wall plate 24 and front and rear end plates 25 and 26. When the fire box 10 is of considerable length, the frame 23 may also include a pair of transverse intermediate tie plates, as 27 and 28. There is also a front wall plate 29. 75

The shafts 21 and 22 are preferably of stout construction and substantially square in cross section with rounded corners, as 80 30, the openings through the rolls 18 being of substantially the same shape in cross section so that the rolls are rotated by the turning of the shafts. Each shaft 21, 22, is journaled at its rear end in the rear end plate 85 26 and extends forwardly therefrom through the tie plates 28 and 27, through the front end plate 25 of the frame 23 and into a gear box 31 which is secured against the front wall plate 29 upon the outside. Each of the 90 end plates 25, 26 and the two tie plates 27 and 28 accordingly have round openings, as 32, (Fig. 2), to provide bearings for the shafts. As the two sets 19 and 20 of rolls 18 are to rotate in opposite directions, intermeshing gears 33 and 34 are mounted upon the forward ends of the shafts 21 and 22 within the gear box 31. Any convenient 95 mechanism may be employed for actuating the rolls. In the arrangement shown, a pinion 35 is engaged with the gear 33 and a pawl arm 36 coöperates with a ratchet wheel 37 which is mounted upon the forward end of the spindle of this pinion. 100

While all of the rolls 18 have a step by step 105 rotating movement during the operation of the furnace the rate of this movement will usually be very slow. While all of the rotat-

ing parts between the two ends of the frame 23 are thereby unequally exposed to the heat of the fire for long periods, distortion of the two sets of rolls 19, 20, is largely prevented 5 by the use of a plurality of relatively short rolls 18 in each set. Furthermore these rolls substantially inclose the shafts 21 and 22 and protect them against direct exposure to the heat of the fire.

10 Under these circumstances the distortion of the shafts 21, 22, by unequal expansion upon their two sides is prevented if the surface material of each shaft is interrupted at intervals throughout its length, as by the 15 provision of a series of peripheral grooves 38 or 39 in each shaft. These grooves permit the expansion of the surface material of the shaft along one side without increasing the total length of the shaft at that side. In the 20 form of construction illustrated in Fig. 4, the peripheral grooves 38 are located at the places where the shaft, as 21, is journaled in the frame members 25, 27 and 28.

In some instances, as when the work accomplished by the rolls 18 requires the transmission of a considerable amount of power, provision may be made for preventing any relative twisting movement between adjacent sections of the shafts upon which the 25 rolls are mounted. To this end the rolls of each set, as 19, may be sleeved upon a shaft 40 (Fig. 3), having the peripheral grooves 39 which are so located that each roll 18 covers a portion of the shaft at each side of 30 one of the said grooves. Under these circumstances the rolls 18 serve as couplings for rotatably connecting the parts of the shaft at opposite sides of the grooves. It follows that the grooves may be cut to any 35 desired depth, as the adjacent sections of each shaft require no direct connection, though such a connection may afford convenience in assembling the parts.

I claim as my invention,—

1. A clinker grinder element for furnaces 45 comprising, in combination, a series of shaft sections extending in axial alinement, adjacent sections being spaced apart at their peripheries to permit independent longitudinal expansion of the peripheral portions of the 50 sections, and a series of crushing rolls sleeved upon the shaft sections with intervening spaces between adjacent rolls in the said series to permit independent longitudinal 55 expansion of the several rolls.

2. A clinker grinder element for furnaces comprising, in combination, a series of shaft sections extending in axial alinement, adjacent sections being spaced apart at their peripheries to permit independent longitudinal 60 expansion of the peripheral portions of the sections, and a series of crushing rolls slidingly mounted upon the shaft sections to permit longitudinal expansion of the rolls independent of the shaft sections. 65

3. A clinker grinder element for furnaces comprising, in combination, a pair of non-circular shaft sections extending in axial alinement, the adjacent ends of the two sections being spaced apart at their peripheries, 70 and a crushing roll sleeved upon the two shaft sections and serving as a coupling for rotatably connecting them.

4. A clinker grinder element for furnaces comprising, in combination, a longitudinally 75 continuous shaft core, a plurality of non-circular peripheral shaft sections arranged along the said shaft core with their ends spaced apart and a plurality of separate crushing rolls sleeved upon the said peripheral shaft sections, each of said crushing rolls being extended over parts of two adjacent peripheral shaft sections and each two adjacent crushing rolls covering parts of the same peripheral shaft section. 80

LANE JOHNSON.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."