

Jan. 20, 1942.

H. C. CARTER

2,270,265

VERTICAL ROTARY-TYPE ASH REMOVER

Filed Nov. 21, 1939

2 Sheets-Sheet 1

FIG. 1.

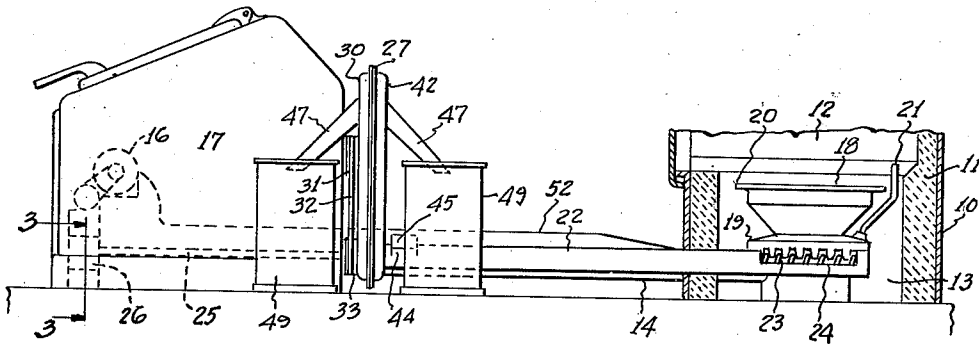


FIG. 2.

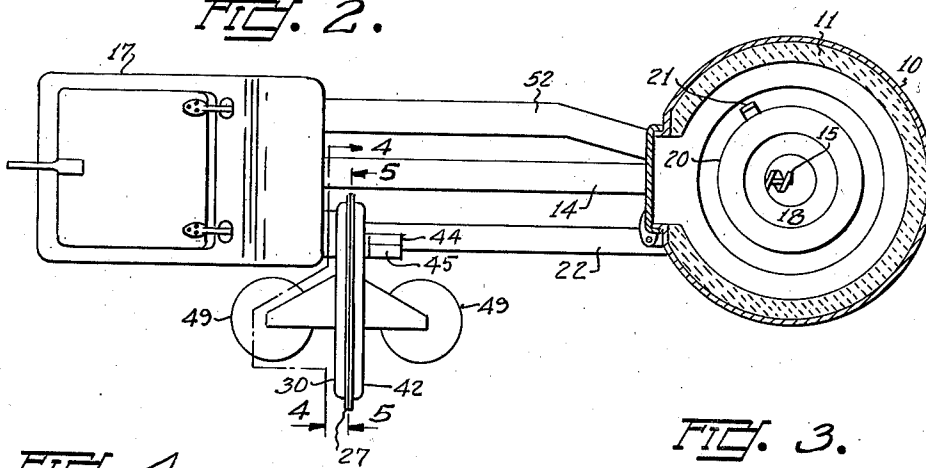


FIG. 4.

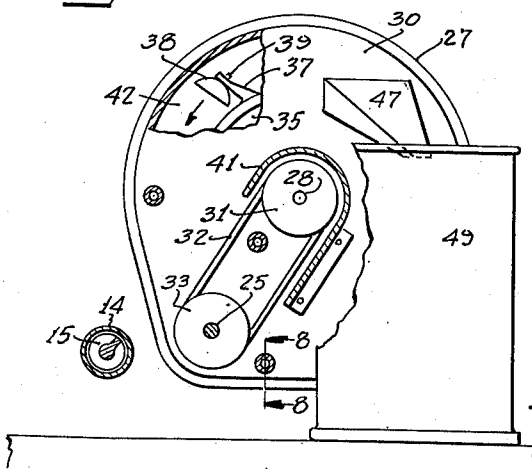
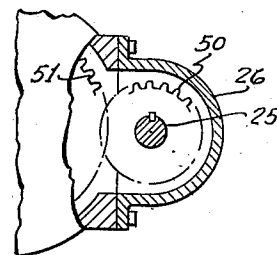


FIG. 3.



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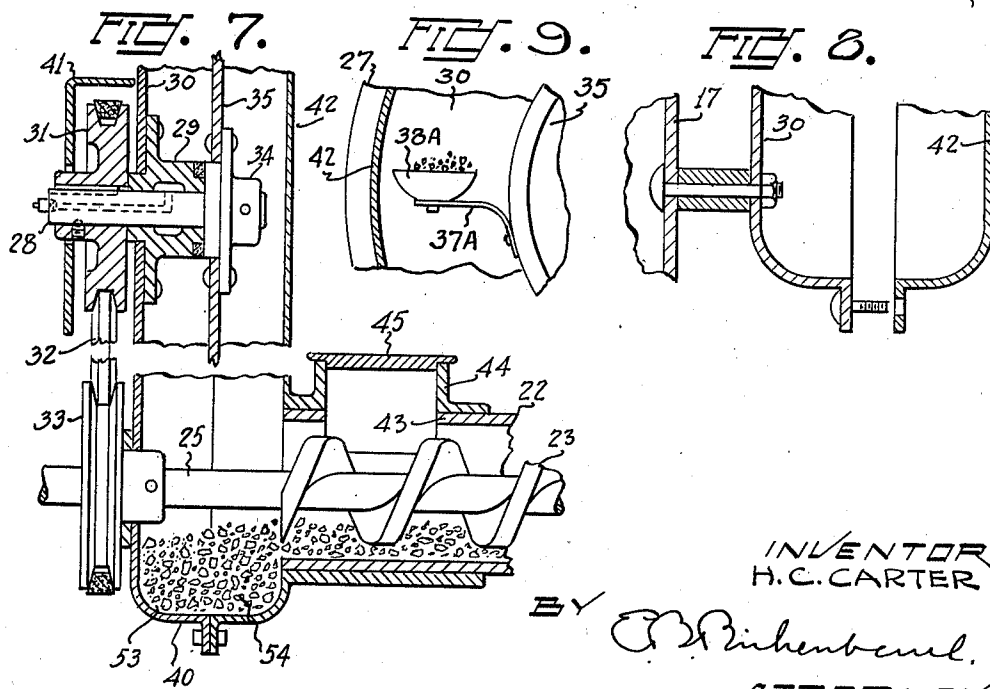
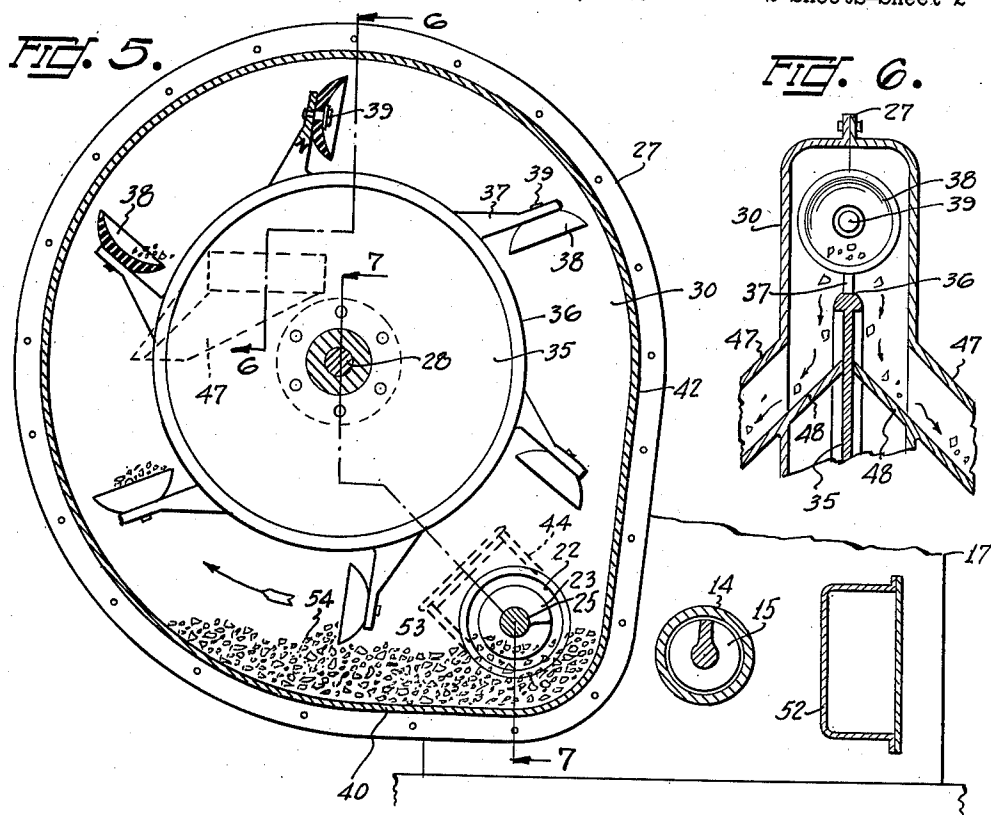
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2 Sheets-Sheet 2



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2,270,265

VERTICAL ROTARY-TYPE ASH REMOVER

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Application November 21, 1939, Serial No. 305,475

5 Claims. (Cl. 198—104)

This invention relates generally to coal burning stokers and particularly to a vertical rotary-type ash remover.

The main object of this invention is to construct a rotary-type ash remover at a reasonably low cost that will satisfactorily elevate ashes from an ash bin of a furnace into ash collecting cans.

The second object is to construct an ash remover which will be substantially noiseless in operation and which will be so flexible and yielding in its operation as to prevent it from being self-destructed by the presence of large, hard, clinkers or foreign substances which could not be satisfactorily handled by ordinary types of ash conveyors now in common use.

The third object is to construct an ash remover employing flexible rubber cups which are susceptible to rotation as well as yielding actions in order to enable the cup to wear evenly about its entire circumference.

The fourth object is to construct a stoker of the class described with a special form of drive which will render unnecessary the employment of shear pins or other safety mechanisms ordinarily employed to protect the elevator in case the buckets should become jammed.

The fifth object is to construct an ash remover of the class described employing a single rotating member in which extreme simplicity predominates in the design and in which the number of parts is reduced to a minimum.

The sixth object is to construct a device of the class described including a provision for protecting the elevating mechanism in event the emptying of the ash cans is neglected for an excessive period.

These and other objects are accomplished in the manner set forth in the following specification as illustrated in the accompanying drawings, in which:

Fig. 1 is a side elevation of the device showing its relation to a stoker and showing the lower portion of the furnace broken away in vertical section.

Fig. 2 is a plan of the stoker, the lower portion of the furnace broken away in horizontal section.

Fig. 3 is a fragmentary section taken along the line 3—3 in Fig. 1.

Fig. 4 is a section taken along the line 4—4 in Fig. 2.

Fig. 5 is a section taken along the line 5—5 in Fig. 2.

Fig. 6 is a section taken along the line 6—6 in Fig. 5.

Fig. 7 is a section taken along the line 7—7 in Fig. 5.

Fig. 8 is a fragmentary section through the housing showing the parts of the casing separated.

Fig. 9 is a fragmentary section showing a modified form of cup and supporting arm.

Similar numbers of reference refer to similar parts throughout the several views.

Referring in detail to the drawings, there is shown the base 10 of a furnace which is lined with refractory 11 to form a combustion chamber 12 and ash pit 13. Through the refractory 11 extends the coal feeding tube 14 within which is disposed the coal conveying worm 15. The worm 15 is driven by a motor 16, contained within the casing 17. The worm 15 delivers coal to the interior of a retort 18 around which is disposed a rotatable toothed ring 19 which is just below the rim 20 of the retort 18. This construction is more fully set forth in my Patent No. 2,122,807 over which the ash remover described herein is an improvement.

A clinker breaking bar 21 is attached to the ring 19 and travels around the rim 20, breaking up the clinkers as they pass over the rim 20.

Referring now to my invention, it is seen to consist of an ash conveying tube 22 within which is disposed an ash conveying worm 23, one end of which meshes with the toothed ring 19 within the cut-away portion 24 of the ash conveying tube 22.

The shaft 25 of the ash conveying worm 23 extends to a set of reduction gears contained within the casing 26 and receives its power from the motor 16. The outermost end of the ash conveying tube 22 terminates in the upright casing 27 which is somewhat circular in form at its upper portion and has mounted on the center of its circular portion a horizontal shaft 28 which journals on the bearing 29 secured to the side 30 of the casing 27.

On the shaft 28 is secured the pulley 31 which is connected by the belt 32 to the pulley 33 which is secured on the ash conveying worm shaft 25 on the outside of the casing wall 30. The belt 32 is of the type which will supply sufficient power for the shaft 28 under normal load conditions but will slip easily during overloaded periods.

On the shaft 28 is secured a flanged hub 34 to which is secured a disc wheel 35 from whose rim 36 project the cup carrying arms 37, on each of

which is rotatably mounted a flexible rubber cup 38 on a pivot bolt 39.

It will be noted that the cup 38 does not touch the interior of the casing 27 at any point, there being ample clearance between these parts and additional clearance at the lower portion of the casing 27 which extends around the under side of the shaft 25 below the lowermost portion of the ash conveying tube 22.

It is desirable to provide a guard 41 around the outside of the pulley 31 and belt 32. This guard may be conveniently attached to the side 30.

Opposite the side 30 of the casing 27 is a side 42 which closes this side of the elevator except for the opening for the ash conveying tube 22 and the openings for the chutes 47.

The ash conveying tube 22 is provided with an opening 43 on its upper side near the casing side 42. A flanged collar 44 surrounds the opening 43 and has loosely resting thereon a closure 45, the purpose of which is to provide a safety outlet for ashes, in the event that the elevator is clogged for any reason whatsoever.

The sides 30 and 42 are provided with ash outlet openings to which are connected the ash chutes 47 whose lower sides 48 extend into the casing 27 up to the disc 35. Each of the chutes 47 inclines downwardly above its respective ash can 49.

In Fig. 3 is shown the manner in which the ash worm shaft 25 is driven through the gearing 50 and 51 contained within the casing 26.

In the form of the device shown in Fig. 9, the cup 38—A may be of rubber or any other material, either flexible or rigid and the arm 37—A constructed of a resilient material which will provide the yielding action for the cup 38—A. It is not of vital importance where the yielding action occurs but it is important that ample clearance be provided between the cups 38 or 38—A and the interior of the casing parts 30 and 42.

In the operation of this device, coal is fed into the retort 18 by the worm 15 and air is supplied thereto through the air duct 52 and as the coal is burned and passes over the rim 20 into the ash pit 13, it falls through the opening 24 into the ash conveying tube 22 and thence passes into the pocket 53.

As the ashes 54 accumulate in the pocket 53, they are picked up by the cups 38 as they rotate about the axis of the shaft 28 and carried upwardly to the dumping point above the chute bottom 48 causing them to slide downwardly through the two chutes 47 to their respective cans 49.

It can be seen, that should any clinker be not completely broken up by the bar 21, or the action of the ash conveying worm 23, and actually finds it way into the casing 27 and is carried around by the cups 38, there can be no wedging action as the buckets will merely rotate on their respective pivots 39 or yield sufficiently to allow the clinker to fall. Ultimately, it will be picked up squarely by a bucket and discharged from the casing into the ash can.

It will be noted that there is a complete absence of closely related metal parts between which ashes and clinkers may become wedged. In the present device, the conveyor contains only metal and rubber parts with large clearances to minimize the noise produced by the ash removing operation.

While I have illustrated and described the use of rubber buckets or paddles in order to provide the desired resiliency therefor, it must be understood that the cups 38 may be of rigid material

and the arms 37 may be of a yielding nature as shown in Fig. 9.

It will be noted in Figs. 4 and 5 of the drawings that the open sides of the cups incline away from lines radiating from the axis of rotation of the wheel in a manner that when said wheel is rotating, the outermost side of each cup will be in advance of the innermost side thereof.

I am aware that numerous forms of ash removing devices have been constructed in the past. I am not attempting to cover such devices broadly, but I do intend to cover all such forms and modifications thereof as fall fairly within the appended claims.

I claim:

1. An ash remover of the class described consisting of an upright revolvable disc paddle wheel having an outwardly flared rim having a plurality of paddles disposed around the outer side of said rim, a casing enclosing said paddles, means for conveying ashes into said casing, an outlet opening in the upper portion of said casing below the uppermost portion of the buckets travel, a chute communicating with the interior of said casing below the discharge point of the buckets and extending to said disc and means for preventing excessive packing of ashes in the lowermost portion of said conveyor.

2. An ash remover having in combination a wheel revolvable in a vertical plane, a casing surrounding said wheel and spaced therefrom, means for conveying ashes into said casing, a plurality of yieldable rubber cups attached to the rim of said wheel and spaced from said casing, means for rotating said wheel in a manner to move said cups in the direction of their open sides, and ash delivery chutes extending through said casing from opposite sides thereof at points below said cups during their uppermost position of travel.

3. An ash remover having in combination a wheel revolvable in a vertical plane, a casing surrounding said wheel and spaced therefrom, a plurality of rubber cups revolvably mounted on said wheel beyond its outermost edge and having the open side of said cups inclined away from a radial line in a manner that when said wheel is rotating, the outermost side of the cup will be in advance of the innermost side thereof.

4. An ash remover having in combination a disc wheel revolvable in a vertical plane, a casing surrounding said wheel and spaced therefrom, said casing having ash chutes opening through the sides thereof and extending to said disc wheel, said wheel having arms radiating therefrom, each of said arms having a circular, flexible rubber cup rotatably attached thereto and spaced from said casing, means for yieldably rotating said wheel on a horizontal axis and means for discharging ashes into said casing.

5. An ash remover having in combination a wheel adapted to rotate in one direction in a vertical plane and having a plurality of hollow, resilient, ash elevating cups revolvably mounted around its outer circumference with the open sides of the cups facing the direction of rotation and having the outermost portions of said cups leading, a casing surrounding said wheel and cups and spaced therefrom, inclined ash discharge chutes extending through the sides of said casing to said wheel, the uppermost portion of each of said chutes being below the lowermost portion of each of said buckets while it is in its uppermost position.