Oct. 23, 1934. R. L. BEERS 1,977,665

STOKER CONSTRUCTION

Filed May 4, 1931 3 Sheets-Sheet 1

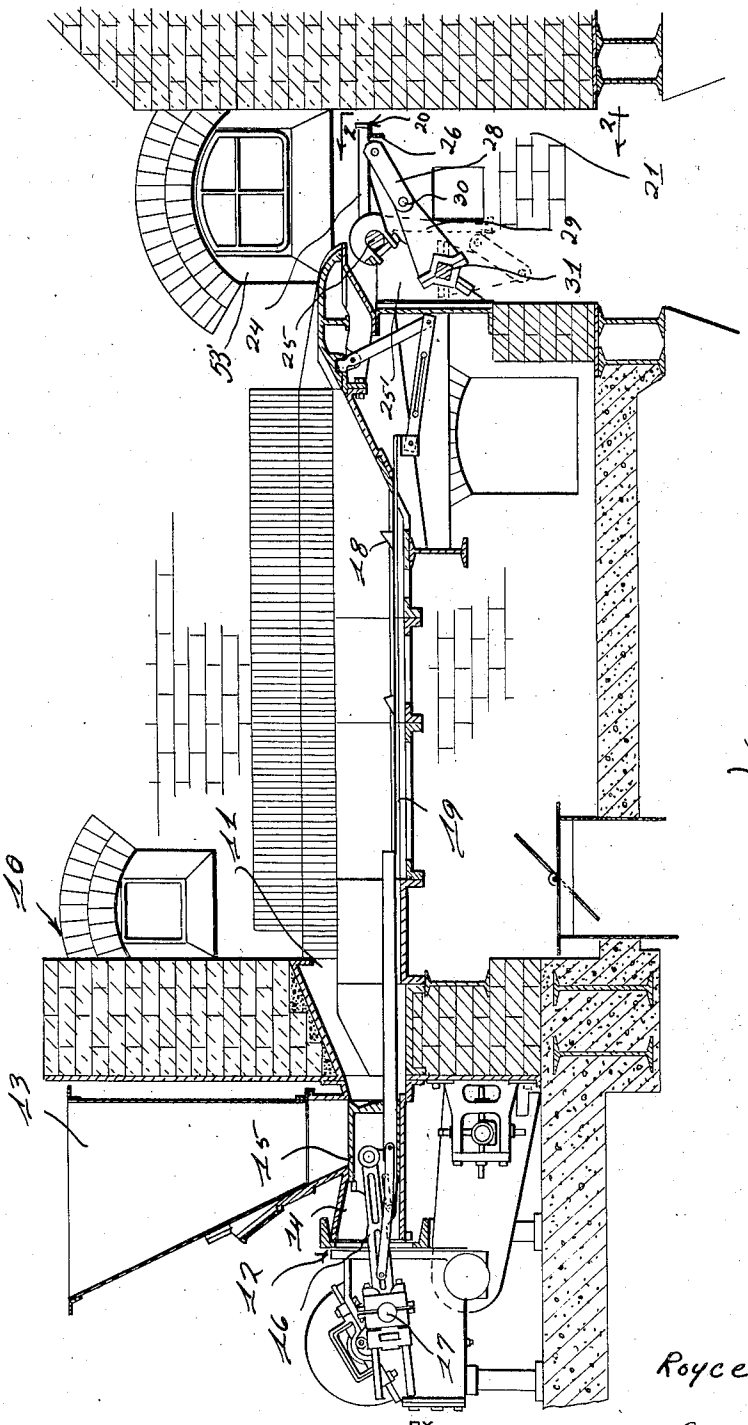


Fig. 1.

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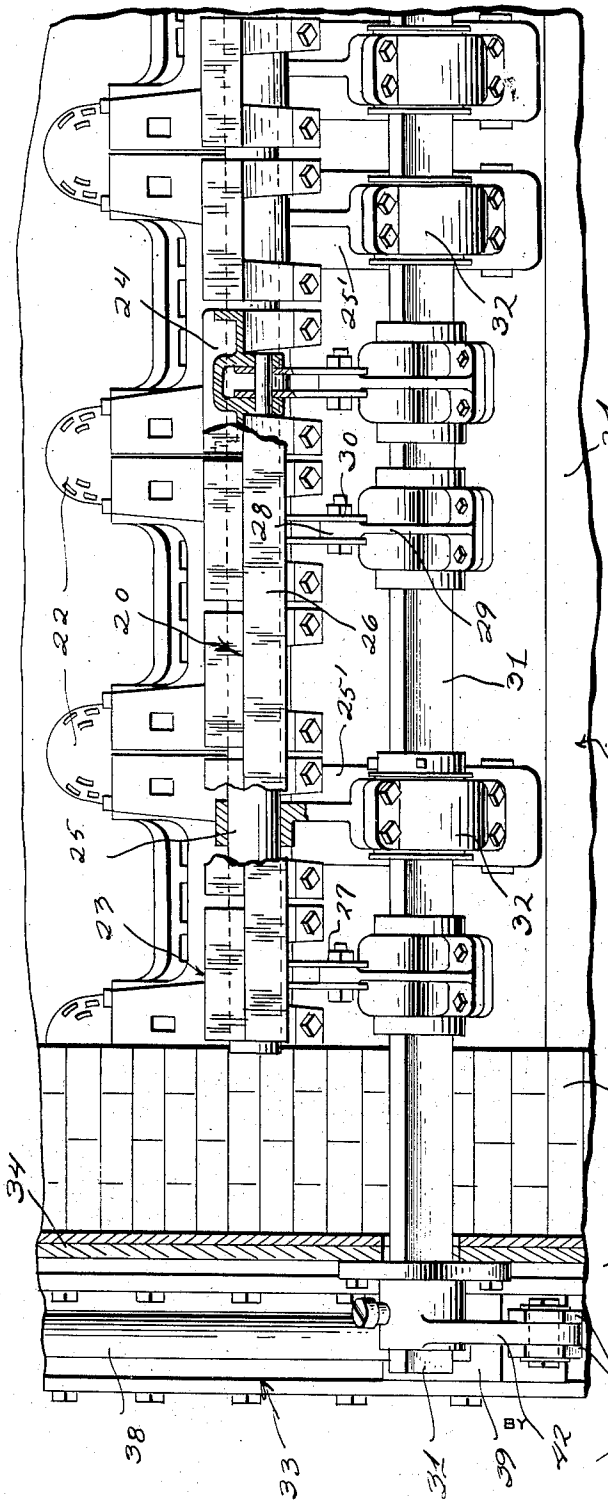


Fig. 4.

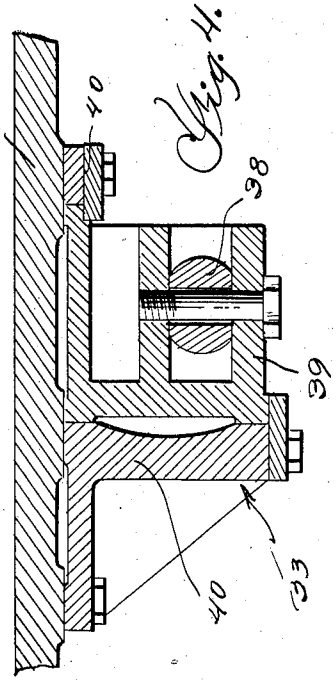


Fig. 5.

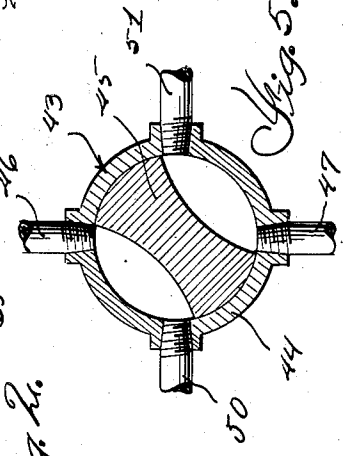


Fig. 2.

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Filed May 4, 1931 3 Sheets-Sheet 3

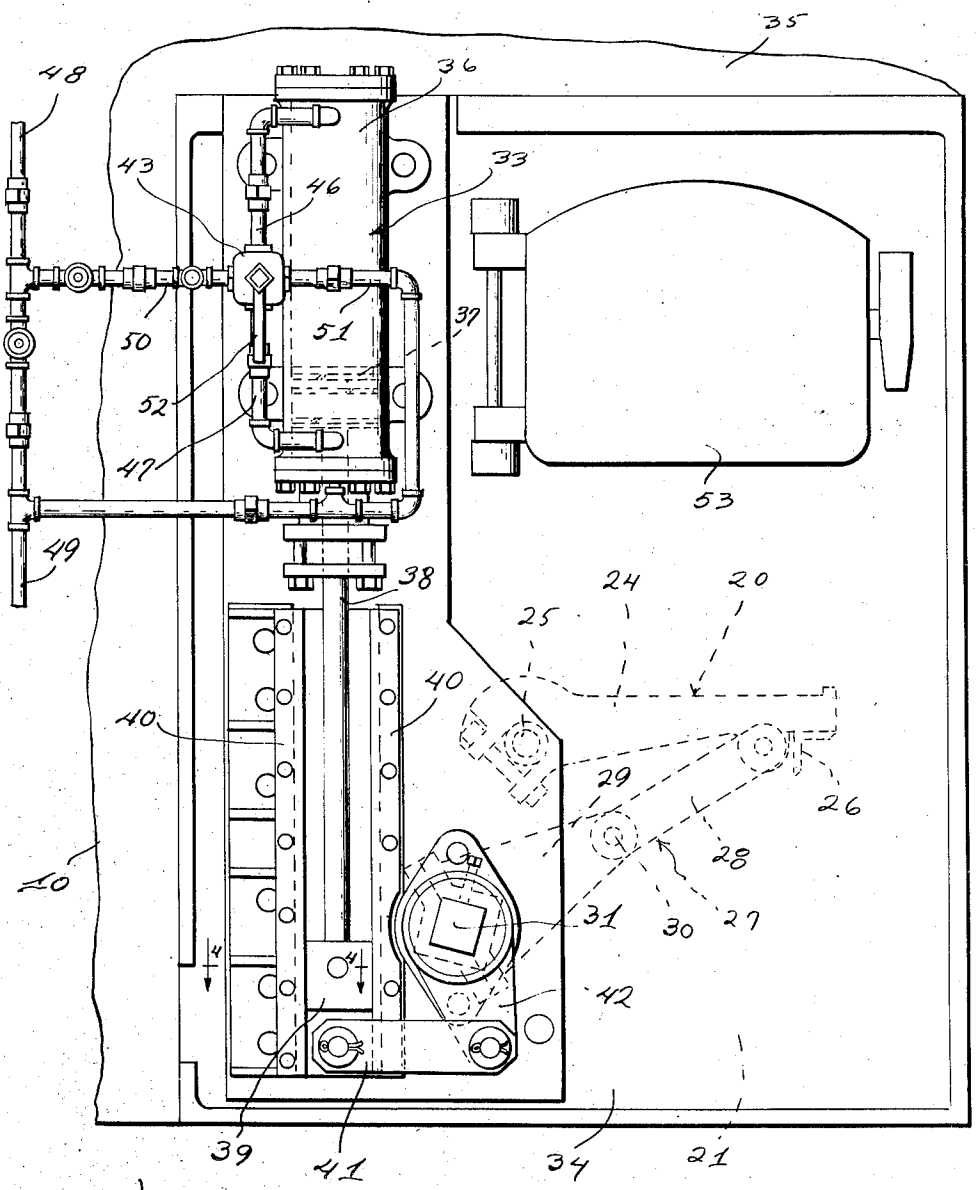


Fig. 3.

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UNITED STATES PATENT OFFICE

1,977,665

STOKER CONSTRUCTION

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Application May 4, 1931, Serial No. 535,035

5 Claims. (Cl. 110—165)

This invention relates generally to power actuated dumping mechanisms and refers more particularly to devices of this character designed for use in connection with stokers to simplify the operation thereof as well as increase the efficiency of the same.

The invention provides for simplifying the operation of stokers and otherwise improving the construction of the same by introducing a power actuated dump requiring relatively little power for operation and provided with actuating mechanism designed to automatically lock the dump in its normal position without the assistance of separate locking devices.

Another object of this invention is to provide control means for the power actuated dump positioned in such a manner as to permit the same to be conveniently manipulated by the operator and located adjacent an inspection opening in the furnace so as to permit the operator to observe the dumping action while manipulating the control means.

Another advantageous feature of this invention resides in locating the power means for the dump in a position where it is readily accessible for repairs and adjustment.

In addition to the foregoing, this invention contemplates a stoker construction wherein the power dump is located in rear of the retort at the same level the fuel enters the latter, with the result that the investment is reduced and costly excavations eliminated.

A further object of this invention resides in the simplicity and compactness of the power dump mechanism which permits the same to be economically constructed, assembled and installed.

The foregoing as well as other objects will be made more apparent as this description proceeds, especially when considered in connection with the accompanying drawings, wherein:

Figure 1 is a longitudinal sectional view through a furnace equipped with a power dump constructed in accordance with this invention;

Figure 2 is a sectional view taken on the line 2—2 of Figure 1;

Figure 3 is a fragmentary side elevational view of a portion of the furnace wall illustrating the location of the power means for actuating the dump;

Figure 4 is a sectional view taken on the line 4—4 of Figure 3; and

Figure 5 is a sectional view through the control valve for the power mechanism.

While it will be apparent as this description proceeds that the present invention is capable of use in connection with numerous different types of furnaces, nevertheless, for illustration purposes, I have shown the same as employed in a furnace equipped with a retort adapted to be supplied with fuel from a stoker of the under feed type. In detail, I have shown in Figure 1 a furnace 10 of conventional design having a retort 11 communicating with a stoker 12 located exteriorly of the front wall of the furnace.

The stoker 12 comprises generally a fuel hopper 13 having a restricted throat portion communicating with a ram casing 14 which in turn communicates with the retort through the front wall of the furnace. Fuel from the hopper 13 is transferred into the retort 11 by means of a reciprocable ram 15 mounted within the ram casing and operatively connected by means of a pitman 16 to a power actuated crank shaft 17. The arrangement is such that upon each power stroke of the ram, a quantity of fuel is discharged from the fuel hopper into the retort below the fire in the latter. The fuel is properly distributed along the length of the retort by means of auxiliary rams 18 secured at longitudinally spaced points to a pusher bar 19 which in turn is connected to the crank shaft 17 for reciprocation thereby.

My improved power dump designated generally by the reference character 20 is located within an ash receiving compartment 21 in the furnace beyond the rear ends of the tuyères 22 in the retort so as to receive the ashes or refuse discharged from the tuyères by the incoming fuel. The power dump 20 illustrated herein comprises a dump plate 23 formed of a plurality of individual bars 24 independently pivotally mounted at the forward ends thereof on a rod 25 which in turn is journaled in suitable brackets 25'. While as stated above the bars 24 are independently mounted upon the rod 25, it is to be noted that relative rocking movement of the same is prevented by means of an angle bar 26 extending longitudinally of the dump and rigidly secured to the rear or free ends of each of the bars as shown in Figures 1 and 2. The dump 20 is mounted within the ash compartment 21 at substantially the same level that the fuel is discharged by the ram into the retort with the result that investment is materially reduced and expensive excavations eliminated.

For rocking the dump 20 to its operative and inoperative positions, I provide a plurality of sets of toggle levers 27 secured to the dump plate 23 at longitudinally spaced points as clearly shown in Figure 2. Each set of toggles 27 comprises a

pair of links 28 and 29 having their inner ends pivotally secured together as at 30 and having their outer ends respectively connected to the dump plate adjacent the rear edge of the same and to an oscillatable power shaft 31. The power shaft 31 is preferably polygonally-shaped in cross section and is journaled at longitudinally spaced points in suitable bearings 32 which may be of any desirable construction to permit oscillation of the shaft and are carried by the brackets 25'. The foregoing arrangement is such that when the dump is in its operative position as shown in Figure 1, the links 28 and 29 of each toggle assume a position in alignment with each other and as will be hereinafter pointed out are held in alignment so as to automatically lock the dump in the aforesaid position.

In order to oscillate the power shaft 31 for effecting a rocking movement of the dump plate 23 through the toggles 27, I provide a fluid operated device designated generally by the reference character 33. This device is mounted upon a plate 34 which in turn is secured to the exterior surface of the side wall 35 of the ash compartment 21 as clearly shown in Figures 2 and 3. In detail, the fluid operated device comprises a cylinder 36 having the opposite ends thereof communicating with a source of fluid supply, in a manner to be presently described, and containing a piston 37 mounted for reciprocation therein. The lower end of the piston 37 is secured to a suitable connecting rod 38 which extends through the lower end of the cylinder and is fastened to a head 39 slidably mounted upon the plate 34. The head 39 is accurately mounted for sliding movement upon the plate by means of suitable ways 40 detachably secured to the plate as shown in Figure 4 and frictionally engaging opposite sides of the head 39. The latter is pivotally connected to one end of a link 41 having the opposite end thereof similarly connected to a second lever 42 which in turn is secured upon the end of the polygonally-shaped power shaft 31 projecting through the plate 34. In this connection, it is to be noted that when the dump plate 24 is in its operative position as shown in Fig. 3, the link 41 assumes a substantially horizontal position, with the result that it forms a stop for holding the toggles 28 and 29 in alignment to lock the dump plate in the aforesaid position.

With the construction as thus far described and assuming that the parts are in the position shown in Figure 3, it will be apparent that raising of the piston 37 in the cylinder 33 will cause a corresponding movement of the head 39 which, through the levers 41 and 42, causes a rocking movement of the power shaft 31 in a clockwise direction. Movement of the power shaft 31 in the aforesaid direction actuates the toggle links 29 to effect a downward movement of the pivotal connections 30 between the inner ends of the toggle links. Downward displacement of the pivotally connected inner end portions of the toggles obviously breaks the toggles from locking positions and permits the dump 23 to move to its inoperative position illustrated by the dotted lines in Figure 1. After the refuse on the dump has been disposed of by dumping the latter as stated above, the piston 37 is caused to move downwardly in the cylinder so as to effect a return of the dump to its initial operative position. In detail, downward movement of the piston 37 transmits motion to the power shaft 31 in a counter-clockwise direction through the piston rod 38, head 39 and levers hereinbefore specifically described. Rotation of the power shaft 31 in the above-mentioned direction effects an upward movement of the toggle links 29 and thereby causes a corresponding movement of the dump 23 to its operative position as shown in Figure 3. As previously stated, the toggle arrangement is such that when the dump is in its operative position, the toggle links are in accurate alignment with each other, thereby locking the dump.

Referring now more in detail to the system employed herein for reciprocating the piston 37 within the cylinder 33, it will be noted from Figure 3 that I provide a four-way valve 43 having a circular portion 44 within which a suitable valve member or vane 45 is rotatably mounted. The valve member 43 communicates with opposite ends of the cylinder 36 by means of the conduits 46 and 47 and, in addition, communicates with fluid supply and exhaust conduits 48 and 49, respectively, by means of the conduits 50 and 51. As shown particularly in Figure 5, the above arrangement is such that in one rotative position of the valve member 45 communication is established between the source of supply and upper end of the cylinder to force the piston therein downwardly and also between the lower end of the cylinder and exhaust conduit 49 so as to relieve any pressure in advance of the piston. When, on the other hand, the valve member 45 is moved to another operative position, communication between the lower end of the cylinder and source of supply is effected to move the piston upwardly and communication between the upper end of the cylinder and exhaust conduit is also accomplished so as to relieve any back pressures tending to retard upward movement of the piston. Thus, from the foregoing it will be apparent that the power dump is controlled by actuating the valve 43 and for accomplishing this result, I provide a manually operable control lever 52 suitably secured to the valve member. In this connection it is to be noted that the power device 33 including the valve 43 is mounted upon the plate 34 adjacent an ash compartment inspection door 53. Preferably this door 53 is hingedly mounted on the plate 34 and serves as a closure for the opening 53' through the side wall of the furnace. Thus when the door 53 is open the operator can inspect the dumping operation while manipulating the valve.

While in describing and illustrating this invention particular stress has been placed upon the association of my improved power actuated dump with the type of stoker shown in Figure 1, it will be obvious from the nature of the invention that the same may be utilized to advantage with other types of stokers or with any type of furnace where a power actuated dump is desired. Accordingly, the invention should not be restricted to the application of the same illustrated herein and reservation is made to make such changes in the construction as may come within the scope of the accompanying claims.

What I claim as my invention is:

1. A power actuated dump for use in connection with a retort, comprising a dumping member positioned to receive refuse discharged from the retort, a rockshaft adjacent said member, two pivotally connected links having their free ends respectively connected to the rockshaft and dumping member and normally arranged in alignment for locking said dumping member in the aforesaid operative position thereof, a head mounted for reciprocation at one side of the rockshaft in a

direction transverse to the axis of rotation of the rockshaft, and a connection between the head and rockshaft comprising two pivotally connected members having their free ends respectively connected to the head and rockshaft and operable upon movement of the head to one extreme position to actuate the rockshaft to align the linkage aforesaid and operable when the linkage is aligned to prevent rocking movement of said shaft by any other means than said head, the arrangement of the head and member to which it is connected being such that the member is disposed substantially at right angles to the path of movement of said head when the dumping member is in the operative refuse receiving position aforesaid.

2. In combination, a substantially horizontal pivotally mounted ash dump, a stationary upright plate positioned adjacent one end of said dump, a member mounted for sliding movement upon said plate, and a connection between said member and dump operable upon movement of said member to actuate the dump and operable when said member is in a predetermined position to hold the dump against movement by any means other than by said member, including a rockshaft intermediate the member and dump, two levers rigid with said rockshaft and disposed at substantially right angles to each other, a link terminally connected to said member and to one of said levers, and a link terminally connected to the other of said levers and to said dump, the arrangement of the member and first mentioned link being such that the first mentioned link is disposed substantially at right angles to the path of movement of said member when the ash dump is held in the predetermined position aforesaid.

3. A power actuated dump for use in connection with a retort, comprising a substantially horizontal pivotally mounted ash dump positioned to receive refuse discharged from the retort, a substantially horizontal rockshaft adjacent said ash dump, two pivotally connected links having their free ends respectively connected to the rockshaft and ash dump and normally arranged in alignment for locking said ash dump in the aforesaid operative ash receiving position thereof, a rod disposed at substantially right angles to said rockshaft and mounted for reciprocation, a head fixed to said rod, and a connection between the head and rockshaft comprising two pivotally connected members having their free ends respectively connected to the head and rockshaft and operable upon movement of the head to one extreme position to actuate the rockshaft to align the linkage aforesaid and operable in the latter position of the linkage to prevent rocking movement of said shaft by any other means than said head, the arrangement of the head and member to which it is connected being such that the member is disposed substantially at right angles to the path of movement of said head when the ash dump is held in the ash receiving position aforesaid.

4. A power actuated dump for use in connection with a retort, comprising a substantially horizontal pivotally mounted dumping member positioned to receive refuse discharged from the retort, a rockshaft adjacent said dumping member, two pivotally connected links having their free ends respectively connected to the rockshaft and dumping member and normally arranged in alignment for locking said dumping member in the aforesaid operative refuse receiving position thereof, a fluid pressure actuated piston rod, a head fixed to said rod, and a connection between the head and rockshaft comprising two pivotally connected members having their free ends respectively connected to the head and rockshaft and operable upon movement of the head to actuate the rockshaft to align the linkage aforesaid and operable in the latter position of the linkage without strain on the rod to prevent rocking movement of the shaft by any means other than said head, the arrangement of the head and member to which it is connected being such that the member is disposed substantially at right angles to the path of movement of the head when the dumping member is held in the refuse receiving position aforesaid.

5. In a stoker construction, a refuse compartment having an inspection opening in one side wall thereof, a substantially horizontal pivotally mounted ash dump within said compartment below and in substantial alignment with said opening, a substantially horizontal rockshaft adjacent said dump, two pivotally connected links having their free ends respectively connected to the rockshaft and dump and normally arranged in alignment for locking said dump in operative ash-receiving position, a fluid pressure actuated piston rod beside the rockshaft, a head fixed to said rod, a connection between the head and rockshaft comprising two pivotally connected members having their free ends respectively connected to the head and rockshaft and operable upon movement of the head to actuate the rockshaft to align the linkage aforesaid, and operable in the latter position of the linkage to prevent rocking movement of the shaft by any means other than the head, and control means for the rod including a manually operable member adjacent the inspection opening aforesaid, the arrangement of the head and member to which it is connected being such that the member is disposed substantially at right angles to the path of movement of said head when the ash dump is held in the operative ash receiving position aforesaid.

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