Nov. 15, 1938. J. W. MYERS 2,136,775

FUEL CONVEYING AND CRUSHING MECHANISM

Original Filed April 25, 1930 2 Sheets-Sheet 1

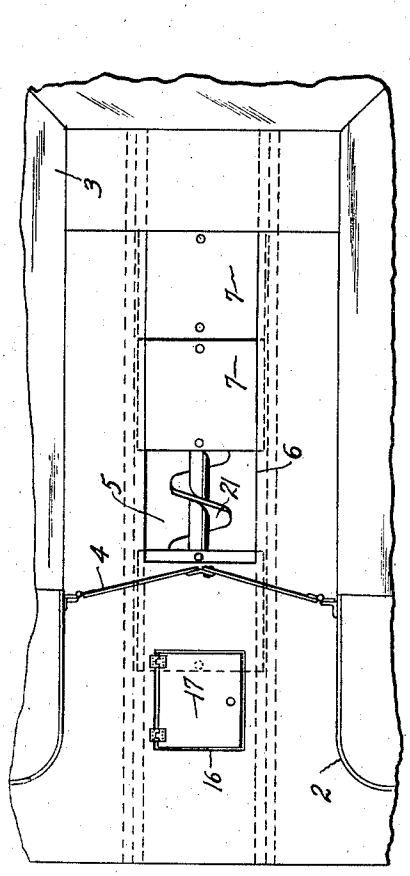


FIG. 2.

FIG. 1.

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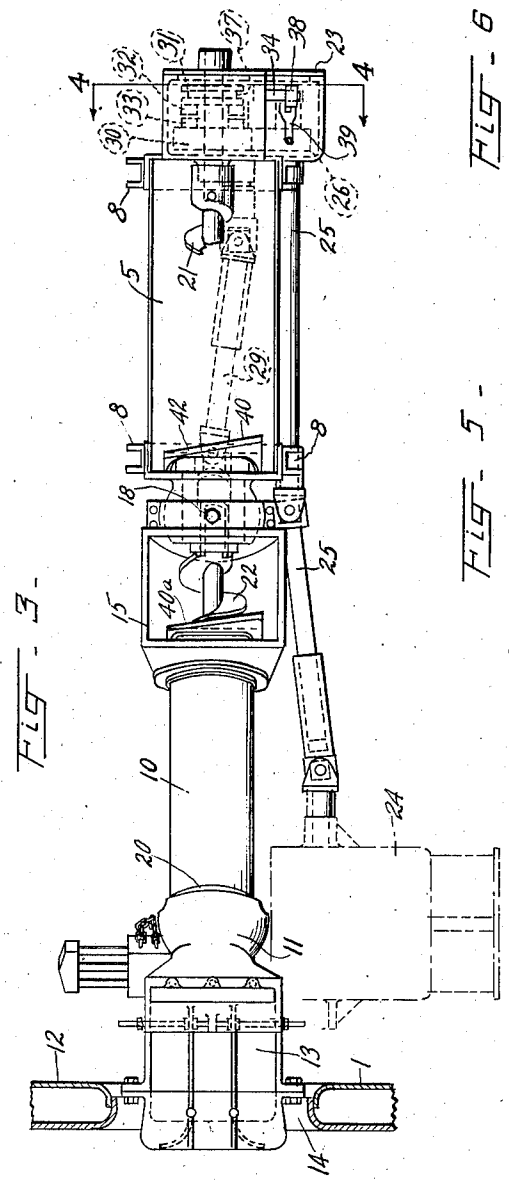


FIG - 3 -

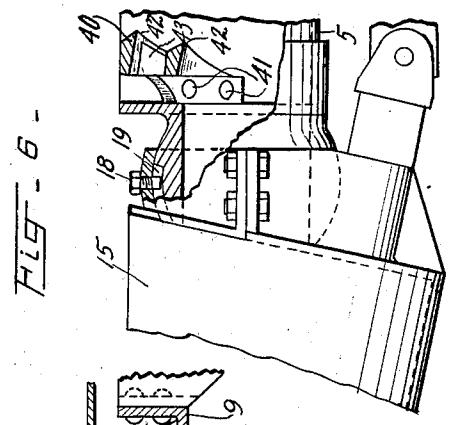


FIG - 6 -

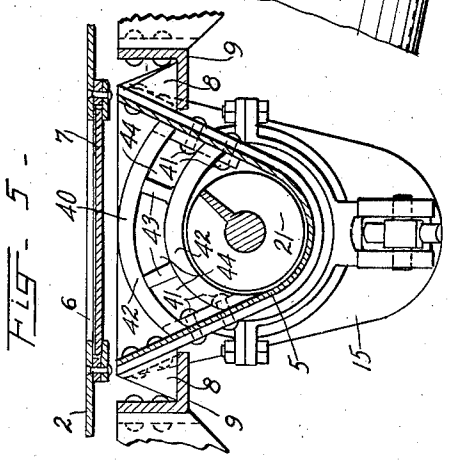


FIG - 5 -

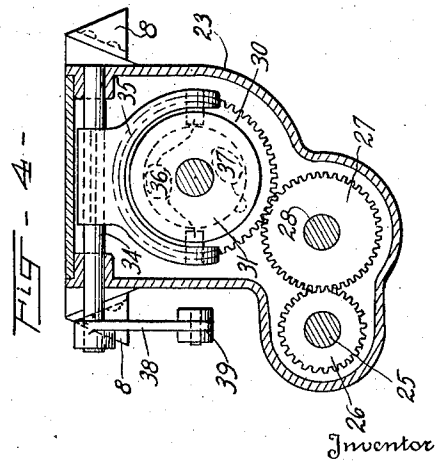


FIG - 4 -

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UNITED STATES PATENT OFFICE

2,136,775

FUEL CONVEYING AND CRUSHING MECHANISM

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Original application April 25, 1930, Serial No. 447,365. Divided and this application April 1, 1935, Serial No. 14,063

5 Claims. (Cl. 83—52)

This application is a division of my co-pending application Serial No. 447,365, filed April 25, 1930 which eventuated into Patent No. 2,007,095 on July 2, 1935, for Locomotive stokers.

The present invention relates to conveying and crushing mechanism particularly applicable to stokers for locomotives and the like although adapted for use generally in conveying systems for transferring fuel such as coal.

It is accordingly the main object of the invention to provide improved fuel conveying and crushing mechanism capable of reducing the larger lumps of coal to smaller sizes while permitting the smaller sizes initially in the mass of coal being conveyed or resulting from crushing the larger lumps to pass freely through the crusher or to be advanced on through the crusher with a minimum of further reduction in size.

More specifically, an object of the invention is the provision of a crushing member having openings through which the coal may pass.

Other and still more specific objects of the invention reside in the advantageous forms, combinations and relations of parts as will hereinafter appear and be pointed out in the claims.

In the drawings illustrating the preferred embodiment of the invention:

Fig. 1 is a longitudinal sectional view of stoking apparatus embodying the invention together with adjacent parts of a locomotive and tender;

Fig. 2 is a fragmentary plan view of the central portion of the tender of Fig. 1;

Fig. 3 is a plan view of the stoking apparatus embodying the invention, the tender being omitted;

Fig. 4 is an enlarged sectional view taken on the line 4—4 of Fig. 3;

Fig. 5 is an enlarged sectional view taken on the line 5—5 of Fig. 1; and

Fig. 6 is a side elevational view, partly in section and partly in elevation, of the construction of adjoining portions of the tender and transfer conduits illustrating a sectional view of the improved crusher.

Referring to the drawings, 1 indicates a portion of a locomotive, which may be of any desired construction, and 2 the locomotive tender having a coal bin defined by the inclined walls 3 and gates 4.

Underlying the floor of the tender is a fuel receiving trough-like conduit 5 into which coal may gravitate from the tender through an opening 6. This opening extends for substantially the entire length of the coal bin and may be closed when desired by a plurality of slidably mounted doors 7 which are so arranged that they may be drawn forward one at a time as the coal is consumed to present a relatively small opening in the desired position in the floor of the bin. To support the conduit 5 beneath the floor of the tender it may be rigidly provided with laterally projecting extensions 8 which rest upon angle shaped members 9 extending longitudinally of the tender.

Extending toward the locomotive from the forward portion of the tender conduit 5 is a conduit 10 for transferring the coal from the tender to the locomotive. The forward end of the transfer conduit projects into a conduit 11 rigidly mounted upon the backhead 12 of the locomotive boiler and this last named conduit extends upwardly and communicates with a chamber 13 projecting into the fire box opening 14 formed in the boiler backhead.

The rear portion of the transfer conduit 10 extends beneath the floor of the tender and is enlarged as at 15 to form a hopper for receiving coal directly from the tender through an opening 16 formed in the floor of the latter. This opening may advantageously be closed by a door 17 hingedly mounted along one edge thereof. The rear end of the transfer conduit is preferably supported by the forward portion of the tender conduit and is connected thereto so as to have universal movement with respect thereto. However, to prevent the transfer conduit from rotating axially it may be conveniently provided with a screw 18 or any other suitable means which extends into a slot 19 formed in the upper surface of the adjacent portion of the tender conduit, the slot extending longitudinally of the axis of the latter. The forward end of the transfer conduit is supported by the upwardly extending conduit 11 and in order that it may have universal movement with respect thereto it is provided with a sleeve 20 spherically curved on its outer surface to cooperate with a correspondingly curved portion of the conduit 11. The transfer conduit is slidable with respect to the sleeve 20 so that upon the uncoupling of the locomotive and tender it may be readily withdrawn from the conduit 11.

Spiral conveyors 21 and 22 are respectively disposed within the tender and transfer conduits for advancing or feeding the fuel therethrough. The rear end of the transfer conveyor extends into the hopper 15 to advance the fuel delivered to the latter through the tender conduit 5 or through the opening 16 in the floor of the tender. Furthermore, the rear end of the

transfer conveyor is offset below the adjacent portion of the tender conveyor so that the coal advanced by the latter will fall by gravity onto the former.

The conveyors are rotated through the intermediacy of a plurality of gears disposed within a box 23 at the rear end of the tender conduit. The motive power may be furnished by a suitable motor, diagrammatically illustrated at 24, provided with a universally coupled shaft 25 which extends rearwardly into the gear box. Mounted upon the motor shaft 25 is a gear 26 meshing with a gear 27 splined upon a shaft 28 which extends forwardly from the box 23 and is universally connected by shafting 29 to the transfer conveyor 22. Thus it will be seen that the transfer conveyor is at all times operatively connected to the motor 24. The rear portion of the shaft of the tender conveyor extends into the gear box 23 and is provided with a gear 30 which is freely rotatable thereon and in mesh with gear 27. For imparting movement to the tender conveyor through the intermediacy of the gears 27 and 30 a clutch member 31 is slidably keyed to the shaft of the conveyor. This clutch member is provided with inwardly projecting lugs or teeth 32 adapted to cooperatively engage outwardly projecting lugs or teeth 33 formed on the gear 30. Although any suitable means may be employed for operating the clutch I have illustrated a rock shaft 34 journalled in the side walls of the gear box upon which is rigidly mounted a bifurcated member 35 having inwardly projecting pins or lugs 36 which extend into a peripheral groove 37 formed in the clutch member. The shaft 34 may be rigidly provided with an arm 38 disposed on the exterior of the gear box and connected to an operating rod 39 which may extend forwardly so as to be easily manipulated by an operator.

To prevent the tender conveyor from becoming clogged due to the presence of large lumps of coal a crushing member 40 is disposed adjacent the forward portion of the conveyor. This member may advantageously be secured to the sides of the conduit by rivets 41 and is provided with arcuate shaped portions 42 having relatively sharp cutting edges which extend transversely of the conduit above the conveyor. These portions are radially spaced to permit the finer particles of coal initially in the mass or resulting from crushing the lumps to pass between them to the opposite sides of the crusher. Since the coal tends to pack in a relatively dense mass in that side of the trough 5 toward which the conveyor rotates, the arcuate portions are preferably eccentric with respect to the axis of the conveyor so that the space between the under side of the lower arcuate portion and the periphery of the screw of the conveyor is larger adjacent the side of the trough toward which the conveyor rotates than adjacent the opposite side of the trough. Thus substantially the same quantity of coal may pass under the crusher adjacent one side of the trough as adjacent the other side. If desired, the arcuate portions 42 may be connected intermediate their ends by a plurality of webs or ribs 43 thus dividing the space or opening between the portions into a plurality of openings 44.

In order to permit the coal to freely pass through the openings the upper and lower walls thereof preferably diverge with respect to each other in the direction of the path of movement of the coal. This divergence may be conveniently accomplished by inclining upwardly the under surface of the upper arcuate portion. Furthermore, to permit the coal to freely pass beneath the lower arcuate portion its under surface is also inclined upwardly in the direction of the path of movement of the coal. It will be readily appreciated that by forming that portion of the crusher which extends above the conveyor with one or more openings through which coal may pass, the quantity of coal fed past the crusher is materially greater than if all the coal had to pass beneath the crusher. Preferably the arcuate portions 42 are positioned one over and above the other to form in effect a compact integral crushing member. The upper one of the arcuate portions 42 extends into the advancing fuel a greater distance than the lower one to prevent the coal from being forced upwardly when brought into engagement with the crusher by the conveyor.

It is preferred to equip the hopper 15 with a crusher 40*a* of the same construction as that just described so that the coal delivered directly to the hopper from the tender may be also broken up. It should be noted that, as shown in various figures of the drawings, the web portions of the crushers are spaced a sufficient distance away from adjacent portions of the conduits in which they are disposed to permit the coal to freely pass through the openings 44.

From the foregoing description it will be apparent to those familiar particularly with stoking apparatus that the fuel conveying and crushing mechanism of my invention eliminates congestion of coal at the crusher and minimizes the degradation of the lumps or particles of coal of a size suitable for delivery to the fire box.

I claim:

1. In a stoking apparatus, the combination with a conduit and a conveyor for advancing coal therethrough, of crushing means having a plurality of crushing members extending transversely of the conduit above the conveyor, said members being spaced one over and above the other to permit coal to pass therebetween to the opposite side of the crushing means, the under side of said crushing members being disposed eccentrically with said conveyor and the portions of said members bounding the space between them diverging with respect to each other in the direction of movement of the coal, and a plurality of ribs integrally connecting said members.

2. In a stoking apparatus, the combination with a conduit and a conveyor for advancing coal therethrough, of crushing means having a plurality of arcuate shaped crushing members extending transversely of the conduit above the conveyor, said members being radially spaced one over and above the other to permit coal to pass therebetween to the opposite side of the crushing means, the under side of said arcuate shaped crushing members being disposed eccentrically with the axis of said conveyor and the portions of said members bounding the space between them diverging with respect to each other in the direction of movement of the coal, and a plurality of ribs integrally connecting said members.

3. In a stoking apparatus, the combination with a conduit and a conveyor for advancing coal therethrough, of crushing means disposed within said conduit having a plurality of arcuate shaped members extending transversely of the conduit above the conveyor, said members being in fixed relation with respect to each other and radially spaced one over and above the other to permit coal to pass therebetween to the opposite sides of the said means, the portions of said members bounding the space between them diverging

with respect to each other in the direction of movement of the coal, the upper of said members extending rearwardly into said conduit at least as far as the lower of said members and the distance between the upper and lower members being such that coal will pass therebetween of a size approximating the maximum size of the coal passing beneath the lower member.

4. In a stoking apparatus, the combination with a conduit and a conveyor for advancing coal therethrough, of crushing means disposed within said conduit having a plurality of arcuate shaped members extending transversely of the conduit above the conveyor, said members being in fixed relation with respect to each other and radially spaced one over and above the other to permit coal to pass therebetween to the opposite sides of the said means, the portions of said members bounding the space between them diverging with respect to each other in the direction of movement of the coal, and a plurality of ribs integrally connecting said members, the upper of said members extending rearwardly into said conduit at least as far as the lower of said members and the distance between the upper and lower members being such that coal will pass therebetween of a size approximating the maximum size of the coal passing beneath the lower member.

5. In a stoking apparatus, the combination with a conduit and a conveyor for advancing coal therethrough, of crushing means disposed within said conduit having a plurality of arcuate shaped members extending transversely of the conduit above the conveyor, said members being in fixed relation with respect to each other and radially spaced one over and above the other to permit coal to pass therebetween to the opposite sides of the said means, and a plurality of ribs integrally connecting said members, the upper of said members extending rearwardly into said conduit at least as far as the lower of said members and the distance between the upper and lower members being such that coal will pass therebetween of a size approximating the the maximum size of the coal passing beneath the lower member.

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