Oct. 3, 1933. C. F. MARTIN 1,929,324

FUEL FEEDER HOPPER ATTACHMENT

Filed Dec. 17, 1931

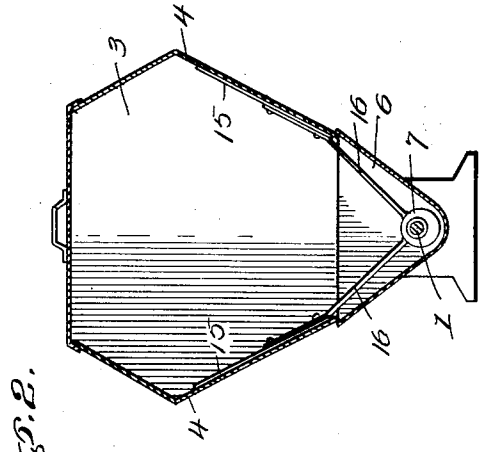


Fig. 2.

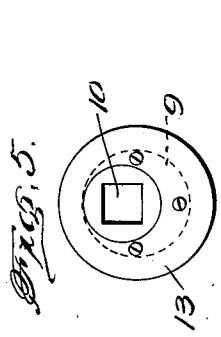


Fig. 5.

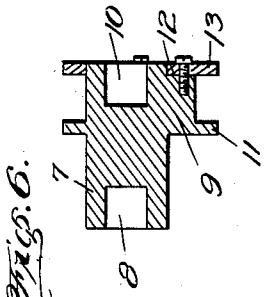


Fig. 6.

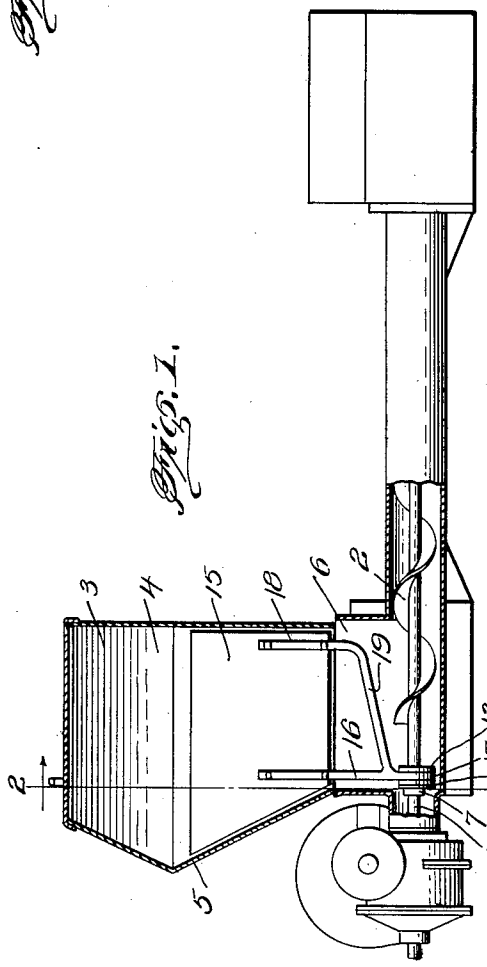


Fig. 1.

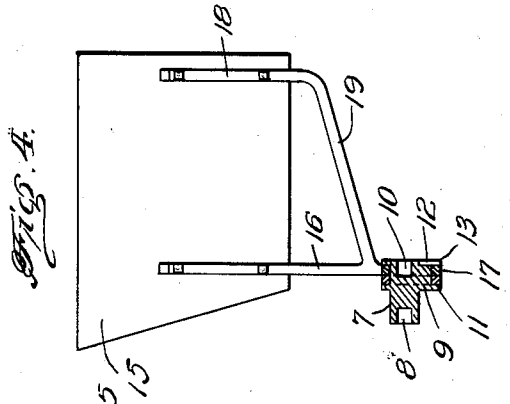


Fig. 4.

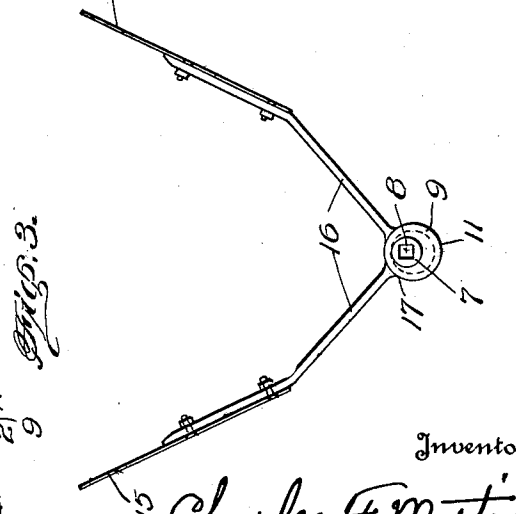


Fig. 3.

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UNITED STATES PATENT OFFICE

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FUEL FEEDER HOPPER ATTACHMENT

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Application December 17, 1931
Serial No. 581,704

4 Claims. (Cl. 259—38)

This invention is directed to an improvement in hoppers designed more particularly for use in connection with automatic stokers, and is directed generally to means for agitating and feeding the fuel in the hoppers to prevent the fuel adhering to the hopper sides or bridging over and to insure a proper and consistent feeding from the hopper to the usually employed feed worm.

The primary object of the present invention is the provision of means to be removably attached to the usual gear case shaft and feed worm shaft, with such means serving as the operating element for agitators arranged within the hopper and cooperating with the sides thereof and also more or less directly with the material to insure agitation of the material, particularly adjacent the sides of the hopper, to promote proper material feeding.

A further object of the invention is the provision of agitating plates operating in contact with selected walls of the hopper, with the plates reciprocated vertically of said walls through the medium of an eccentric element removably mounted between the gear case shaft and the feed worm shaft to insure effective agitation of the fuel material adjacent the walls of the hopper when the feed worm shaft is operating.

A further object of the invention is the provision of agitating plates which substantially conform in size and shape to the directing walls of the hopper, the agitating plates being movable over the walls to maintain effective agitation of the material immediately in contact with the plates and through this agitation insure proper feeding movement of the mass of material as a whole.

The invention is illustrated in the accompanying drawing, wherein:—

Figure 1 is a view in vertical section, partly in elevation, showing the hopper provided with the improved agitating means and illustrating the actuation and position of the operating eccentric.

Figure 2 is a section on the line 2—2 of Figure 1.

Figure 3 is an enlarged end elevation showing the eccentric member and agitating plates.

Figure 4 is a side elevation of the same.

Figure 5 is an end view of the eccentric element.

Figure 6 is a longitudinal section of the same.

The improvement is shown as applied to automatic stokers wherein the motor driven gear case shaft 1 is ordinarily employed to operate a feed worm 2, to which latter the material is delivered from a hopper 3, the side walls 4 and one end wall 5 of which are preferably downwardly convergent to deliver the material into the chute 6 to be advanced for feeding purposes by the worm 2.

Ordinarily, in the use of fuel feeding means of this character, and particularly where fuel to be fed has been treated either chemically or by water to eliminate dust, there is an increasing tendency of such material to adhere to the walls of the hopper, with the result that the material within the hopper bridges over incident to this adherence and the feeding to the worm is very materially reduced and at times completely stopped. The present invention aims to prevent the possibility of this adherence between the walls of the hopper and the material by maintaining the material adjacent the walls of the hopper in continual agitation, thus insuring that the material will properly gravitate toward the feed worm and any possibility of bridging over is prevented.

In carrying out the invention, there is arranged between the gear case shaft 1 and the feed worm shaft 2 an eccentric element, illustrated more particularly in Figures 5 and 6. This element comprises a cylindrical section 7 axially formed with a rectangular end recess 8 to receive the correspondingly shaped end of the gear case shaft 1, whereby the eccentric element may be driven. The element includes a circular body 9 arranged eccentric with respect to the axis of the section 7 and formed in line with the axis of the section 7 with a rectangular recess 10 in which is fitted the correspondingly shaped end of the worm shaft 2, whereby the worm is driven from the eccentric element. The juncture of the circular eccentric body 9 and section 7 is formed as an annular flange 11 which is concentric with and projects beyond the surface of the eccentric body 9.

The end of the eccentric body remote from the flange 11 is cut away at 12, with the inner margin of the cut-away portion concentric with and substantially of the diameter of the section 7 to thus form a recess in the free end of the eccentric body 9 which merges into the upper surface of the body, as indicated more particularly in Figure 5. A washer-like member 13 is designed to seat in the recess, the periphery of this member when in place being in the plane of the periphery of the flange 11, while the interior opening of the member 13 corresponds with the interior shape of the recess or cut-away

portion 12. The washer-like member 13 is secured in the recess by screws or other fastening means 14 and when in place defines with the flange 11 spaced flanges concentric with the periphery of the eccentric body 9 and projecting beyond such periphery to receive and hold against relative endwise movement the ring-like elements for actuating the plates.

The agitating plates, which are in duplicate, include plate-like sections 15 which, as shown in Figure 1, conform in shape with one inclined wall of the hopper and, as shown in Figure 2, are substantially in contact with the opposing inclined walls of the hopper. Each plate is operated through the medium of a connector between the plate and eccentric member involving an arm 16 terminally provided with a ring 17 which fits over the periphery of the eccentric body 9 for independent rotation relative thereto. The plates 15 are duplicated, the arms 16 and rings 17 are also duplicated, and the rings 17 are arranged side by side on the periphery of the eccentric body 9 and together take up the space between the flanges 11 and 13.

In addition to the arm 16, each plate is further supported by a second arm 18 connected to the plate remote from the arm 16 and extending below the plate and laterally and downwardly providing a free section 19, the terminal of the section 19 being connected to the arm 16 immediately above the ring 17.

Obviously, from the construction described, in the operation of the driving gears for the actuation of the feed worm, the eccentric body 9 is rotated, with the effect of causing a corresponding vertical movement of the plates 15. As these plates are substantially between the side walls of the hopper and the material in the hopper, it is apparent that such material in the immediate vicinity of the side walls is subjected to an agitation which positively prevents any adherence between said material and hopper walls. Thus, there is a direct tendency for the material to move down the side walls of the hopper, and as the arm section 19 extends across the path of movement of the material, it is apparent that this section also tends to prevent any possibility of bridging over of the material and, in fact, by the reciprocating vertical movement of this arm section, there is a direct feeding action on the material toward the worm chute.

It is noted that the rings 17 controlling the respective plates are wholly independent, and that the respective arms 16 are connected to these rings on opposite sides of a vertical plane passing through the axis of the eccentric. Therefore, as the rings are independently affected by the eccentric, and as the arms 16 hold the rings against any turning movement, it follows that the rings and thereby the arms and plates are successively influenced by the eccentric, that is, while one ring is moved by the eccentric to the highest point, the second ring is approaching but has not reached such highest point, and as such second ring reaches its highest point the first ring is moving toward the lowest point. Hence the plates are moving in the same directions at different speeds for a portion of their strokes and then moving in reverse directions for the remainder of their strokes. This similar direction and opposite direction movement occurs in each and down movement of the plates.

While the invention is more particularly designed in connection with automatic stokers and to insure proper and constant feeding of the material from the hopper, it is apparent that the invention as a whole is equally applicable to the feeding of any material from the hopper, as in the majority of instances such material under feeding conditions shows a more or less decided tendency to stick to the side walls of the hopper. It is, therefore, to be distinctly understood that the invention is designed for assisting the feeding of material from a hopper for any and all purposes, and notwithstanding the specific description and showing herein, is not to be limited to its use in connection with automatic fuel stokers.

I claim:—

1. A fuel feeding mechanism comprising a feed screw, a hopper communicating with the feed screw at the intake end and formed with downwardly converging walls, an eccentric portion on said screw, plates movable in the hopper and separate means for each plate directly connected to the eccentric and independent of each other, said means rotatable thereon to effect slight reciprocatory movement of the plates simultaneously in relatively reverse directions when the feed screw is rotated.

2. A fuel feeding mechanism comprising a feed screw, a hopper communicating with the feed screw at the intake end and formed with downwardly converging walls, an eccentric portion on said screw, plates movable in the hopper and of substantially the area of said walls and laid loosely on the latter, and independent operative connections between the plates and said eccentric portion, and each rotatable thereon to effect slight reciprocatory movement of the plates simultaneously in relatively reverse directions when the feed screw is rotated.

3. A fuel feeding mechanism comprising a feed screw, a hopper communicating with the feed screw at the intake end and formed with downwardly converging walls, plates of substantially the area of said walls and laid loosely on the latter, and independent operative connections between the plates and the screw to effect slight reciprocatory movement of the plates simultaneously in relatively reverse directions when the feed screw is rotated, said operative connections comprising an eccentric on the feed screw and rigidly connected divergent arms to which the plates are secured, the arms being formed at the points of juncture with openings in which said eccentric rotates, so that the sets of arms have independent turning movement on the eccentric.

4. A fuel feeding mechanism including a hopper, a shaft at the bottom of the hopper, a feed screw on said shaft at the bottom of the hopper, agitating plates operating in contact with opposed walls of the hopper, an eccentric mounted on said shaft and connected to the feed screw, means for operating the eccentric and thereby the feed screw, and means for independently operating each plate by the eccentric, said means being successively and similarly affected by the eccentric, whereby the plates in each eccentric cycle are first moved in the same direction at different speeds and then in opposite directions at different speeds.

CHARLES F. MARTIN.