

Feb. 8, 1938.

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2,107,419

LOCOMOTIVE TENDER

Original Filed Oct. 26, 1933

3 Sheets-Sheet 1

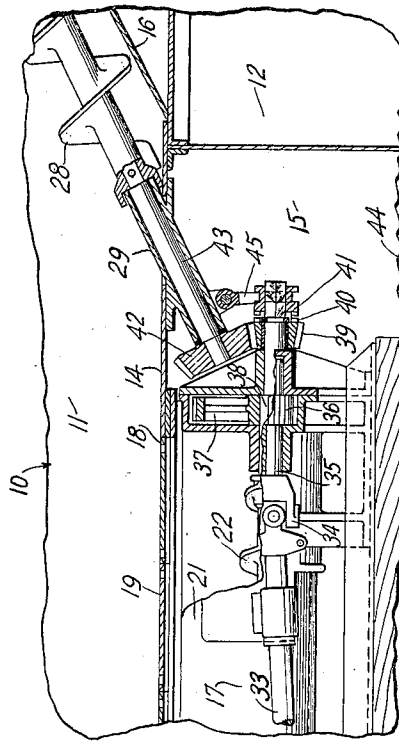
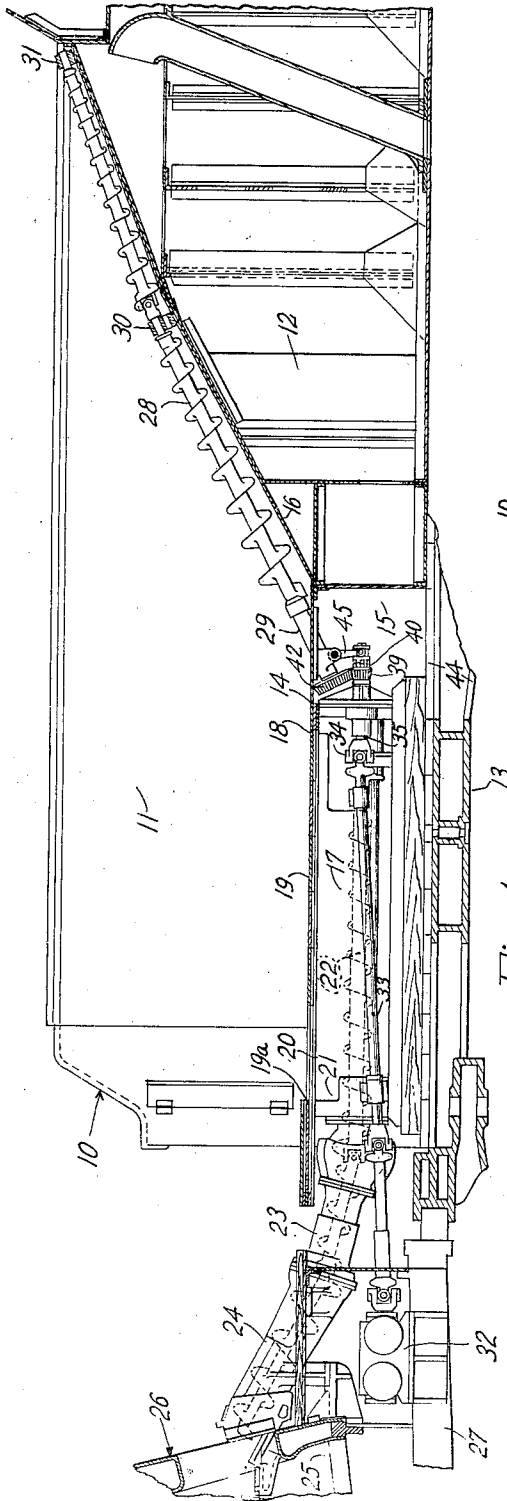


Fig. 2

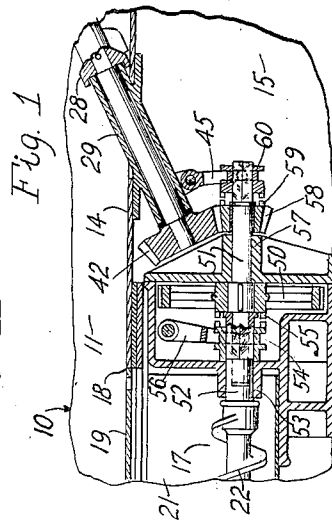


Fig. 3

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3 Sheets-Sheet 2

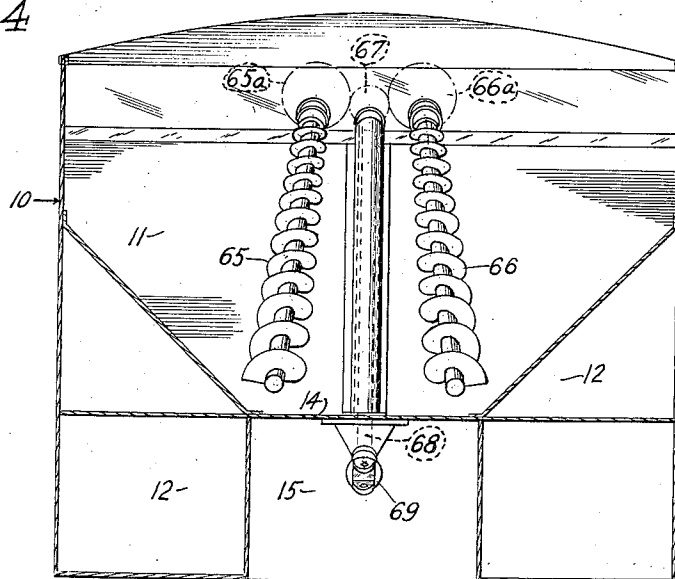
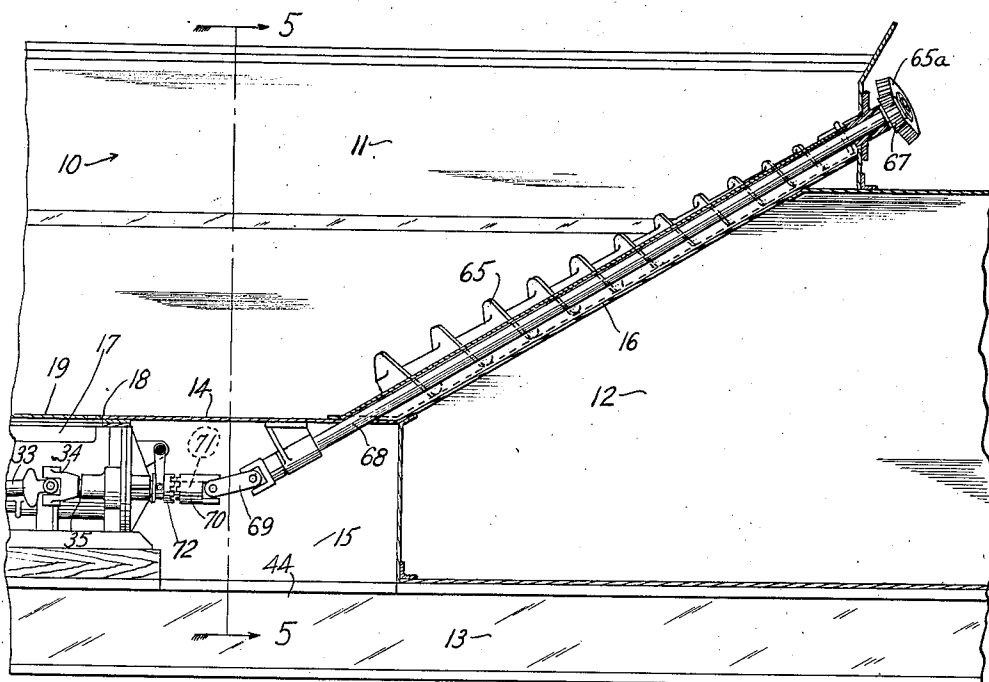


Fig. 5

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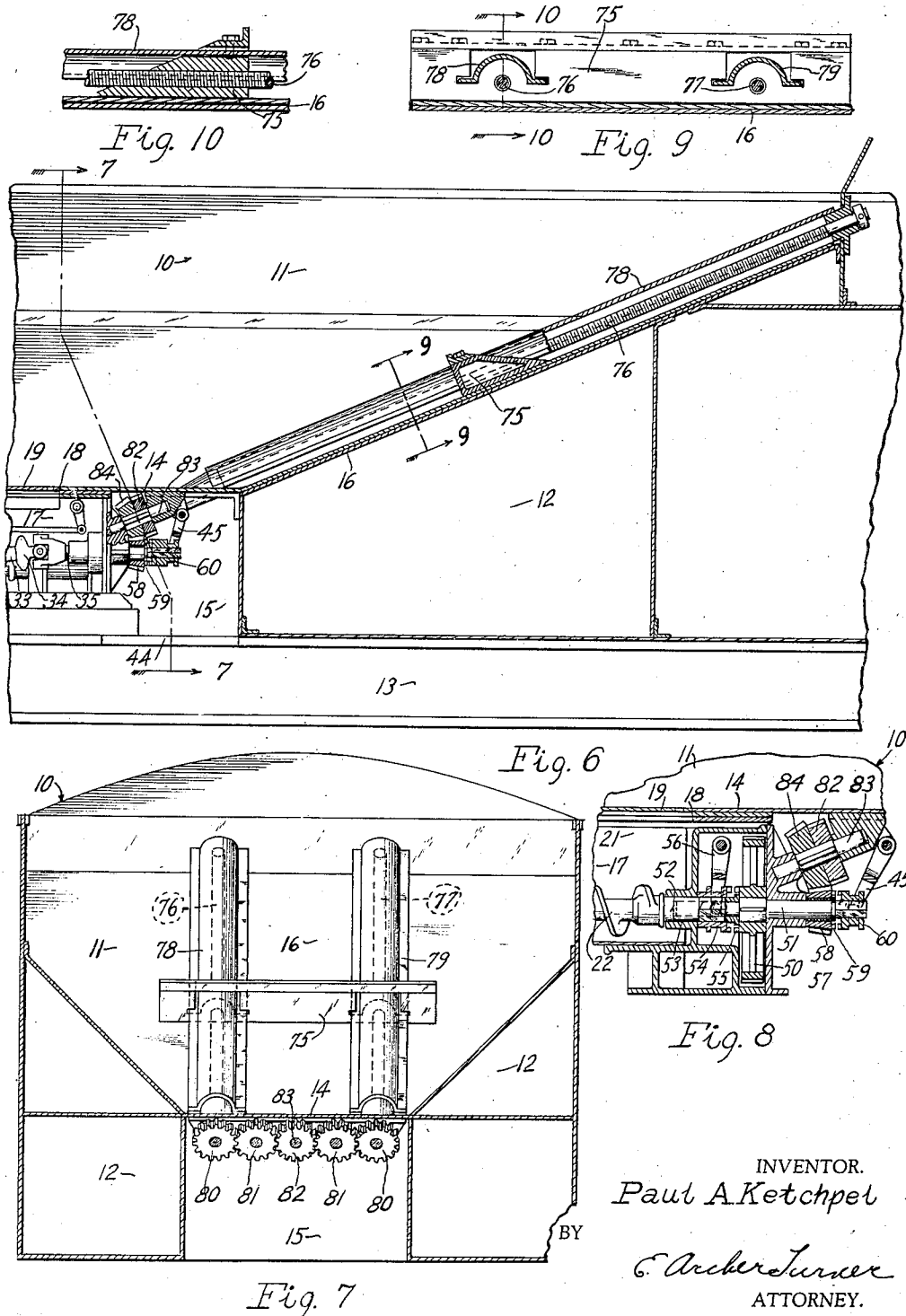
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LOCOMOTIVE TENDER

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3 Sheets-Sheet 3



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2,107,419

LOCOMOTIVE TENDER

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Renewed March 12, 1936

4 Claims. (Cl. 198—15)

My present invention relates to railway rolling stock and appertains particularly to locomotive tenders of the class equipped with fuel advancing means.

5 The main object of the invention is the provision of an improved locomotive tender of the character described.

Another object of the invention is the provision in a locomotive tender of fuel advancing means for moving the fuel from the extreme rearward end of the fuel bin to the front end of the tender; and more specifically, a further object is to provide such a construction wherein fuel advancing means is disposed on the rear slope sheet of the fuel bin for advancing fuel forwardly to still another fuel advancing means disposed beneath the usual shiftable slide plates in the bottom of the fuel bin. It is a still more specific object of the invention to provide with such structure a novel driving means for operating the fuel advancing means.

A further object of the invention is the provision of an improved locomotive tender including novel fuel advancing means in the fuel bin thereof useful with or without the tender conveyor unit of a locomotive stoker mechanism.

My invention is especially advantageous in the construction of unusually long tenders although certain aspects of it readily adapt themselves to tenders of ordinary size or even to the smaller sizes, as will be apparent to those familiar with railway rolling stock upon reading the following description in connection with the accompanying drawings, in which

35 Figure 1 is a vertical central longitudinal sectional view through the rear portion of a locomotive and through the forward portion of the improved tender of my invention with the fuel advancing mechanism therefor being shown in elevation;

40 Figure 2 is an enlarged fragmentary sectional view similar to Figure 1 illustrating the adjacent end portions of the fuel advancing mechanisms with some portions broken away and others shown in section;

Figure 3 is a view similar to Figure 2 but illustrating a modification of the drive mechanism of the invention;

50 Figure 4 is a fragmentary view similar to Figure 1 but illustrating a modification of the invention wherein a plurality of screw conveyors are disposed on the slope sheet of the fuel bin;

Figure 5 is a transverse cross sectional view taken on the line 5—5 of Figure 4;

55 Figure 6 is a view similar to Figures 1 and 4 but

representing still another modification of the invention;

Figure 7 is a transverse cross sectional view taken on the irregular line 7—7 of Figure 6;

Figure 8 is a fragmentary sectional view similar to Figure 6 but illustrating a modification of the drive mechanism;

Figure 9 is a transverse cross sectional view taken on the line 9—9 of Figure 6; and

Figure 10 is a longitudinal sectional view taken on the line 10—10 of Figure 9.

On the drawings and referring particularly to Figures 1 and 2, the locomotive tender is indicated as a whole at 10. Its fuel bin is represented at 11, the water compartment at 12 and the underframe at 13. The customary stoker conveyor compartment usually disposed beneath the floor 14 of the fuel bin is shown at 15. It is separated, as well as the fuel bin, from the water compartment 12 by the usual or any suitable arrangement of partition plates including the rear slope sheet 16 of the fuel bin. Within the compartment 15 there is mounted on the underframe 13 a stoker fuel conveyor 17. That portion of the floor 14 directly above the conveyor 17 is apertured as at 18 and the aperture is closed over or a shiftable opening formed by the customary shiftable slide plates 19.

From Figure 1, it will be observed the slide plates are placed to form the opening 20 adjacent the front end of the fuel bin. Fuel passing through this opening falls into the trough 21 of the stoker conveyor 17 where it is moved forward by the screw 22. Conveyors 23 and 24 then transfer the fuel from the tender forward to the firebox 25 of the locomotive 26, the underframe of which is designated at 27.

As the supply of fuel diminishes in the fuel bin the slide plates are successively moved forward thus shifting the opening 20 rearwardly until it is positioned above the rear end of the conveyor 17. Ordinarily, in past practice, the rear slope sheet of the fuel bin would incline upwardly at a comparatively steep angle directly rearward of the rearward position of the opening 20 and thus substantially all of the fuel would be removed from the bin, but in the improved tender of my invention the rear slope sheet 16 inclines upwardly at a moderate angle from a point a short distance back from the aperture in the floor 14 to increase the capacity of the fuel bin.

Fuel advancing means is mounted in the fuel bin on the rear slope sheet 16 for advancing the fuel resting thereon forwardly toward the conveyor 17. For this purpose, in the preferred em-

bodiment of the invention, there is employed a sectional screw conveyor 28 rotatably journaled in the bearings 29, 30, and 31. This conveyor is disposed longitudinally and centrally of the fuel bin, although, a plurality of conveyors may be used if desired. Preferably, the screw conveyor 28 tapers rearwardly from its forward end. The large forward end acts to push the fuel forward into the conveyor 17 and advances the fuel forwardly more rapidly than it is advanced by the smaller rear flights of the screws. Hence, congestion is avoided and less power is required to actuate the screw.

Both the screw 22 of the stoker conveyor 17 and the sectional screw 28 are driven from the same source of power or drive engine 32 mounted on the locomotive underframe 27. A drive shaft 33 extends rearwardly from the engine and is connected by the joint 34 to a pinion shaft 35 on which there is fixed the pinion gear 36. This pinion, still referring to Figures 1 and 2, meshes with the drive gear 37 fixed on the screw shaft 38 which is operatively connected at one end in any suitable manner to the rear end of the screw 22. In this manner motion is imparted from the drive engine 32 to the screw 22 and this motion is in turn imparted to the screw 28 through gearing and shafting now to be described.

The screw shaft 38 extends rearward from the drive gear 37 and has loosely mounted thereon a pinion gear 39 which on one side carries teeth 40, thus constituting one element of a clutch the other element 41 of which is slidably disposed on the square end of the screw shaft 38. Engagement of the clutch elements imparts the motion of the screw shaft 38 through the pinion gear 39 to the large gear 42 fixed on the lower end of the screw shaft 43 of the sectional screw 28. The shaft 43 is mounted in the bearing 29 which punctures the fuel bin floor. Hence, all of the aforesaid gears are positioned beneath the fuel bin floor where access may be had to them through an opening 44 in the underframe 13.

In operation of this embodiment of my invention, the tender is first filled with fuel. The first slide plate 19a is pulled forward to create the opening 20 in the position as shown in Figure 1. Fuel falling through the opening 20 is received in the trough 21 and is moved forward to the locomotive firebox by the screw 22 and the conveyors 23 and 24. The screw 22 and the aforesaid conveyors are of course driven from the drive engine 32 by means of the shaft 33 and the gears 36 and 37. While the fuel is being supplied from the front end of the fuel bin there is no need to operate the sectional screw conveyor 28 so during this condition the clutch elements 40, 41 are out of engagement as illustrated in Figures 1 and 2. When the supply of fuel recedes in the fuel bin until it stops feeding by gravity into the conveyor 17, then the clutch elements 40, 41 are engaged by shifting the yoke 45 which may be controlled by suitable levers (not shown) from the front end of the tender. Engagement of the clutch elements imparts rotary motion to the sectional screw 28, thus advancing the fuel from the rearward part of the fuel bin toward and into the conveyor 17, the screw 22 of which is in operation and advances the fuel forward to the conveyors 23 and 24.

The drive engine 32 is reversible and when run in reverse it will cause the fuel advancing screws to rotate in reverse direction. This is necessary at times to remove foreign material which may become lodged in the conveyors. By disengaging

the clutch elements 40, 41 it will be understood that the screw 22 of the conveyor 17 may be reversed, or operated in its normal fuel advancing movement independently of the sectional screw 28. In this construction the screw 28 can not be operated independently of the screw 22.

There are times, however, when it is desirable to operate in forward or reverse directions either one of the fuel advancing screws 22 and 28 independently of the other. This is accomplished by the drive mechanism shown in Figure 3 which mechanism is illustrated as adapted for use with the fuel advancing screws of Figures 1 and 2.

Referring now to Figure 3, the gear 50, which it will be understood is driven from the pinion gear 36, the shaft 33 and the drive engine 32 of the structure heretofore described, is fixedly mounted on a shaft 51, one end of which is loosely journaled in the screw shaft 52 which is fixed in the rear end of the screw 22. That portion of the screw shaft 52 within the bearing 53 is round but that portion adjacent the gear 50 is square and there is slidably mounted on the square portion a clutch element 54, the teeth of which are arranged for interlocking engagement with the teeth or clutch elements 55 on the gear 50. Thus by shifting the yoke 56, controlled in any suitable manner, to engage the clutch elements 54, 55 it will be understood that motion from the pinion 36 will be transmitted through the gear 50 to the clutch elements and in turn to the screw shaft 52 and the screw 22. With the clutch elements disengaged it will be seen that motion can be imparted to the shaft 51 while the screw 22 is inoperative.

Rearward of the gear 50 the shaft 51 extends through the bearing 57 and there is loosely mounted on its extended portion a pinion gear 58 carrying the teeth or clutch elements 59. That portion of the shaft 51 extending beyond the gear 58 is made square and carries the slidable clutch element 60, the teeth of which are arranged for interlocking engagement with the clutch elements 59 of the gear 58. The latter meshes with the gear 42 for driving the sectional screw 28.

With the clutch elements 54 and 55, and the clutch elements 59 and 60 in engagement the screws 22 and 28 may be simultaneously operated in forward or reverse directions depending upon the direction of rotation of the drive engine 32. By disengaging the clutch elements 59 and 60 the screw 22 can be operated in forward or reverse direction independently of the screw 28 and similarly the screw 28 may be operated in forward or reverse direction independently of the screw 22 by disengaging the clutch elements 54, 55 and engaging the clutch elements 59, 60.

From the foregoing it will be observed that I provide an improved tender capable of carrying greater quantities of fuel and water than the tenders of past practice and one wherein the fuel is advanced from the extreme rearward end of the fuel bin to the front end of the tender by the provision of fuel advancing means on the rear slope sheet moving the fuel to fuel advancing means disposed in the bottom of the fuel bin forward of and below the rear slope sheet.

Another embodiment of my invention is illustrated in Figures 4 and 5. This differs from the preferred construction in that two tapering fuel advancing screws 65, 66 are mounted in spaced relation on the rear slope sheet and that these screws are driven from their rearward ends by the gears 65a, 66a meshing with the pinion gear 67 driven by the shaft 68. The aforesaid gears

are disposed outside of the fuel bin and the shaft 68 extends down through the floor 14 into the compartment 15. A universal joint 69 connects this shaft to the clutch element 70 loosely mounted on the round end of the screw shaft 71. The latter is made square forward of the clutch element 70 and a slidable clutch element 72 is mounted on the aforesaid square portion of the shaft. Hence, engagement of the clutch elements transmits motion from the shaft 71 to the screws 65, 66. The shaft 71 may be mounted like the shaft 38 or the shaft 51 to receive motion from the drive engine 32 and to operate the fuel advancing means accordingly.

Still another embodiment of my invention is shown in Figures 6 to 10 inclusive. In this construction the fuel advancing means on the rear slope sheet is made in the form of a transverse crosshead or pusher member 75 in which there are threaded the spaced longitudinally extending parallel threaded shafts 76, 77 anchored in any suitable manner at their ends. Covers 78, 79 for the threaded shafts also serve as guides for the pusher member. The threaded shafts extend through the fuel bin floor into the stoker conveyor compartment. There each shaft carries a gear 80, meshing with idler gears 81, driven by the central gear 82, see Figure 7. The gear 82 is fixed on a shaft 83 suitably journaled at its ends which shaft also carries the fixed bevel gear 84. Preferably, the latter is driven, as shown in Figure 8, from the drive construction of Figure 3 heretofore described. This is necessary to permit independent operation of the pusher member, particularly so, when the threaded shafts 76, 77 must be operated in reverse direction to move the pusher member back to its uppermost position after the fuel bin has been cleared of fuel. Otherwise, the tender construction is the same as described in connection with Figures 1, 2 and 3.

While the main purpose of my invention is to provide and combine the operation of fuel advancing means in the rear portion of the fuel bin with other fuel advancing means in the front portion of the fuel bin, I contemplate that the different forms of fuel advancing means herein shown as mounted on the rear slope sheet of the fuel bin may be used to good advantage in the construction of smaller tenders not equipped with conveying means for transferring the fuel to the locomotive but wherein the fuel is carried manually from the front end of the fuel bin to the firebox.

I claim:

1. A locomotive tender having a fuel bin with a floor having an opening therein and an inclined rear wall, a fuel conveyor positioned on said tender below said floor to receive fuel through said opening, fuel advancing means in said fuel bin mounted on said rear wall including a transverse pusher member and a plurality of longitudinally extending threaded shafts arranged in parallelism on said rear wall and being in threaded engagement with said pusher member, said threaded shafts extending downwardly through said floor and terminating adjacent the rearward end of said fuel conveyor, and drive mechanism

disposed beneath said floor rearward of the opening therein between the adjacent ends of said fuel conveyor and said pusher member operatively connecting the rearward end of said fuel conveyor with said threaded shafts and including clutch elements arranged to permit independent operation of the fuel conveyor and fuel advancing means.

2. A locomotive tender having a fuel bin including a floor having an opening therein and an inclined rear wall, a fuel conveyor positioned on said tender below said floor to receive fuel through said opening, fuel advancing means mounted in the fuel bin on said rear wall including a transverse pusher member and a plurality of longitudinally extending threaded shafts arranged in parallelism on said rear wall and being in threaded engagement with said pusher member, said threaded shafts extending downwardly through said floor, and drive mechanism beneath said floor rearward of the opening therein operatively connecting the rearward end of said fuel conveyor with the lower ends of said shafts for imparting rotation to them whereby the pusher member will be moved longitudinally on said rear wall.

3. A locomotive tender having a fuel bin including a floor having an opening therein and an inclined rear wall, a fuel conveyor positioned on said tender below said floor to receive fuel through said opening, fuel advancing means mounted in the fuel bin on said rear wall including a transverse pusher member and a plurality of longitudinally extending threaded shafts arranged in parallelism on said rear wall and being in threaded engagement with said pusher member, said threaded shafts extending downwardly through said floor, and drive mechanism beneath said floor rearward of the opening therein operatively connecting the rearward end of said fuel conveyor with the lower ends of said shafts for imparting rotation to them whereby the pusher member will be moved longitudinally on said rear wall, clutch means for rendering said pusher member inoperative independently of said fuel conveyor and clutch means for rendering said fuel conveyor inoperative independently of said pusher member.

4. In a locomotive tender having a fuel bin including a floor having an opening therein and an inclined rear wall, a fuel conveyor positioned on said tender below said floor to receive fuel through said opening, fuel advancing means mounted in the fuel bin on said rear wall including a transverse pusher member and longitudinally extending threaded shafting disposed on said rear wall and being in threaded engagement with said pusher member, said threaded shafting extending downwardly through said floor, and drive mechanism beneath said floor rearward of the opening therein operatively connecting the rearward end of said fuel conveyor with said threaded shafting for imparting rotation thereto for moving said pusher member longitudinally along said rear wall.

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