April 26, 1932. J. ROSS 1,855,421

LOADING MACHINE

Filed Oct. 26, 1927 3 Sheets-Sheet 1

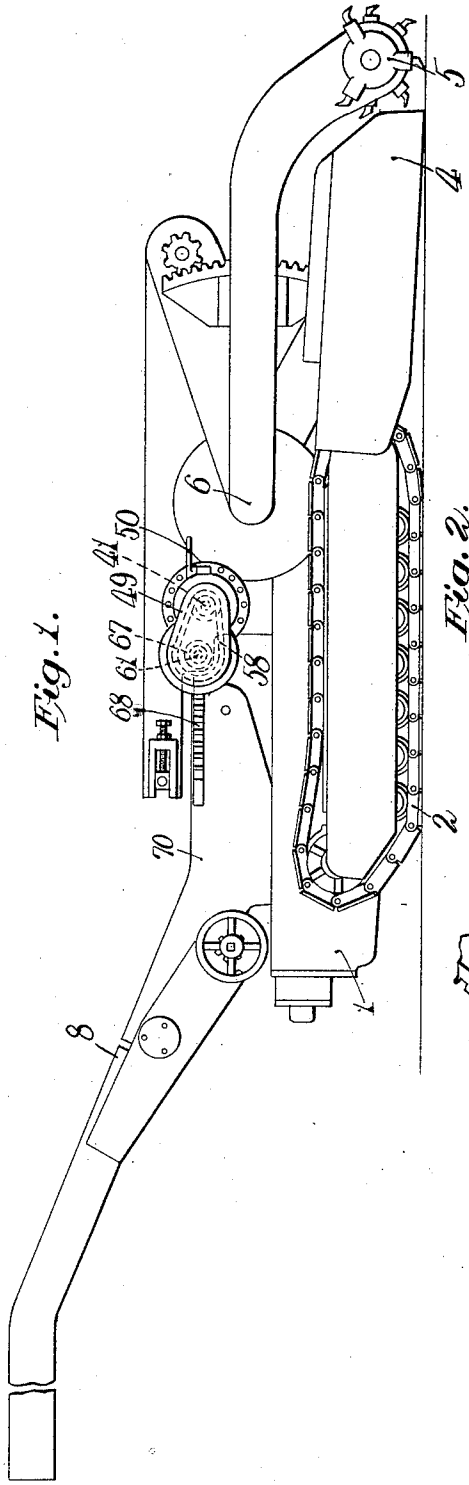


Fig. 1.

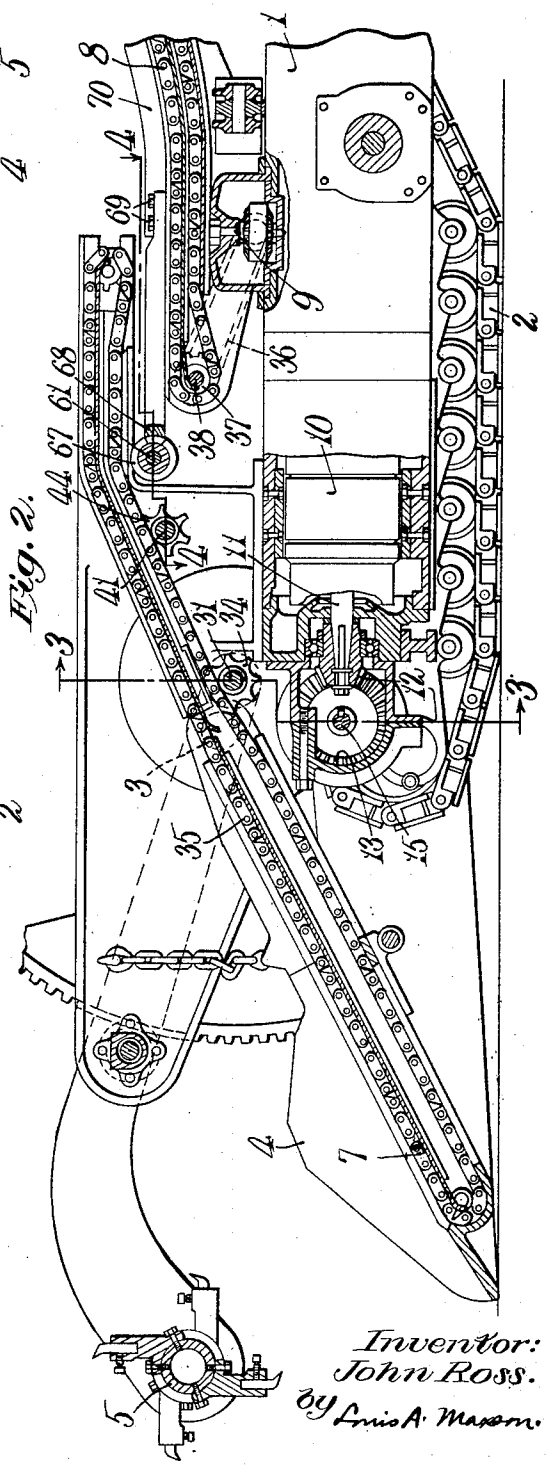


Fig. 2.

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Fig. 3.

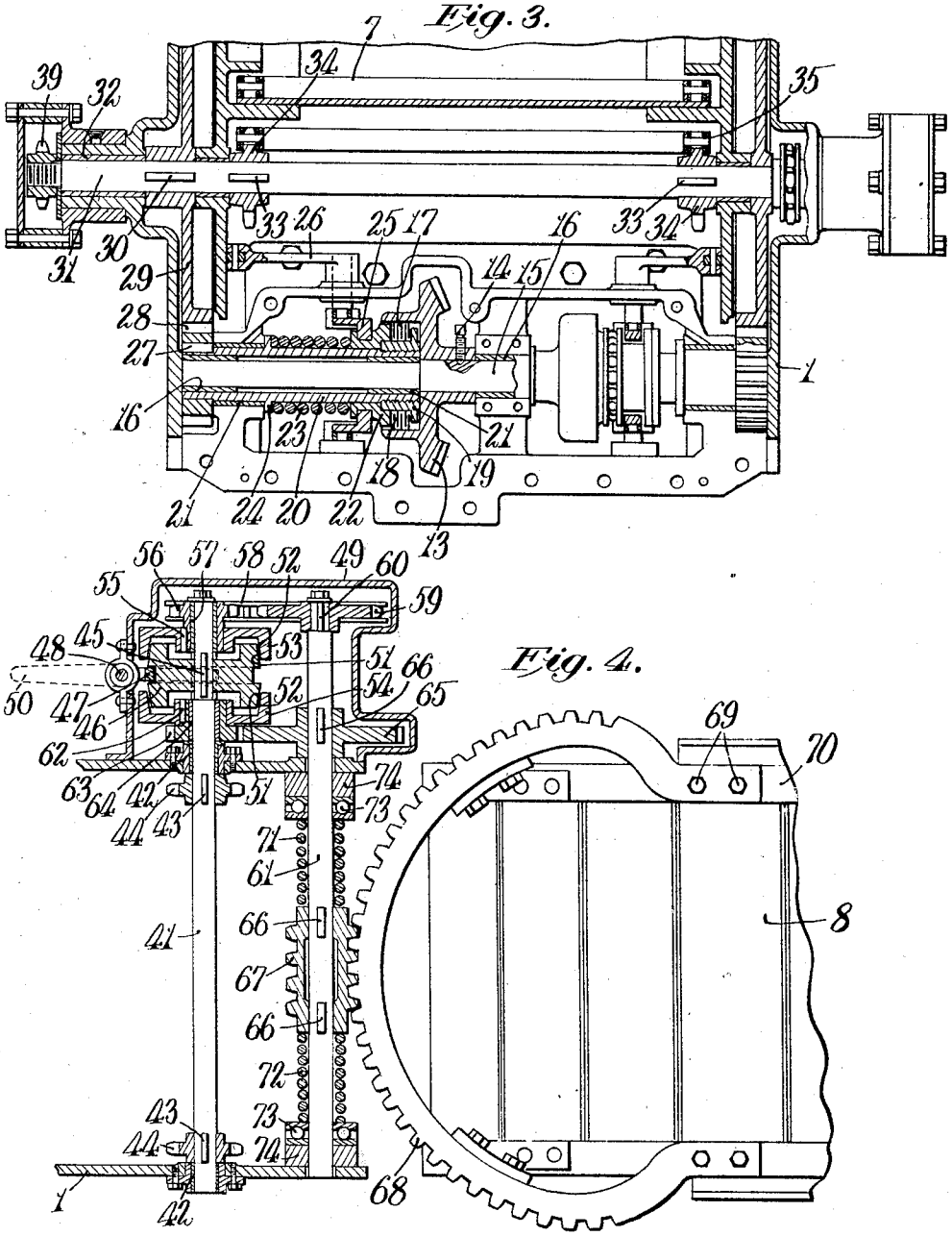


Fig. 4.

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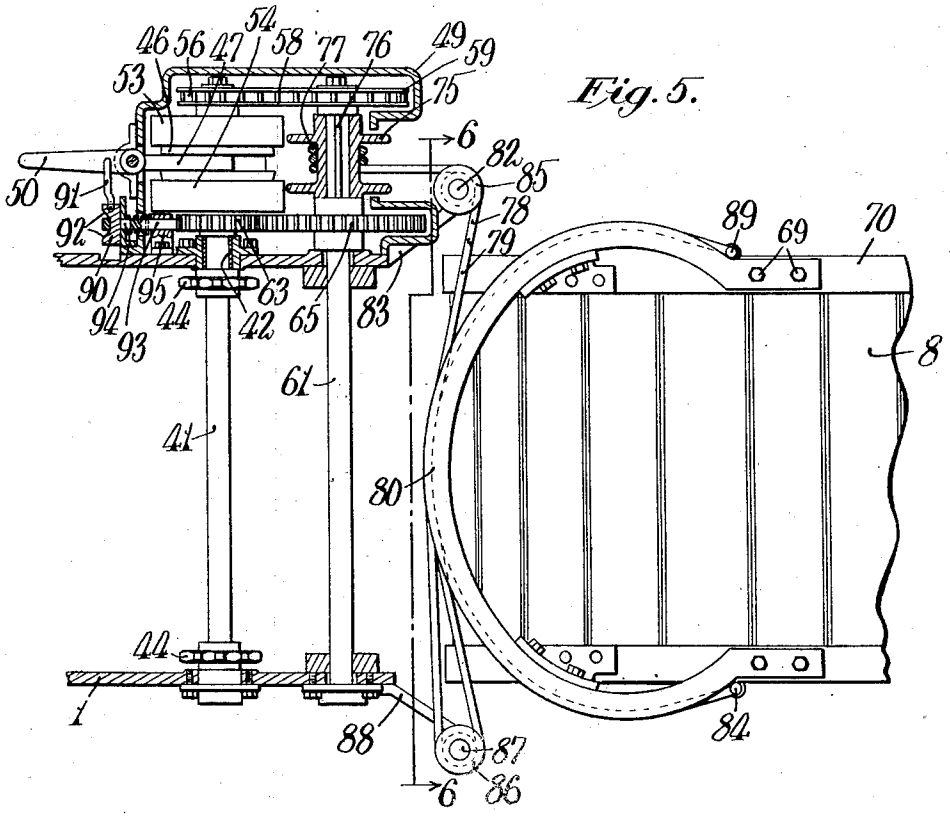
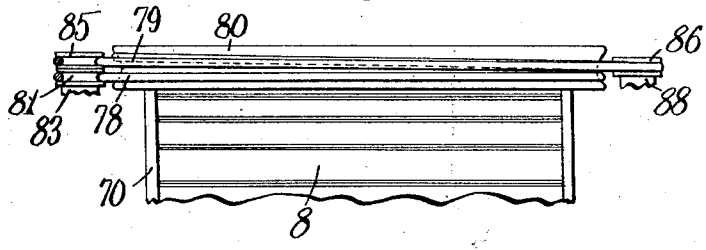


Fig. 5.

Fig. 6.



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UNITED STATES PATENT OFFICE

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LOADING MACHINE

Application filed October 26, 1927. Serial No. 223,942.

This invention relates to loading machines and more particularly, but not exclusively, to a coal loading machine having improved power operated swinging mechanism for the tail conveyor thereof.

An object of this invention is to provide an improved coal loading machine having improved and simplified means for swinging the tail conveyor thereof. Still another object is to provide improved tail conveyor swinging mechanism which is driven directly from the front conveyor, improved driving connections being provided between the front conveyor chains and the rear conveyor swinging mechanism. Yet another object is to provide an improved power operated mechanism for swinging the tail conveyor including a reversing device to enable the conveyor to be swung by power in opposite directions in an improved manner. These and other objects and advantages of this invention will, however, hereinafter more fully appear.

In the accompanying drawings I have shown for purposes of illustration two forms which my invention may assume in practice.

In these drawings,—

Fig. 1 is a side elevation of a coal loading machine having an illustrative embodiment of my improved tail conveyor swinging mechanism incorporated therein.

Fig. 2 is a central longitudinally extending vertical sectional view taken through the loading machine shown in Fig. 1 and illustrating details of construction.

Fig. 3 is a transverse vertical sectional view taken substantially on line 3—3 of Fig. 2.

Fig. 4 is a fragmentary detail sectional view taken on line 4—4 of Fig. 2.

Fig. 5 is a view similar to Fig. 4 illustrating a modified form of construction.

Fig. 6 is a fragmentary view taken substantially on line 6—6 of Fig. 5.

In this illustrative embodiment of the invention there is shown a coal loading machine which is of the same general type as that described in a pending application to one Frank A. Halleck, Ser. No. 160,486, filed Jan. 11, 1927, and generally comprises a frame 1 mounted on and propelled by endless traction treads 2. Pivotally mounted at 3 on the forward end of the frame 1 is a shovel 4, while cooperating with this shovel is a toothed gathering roller 5, the latter also being pivotally mounted, at 6, for vertical swinging movement on the frame 1. The toothed roller 5 is adapted to move the loose coal downwardly and rearwardly onto the shovel 4. Guided on the shovel 4 on the frame 1 is an endless front or gathering conveyor 7 which receives the coal moved by the roller 5 onto the shovel 4 and conveys the same rearwardly lengthwise of the machine. The conveyor 7 discharges onto a tail or loading conveyor 8 mounted on the frame 1 for horizontal swinging movement about a vertical axis as at 9.

As illustrated, the driving connections for the front conveyor 7 comprise a motor 10 herein of the usual electric type having a horizontal armature shaft 11 extending longitudinally of the machine. The shaft 11 has fixed thereto at its forward end a bevel pinion 12 which meshes with a larger bevel gear 13 secured by a set screw 14 to a horizontal shaft 15. This shaft extends transversely of the machine and is journaled in bearings 16 suitably carried by the machine frame 1. The bevel gear 13 carries a series of clutch plates 17 which are interleaved with a corresponding series of clutch plates 18 carried by a clutch member 19 threadedly connected to a sleeve 20, the latter surrounding the shaft 15 and journaled in suitable bearings 21. Slidably mounted on the sleeve 20 is a clutch applying member 22 which is normally maintained in its applied position by means of a coiled spring 23 encircling the sleeve 20 and reacting against a flange 24 on the latter. The member 22 is adapted to be released against the tension of the spring 23 by means of a shipper yoke 25 pivotally mounted on the machine frame and having suitable operating means including a lever 26. In accordance with this illustrative embodiment of the invention the sleeve 20 has keyed thereto at 27 a spur pinion 28 which meshes with a large spur gear 29 fixed at 30 to a horizontal shaft 31 extending transversely of the machine parallel with and above the shaft 15. The shaft 31 is journaled in bearings 32 suitably carried by the machine frame and has fixed thereto at

33 chain sprockets 34 which engage the endless side chains 35 of the front conveyor 7. As clearly described in the copending application mentioned above, the tail conveyor 8 is driven from the rear end of the motor through connections including a drive chain 36 (see Fig. 2) engaging a sprocket 37 secured to the conveyor drive shaft 38. Also suitably fixed to the shaft 31 are chain sprockets 39, only one of which is shown, which drive through endless chain connections the toothed gathering roller 5. However, as the specific driving connections for the tail conveyor 8 and toothed gathering roller 5 form no part of the present invention, further description of the same is submitted to be unnecessary.

The improved power operated swinging mechanism for the tail conveyor 8 comprises a horizontal shaft 41 disposed transversely of the machine and journaled in suitable bearings 42 carried thereon. This shaft has fixed thereto at 43 chain sprockets 44 which directly engage and are driven by the lower portions or strands of the endless side chains 35 of the front conveyor 7 as clearly shown in Fig. 2. Moreover, as shown in Fig. 4, splined at 45 to the shaft 41 for axial sliding movement relative thereto is a clutch shipper member 46. Engaging a peripheral groove on the shipper member 46 is a clutch shipper yoke 47 pivoted at 48 on a clutch and transmission housing 49 rigidly secured to the side of the machine frame 1. This shipper yoke 47 is provided with an operating lever 50. Formed on opposite sides of the shipper member 46 are conical surfaces 51 which are adapted to alternatively engage conical surfaces 52 formed on clutch members 53 and 54 respectively. In this instance the clutch member 53 is keyed at 55 to the hub of a chain sprocket 56 rotatably mounted on a bearing sleeve 57 supported by the shaft 41. This sprocket 56 is connected through an endless chain connection 58 to a chain sprocket 59 keyed at 60 to a shaft 61 arranged parallel with and in the rear of the shaft 41 heretofore described. The clutch member 54 is keyed at 62 to the hub of a spur pinion 63 rotatably mounted on a bearing sleeve 64 carried by the shaft 41. This pinion meshes with a larger spur gear 65 keyed at 66 to the shaft 61. From the foregoing, it is evident that when the shipper member 46 is slid outwardly the clutch member 53 is connected to the shaft 41, and as a result the shaft 61 is driven thereby through the chain and sprocket connection 56, 58, 59. When the shipper member 46 is slid inwardly the clutch member 54 is connected to the shaft 41 and as a result the shaft 61 is driven through the spur gears 63, 65 at the same speed in the reverse direction. As illustrated, slidably mounted on and splined to the shaft 61 at 66 is a worm 67 which meshes with a worm gear segment 68 rigidly secured by bolts 69 to the frame 70 of the tail conveyor 8. As shown in Fig. 4, encircling the shaft 61 and engaging the opposite ends of the worm 67 are coiled springs 71 and 72, these springs reacting against ball thrust bearings 73 abutting the inner sides of bearing brackets 74 rigidly fixed to the sides of the machine frame 1, the shaft 61 being suitably journaled in these bearing brackets. The teeth on the worm and worm gear segment are self-locking, and as a result any inadvertent swinging movement of the tail conveyor 8 is prevented when the clutch member 46 is in its released or neutral position.

In the form of the invention shown in Figs. 5 and 6 a cable and drum device is substituted for the worm and worm gear segment of the form described above. This form of the invention comprises a winding drum 75 keyed at 76 to the shaft 61, and wound upon this drum is a cable 77 having end portions 78 and 79 extending from the drum and engaging a grooved arcuate guide member 80 rigidly fixed to the rear conveyor frame 70. The end portion 78 of this cable leads from the bottom of the drum 75 around a guide roll 81 rotatably mounted on a pin 82 carried by a bracket 83 secured to the machine frame. The end portion 78 extends over the guide roll 81 around a portion of the arcuate guide member 80 and is fixed to the latter as at 84. The upper portion 79 of this cable extends from the top of the drum around a guide roll 85 likewise journaled on the pin 82. The portion 79 extends around the guide roll 85 transversely across the machine and around a similar guide roll 86 journaled on a pin 87 carried by a supporting bracket 88. The portion 79 of the cable extends around the guide roll 86 and engages the guide portion 80 and is fixed at its end at 89 to the opposite side of the tail conveyor frame 70. In this form of the invention improved locking means is provided for preventing inadvertent swinging of the tail conveyor when the shipper 46 is in its neutral position and this locking means comprises a wedge member 90 slidably guided on the housing 49 and connected by a rod 91 to the clutch operating lever 50. This wedge member has oppositely disposed inclined cam surfaces 92 which are adapted to cooperate with a spring pressed plunger 93, the wedge member 90 extending through an opening 94 formed in this plunger. This plunger is guided in a bracket 95 fixed to the machine frame 1 and is adapted to engage the teeth of the spur pinion 63. When the lever 50 is in the position shown in Fig. 5 the plunger 93 engages the teeth on the pinion 63 thereby preventing rotation of the latter, and as a result the tail conveyor is locked against swinging movement. When the lever 50 is swung in one direction or the other one of the inclined surfaces 92 forces the plunger into its released position.

The operation of the form of the improved

tail conveyor swinging mechanism shown in Fig. 4 is as follows. When it is desired to swing the tail conveyor, the operator grasps the lever 50 and shifts the shipper member, thereby connecting one or the other of the clutch members 53, 54 to the shaft 41, and as a result, the worm 67 is rotated by power, it being understood that the front conveyor 7 is being driven by the motor 10 at that time. Due to the meshing engagement between the worm and worm gear segment 68 the tail conveyor 8 is swung about its pivot 9 in the desired direction. When it is desired to swing the tail conveyor 8 in the opposite direction the shipper member 46 is shifted in the opposite manner. If, for any reason the tail conveyor 8 strikes some obstruction or is in any other way overloaded, the springs 71, 72 yield, thereby permitting the worm to slide axially relative to the shaft 61, and as a result, breakage of the swinging parts is prevented. The operation of the form of the invention shown in Figs. 6 and 7 is substantially the same as that described above, with the exception that the winding drum 75 winds in one of the cable portions 78, 79 while the other portion is unwound, and as a result the tail conveyor is swung about its pivot 9. The plunger 93 automatically locks the tail conveyor against swinging movement when the clutch shipper member 46 is in its released or neutral position.

As a result of this invention an improved coal loading machine is provided having improved and simplified power operated swinging mechanism for the tail conveyor driven directly by the front conveyor chains. It will further be noted that by driving the tail conveyor swinging mechanism directly from the front conveyor all complicated driving connections have been eliminated, the structure being of exceedingly simplified, rugged and compact character. It will further be noted that an improved tail conveyor swinging mechanism is provided which may be manufactured at a minimum of cost and applied to a coal loading machine of standard construction with a minimum of change. These and other uses and advantages of this invention will be clearly apparent to those skilled in this art.

While I have in this application specifically described two forms which my invention may assume in practice, it will be understood that these forms of the same are shown for purposes of illustration and that the invention may be modified and embodied in various other forms without departing from its spirit or the scope of the appended claims.

What I claim as new and desire to secure by Letters Patent is:

1. In a loading machine, a supporting frame, a gathering conveyor thereon comprising an endless conveyor element having endless side chains, a tail conveyor mounted on said supporting frame for horizontal swinging movement relative thereto, devices for driving said gathering conveyor element, and means driven by said side chains of said gathering conveyor element for swinging said tail conveyor relative to said supporting frame.

2. In a loading machine, a supporting frame, a gathering conveyor thereon comprising an endless conveyor element having endless side chains, a tail conveyor mounted on said supporting frame for horizontal swinging movement relative thereto, devices for driving said gathering conveyor element, and means driven by said side chains of said gathering conveyor element for swinging said tail conveyor in either of opposite directions relative to said supporting frame while said gathering conveyor element operates continuously in the same direction.

3. In a loading machine, a supporting frame, a gathering conveyor thereon comprising an endless conveyor element having endless side chains, a tail conveyor mounted on said supporting frame for horizontal swinging movement relative thereto, devices connected to the side chains of said gathering conveyor element for effecting drive thereof, and means for swinging said tail conveyor relative to said supporting frame including a transverse shaft journaled on said frame, sprockets fixed to said shaft and engaging and driven by said side chains, and connections between said shaft and the tail conveyor.

4. In a loading machine, a supporting frame, a gathering conveyor thereon comprising an endless conveyor element having endless side chains, a tail conveyor mounted on said supporting frame for horizontal swinging movement relative thereto, devices connected to the side chains of said gathering conveyor element for effecting drive thereof, and means for swinging said tail conveyor relative to said supporting frame including a transverse shaft journaled on said frame, sprockets fixed to said shaft and engaging and driven by said side chains, and connections between said shaft and the tail conveyor including a reversing mechanism operable at will for effecting swinging of said tail conveyor in either of opposite directions while the gathering conveyor element operates continuously in the same direction.

5. In a loading machine, a supporting frame, a gathering conveyor thereon comprising an endless gathering conveyor element having side chains, a tail conveyor mounted on said supporting frame for horizontal swinging movement relative thereto, devices engaging the side chains of said gathering conveyor element for effecting drive thereof, and means for swinging said tail conveyor relative to said supporting frame including parallel horizontal transversely ex-

tending shafts, sprockets fixed to one of said shafts and engaging and driven by the side chains of the gathering conveyor element, a plurality of clutch elements arranged coaxially with and rotatable relative to one of said shafts, driving connections between each of said clutch elements and said other shaft, and means for alternatively connecting said clutch elements to said coaxial shaft.

6. In a loading machine, a supporting frame, a gathering conveyor thereon comprising an endless gathering conveyor element having side chains, a tail conveyor mounted on said supporting frame for horizontal swinging movement relative thereto, devices engaging the side chains of said gathering conveyor element for effecting drive thereof, and means for swinging said tail conveyor relative to said supporting frame including parallel horizontal transversely extending shafts, sprockets fixed to one of said shafts and engaging and driven by the side chains of the gathering conveyor element, a plurality of clutch elements arranged coaxially with and rotatable relative to one of said shafts, driving connections between each of said clutch elements and said other shaft, means for alternatively connecting said clutch elements to said coaxial shaft, and cooperating gear elements operatively connecting one of said shafts to said tail conveyor.

7. In a loading machine, a supporting frame, a front conveyor mounted thereon comprising an endless conveyor element, a rear conveyor mounted on said frame for horizontal swinging movement relative thereto, and mechanism for swinging said rear conveyor relative to said frame comprising a transverse shaft journaled in said frame and having elements thereon driven directly by said endless conveyor element, a parallel shaft, a reversing mechanism in the drive between said shafts controllable at will for effecting rotation of said second shaft in either of opposite directions while said first shaft rotates continuously in the same direction, a gear driven by said second shaft, and a gear element connected to the rear conveyor and with which said gear meshes.

8. In a loading machine, a supporting frame, a front conveyor mounted thereon comprising an endless conveyor element, a rear conveyor mounted on said frame for horizontal swinging movement relative thereto, and mechanism for swinging said rear conveyor relative to said frame comprising a transverse shaft journaled in said frame and having elements thereon driven directly by said endless conveyor element, a parallel shaft, a reversing mechanism in the drive between said shafts controllable at will for effecting rotation of said second shaft in either of opposite directions while said first shaft rotates continuously in the same direction, a gear driven by said second shaft, a gear element connected to the rear conveyor and with which said gear meshes, and means permitting said gear to yield relative to its shaft upon overload of the swinging mechanism.

9. In a loading machine, a supporting frame, a front gathering conveyor thereon comprising an endless conveyor element having endless side chains, a rear conveyor mounted on said frame for horizontal swinging movement relative thereto, and mechanism for swinging said rear conveyor relative to said frame comprising a transverse shaft journaled in said frame, sprockets fixed to said shaft and engaging and driven by the side chains of the gathering conveyor element, a parallel shaft journaled in said frame, driving connections between said shafts, a drum driven by said second shaft, and a cable wound on said drum and attached to the rear conveyor.

10. In a loading machine, a supporting frame, a front gathering conveyor thereon comprising an endless conveyor element having endless side chains, a rear conveyor mounted on said frame for horizontal swinging movement relative thereto, and mechanism for swinging said rear conveyor in either of opposite directions while the gathering conveyor operates continuously in the same direction comprising a transverse shaft journaled in said frame, sprockets fixed to said shaft and engaging and driven by the side chains of the gathering conveyor element, a parallel shaft journaled in said frame, a reversing mechanism in the drive between said shafts, a drum driven by said second shaft, and a cable wound on said drum and attached to the rear conveyor.

11. In a loading machine, a supporting frame, a front conveyor thereon including an endless conveyor element, a rear conveyor mounted on said frame for horizontal swinging movement relative thereto, a motor for driving said front and rear conveyors, and mechanism for swinging said rear conveyor in either of opposite directions without reversing said motor, comprising connections driven directly by the endless conveyor element of the front conveyor.

12. In a loading machine, a supporting frame, a gathering conveyor thereon including an endless conveyor element, a tail conveyor mounted on said supporting frame for swinging movement relative thereto, devices for driving said gathering conveyor element, and means driven by said endless gathering conveyor element for swinging said tail conveyor relative to said supporting frame.

13. In a loading machine, a supporting frame, a gathering conveyor thereon comprising an endless conveyor element, a tail conveyor mounted on said supporting frame for swinging movement relative thereto, de-

vices for driving said gathering conveyor element, and means driven by said endless gathering conveyor element for swinging said tail conveyor in either of opposite directions while said gathering conveyor element operates continuously in the same direction.

In testimony whereof I affix my signature.

JOHN ROSS.