May 21, 1935. F. CARTLIDGE 2,002,199

LOADING MACHINE

Original Filed Feb. 15, 1932 3 Sheets-Sheet 1

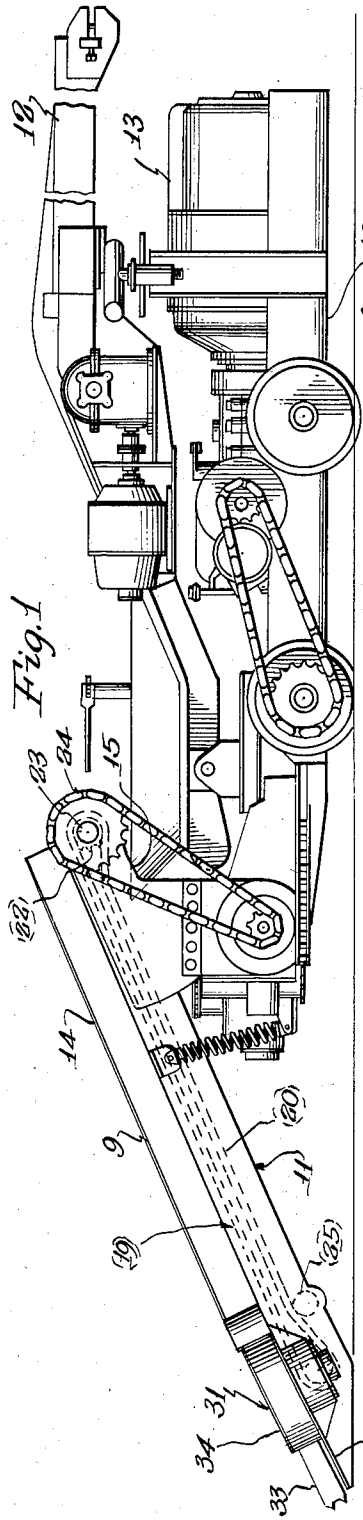


Fig. 1

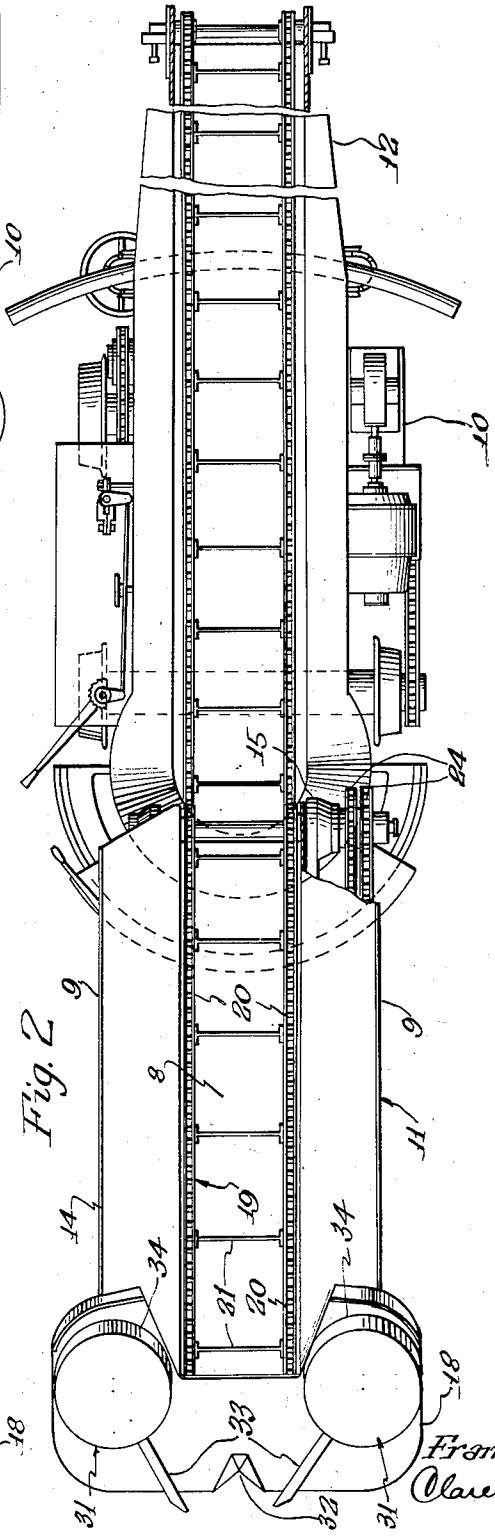


Fig. 2

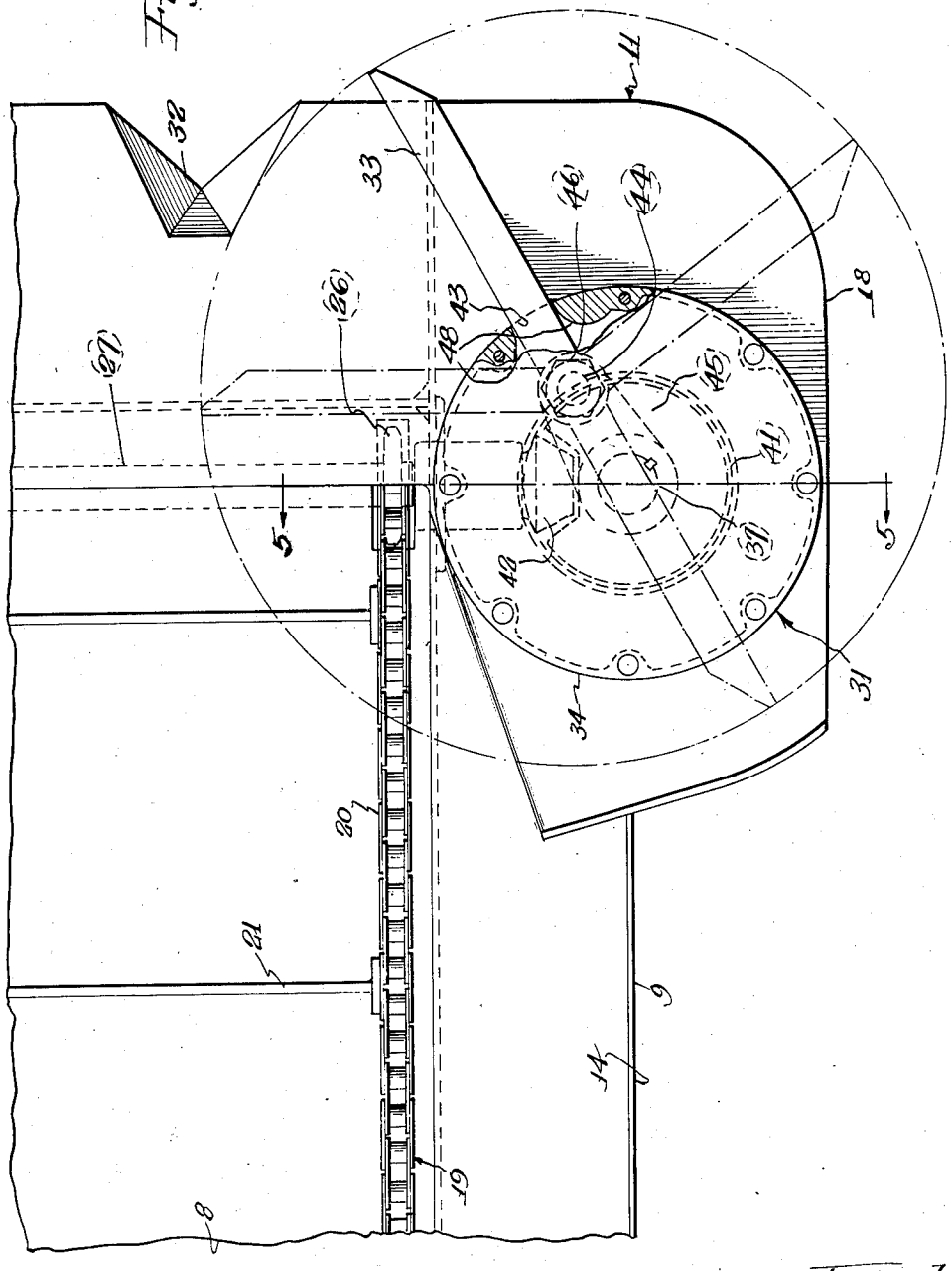
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Fig. 3



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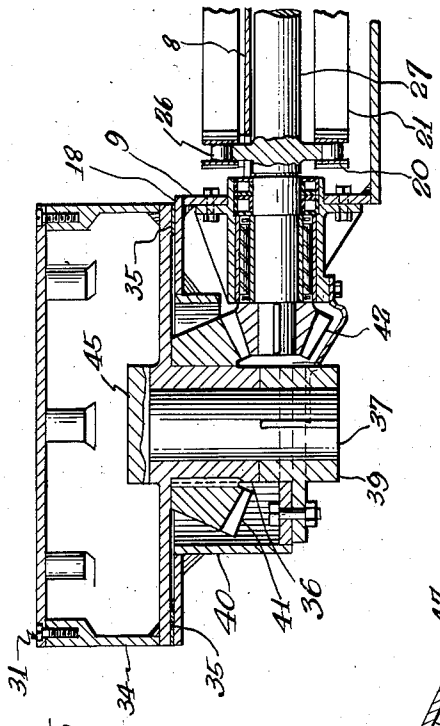


Fig. 5

Fig. 4

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UNITED STATES PATENT OFFICE

2,002,199

LOADING MACHINE

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Application February 15, 1932, Serial No. 592,909
Renewed September 8, 1934

18 Claims. (Cl. 198—9)

This invention relates to loading machines of the type adapted to load coal in mines at the working face and has among other objects to provide a new and improved gathering and loading element for picking up and loading coal or like material.

My invention may be more clearly understood with reference to the accompanying drawings wherein:

Figure 1 is a side elevation of one embodiment of my invention;

Figure 2 is a top plan view of the device shown in Figure 1;

Figure 3 is a partial enlarged detail plan view of the forward portion of the device of my invention with parts broken away and in section to more clearly show the details thereof;

Figure 4 is an enlarged detail side elevation of the forward portion of the embodiment of my invention illustrated in Figure 1, with parts broken away and in section to more clearly show the details thereof; and

Figure 5 is a transverse sectional view taken substantially on line 5—5 of Figure 3.

Like numerals refer to like parts throughout the various figures.

Referring now in particular to the drawings, the main elements of the embodiment of my invention illustrated are similar to those disclosed in a prior application bearing Serial Number 472,701, filed by me August 2, 1930, and entitled Improvements in loading machines, and consist of a wheeled truck or main frame 10 having an inclined gathering and loading element 11 in front of said main frame, and a discharge conveyor 12 extending from beneath the rear end of said gathering and loading element and upwardly and rearwardly therefrom overhanging the rear end of said main frame for discharging material into suitable receptacles such as mine cars.

Suitable means are provided for driving the main operating parts, which means herein comprises an electric motor 13. Said electric motor has driving connection with the truck wheels for driving the loading machine about the mine and for feeding the loading element into the material to be loaded. Said electric motor also serves as a driving means for the operating parts of the gathering and loading element 11 for raising or lowering said gathering and loading element, and for swinging said gathering and loading element about a vertical axis. The details of the drive to the main operating parts are similar to those disclosed in my aforementioned prior application so will not herein be shown or described in detail.

The gathering and loading element 11 comprises an inclined conveyor frame 14 supported between a pair of upright side plates 15 for pivotal movement with respect thereto about a horizontal axis disposed adjacent the rearward end thereof. Said upright side plates are in turn supported on the main frame 10 for swinging said inclined conveyor frame about a vertical axis and positioning said gathering and loading element for gathering from various sections in the working place. The means for swinging said upright side plates about a vertical axis and said inclined conveyor frame about a horizontal axis are not herein shown nor described since they are no portion of my present invention and are fully disclosed in my aforementioned prior application.

The inclined conveyor frame 14 has an apron 18 formed integral therewith and extending forwardly therefrom and along the sides thereof for engaging the ground ahead of said conveyor frame and carrying the major portion of the gathering mechanism.

The inclined conveyor frame 14 is provided with a central portion or pan 8 forming a surface for moving material therealong and sides 9 extending upwardly and downwardly therefrom. Suitable means are provided for moving loose material along the central portion or pan 8 of said inclined conveyor frame which may be of any construction but which is herein preferably shown as being a flight conveyor indicated by reference character 19.

The flight conveyor 19 may be of any suitable construction, but is herein shown as comprising a pair of parallel spaced chains 20 having flights 21 carried therebetween in a suitable manner. Said chains are trained around sprockets 22 adjacent the rearward end of the conveyor frame 14 keyed on a transversely extending drive shaft 23 coaxial with the axis of pivotal connection of said conveyor frame with the upright side plates 15. Said transversely extending drive shaft is driven from the motor 13 by means of a suitable geared reduction drive and chain and sprocket drives generally indicated by reference character 24 in a manner similar to that disclosed in my hereinbefore mentioned prior application.

The conveyor chains 20 extend forwardly from the sprockets 22 beneath the central portion or pan 8 of the conveyor frame 14 over idler rollers 25 and around drive sprockets 26 keyed on a transversely extending shaft 27 for driving said shaft. The idler rollers 25 are adjustable in a

usual manner, which will not herein be described in detail, to compensate for wear in said conveyor chains. From thence said conveyor chains extend rearwardly along the top surface of the central portion or pan 8 of said conveyor frame to the sprockets 22 for moving material upwardly along said pan.

The apron 18 extends forwardly of the conveyor frame 14 and rearwardly along each side of said forward section of said conveyor frame, and has an underportion 30 adapted to engage the ground which, with the forward end of said apron, forms a wedge so said apron may be moved along the ground and wedged under the coal. It should be noted that the length of the ground engaging surface of the underportion 30 compared to the length of the apron 18 is relatively short to permit the loading element 11 to be adapted to rough or uneven mine bottoms and thus enable the forward end of the apron 18 to be disposed adjacent the ground under varying conditions of mining.

The apron 18 is adapted to support gathering mechanism 31 on its top surface adjacent opposite sides of the conveyor 19. The gathering mechanism 31 will hereinafter be more fully described and includes rotatably movable gathering arms 33 disposed adjacent opposite sides of the flight conveyor 19, and said gathering arms and top surface of the apron 18 are inclined at a greater angle of incidence with respect to the ground upon which the machine rests than said conveyor for depositing material on said conveyor and to prevent this material from being carried past the conveyor.

While the apron 18 may be elevated above the ground its underportion 30 is usually adapted to engage the ground during the loading operation and said apron is adapted to be forced into the material which is being loaded to permit said material to be continuously gathered by the gathering mechanism 31. With reference to Figures 2 and 3, it may be seen that the paths of the gathing arms 33 are substantially circular in form and are so arranged that a space whose bottom margins are generally in the form of a V converging towards the apron 18 is left in front of the central portion of said apron. Due to the fact that it is desirable to have the gathering arms 33 move simultaneously towards the conveyor 19 in order to more efficiently gather the loose material, and that large lumps of material are apt to foul oppositely disposed gathering arms, it is impractical to space said gathering arms close enough together to eliminate this V shaped dead space. In order to eliminate this dead space and permit the apron 18 and its associated gathering mechanism 31 to be forced into the coal to perform the loading operation, a portion has been cut from the central forward end of said apron whose lower margins conform generally to the paths of adjacent gatherings arms and converge at a central point as is indicated by reference character 32. The sides of this receding central forward portion of the apron 18 are inclined laterally upwardly and rearwardly from the lower margins thereof and form in effect a wedge which may be moved under and lift up the material left in the dead space formed by the gathering arms 33. It may clearly be seen that when the forward portion of the apron 18 is so arranged, the forward end of said apron may be forced ahead of the material left in the dead space and that the receding central portion thereof will lift up said material and enable the gathering mechanism 31 and gathering arms 33 to pick up said material, which arrangement in effect eliminates said dead space.

Referring now in particular to the details of said gathering mechanism and the novel features of my invention, said gathering mechanism includes the gathering arms 33 which are rotatably moved by means of rotatable drums 34. Inasmuch as the gathering mechanism on each side of the flight conveyor 19 is of a similar construction, the gathering mechanism on one side of said conveyor only will herein be described in detail.

The rotatable drum 34 rests on the apron 18 and is provided with bearing surfaces 35 engaging the top surface of said apron so said drum may be rotated with respect thereto. A hub 36 depends from said rotatable drum and is journaled on a shaft 37 extending perpendicular to said apron, which shaft is keyed adjacent its lower end in a boss 39. Said boss is secured to a housing 40 depending from said apron by suitable securing means such as nuts and bolts.

The means for driving the rotatable drum 34 comprises a bevel gear 41 keyed on the hub 36 of said rotatable drum, which bevel gear meshes with and is driven by a bevel pinion 42 keyed on the end of the transverse shaft 27.

An opening 43 is provided in the side of the rotatable drum 34, which opening is adapted to receive the gathering arm 33 and permit said gathering arm to be slidably moved with respect thereto.

The gathering arm 33 is pivotally supported adjacent its inner end on a pin 44 disposed eccentrically of the axis of rotation of the drum 34 and extending upwardly from and integral with a crank 45 integral with the shaft 37. Suitable means are provided for holding said gathering arm on said pin which herein comprise a washer and nut indicated at 46.

The rotatable drum 34 is provided with a removable cover 47 and suitable curved bearing members indicated at 48 adjacent opposite sides of the opening 43 are adapted to engage opposite sides of the gathering arm 33 and move said gathering arm about its axis of pivotal connection to the crank 45 upon rotation of said drum.

It may now be seen that when the drum 34 is rotated by the bevel pinion 42 and bevel gear 41, that the gathering arm 33 will be moved about its axis of pivotal connection to the crank 45 which will cause said gathering arm to telescope within the rotatable drum 34 as it leaves the flight conveyor 19 and cause said gathering arm to extend from said rotatable drum as it approaches the forward end of the apron 18 and the loose material which it is desired to load onto said flight conveyor.

Thus the gathering arms 33 are so arranged on each side of the flight conveyor 19 that they extend forwardly and outwardly from the drums 34 during the initial gathering operation and engage and sweep the coal or loose material onto the flight conveyor 19 and disappear within said drums when leaving said flight conveyor. With such an arrangement a maximum portion of the gathering arm is present to pick up and move the loose material onto the conveyor and a minimum portion of said gathering arm is present when moving away from the conveyor to prevent said gathering arm from carrying loose material beyond the conveyor to each side thereof and to prevent unnecessary scattering of said loose material. It should be noted that the position in which the gathering arms 33 extend in an extreme forward position with respect to the drums

34 may be varied by varying the positions of the cranks 45 with respect to said apron and flight conveyor.

It may thus be seen that a new and improved gathering device has been provided which is of a rugged and simple construction so arranged as to present a maximum gathering surface when needed and disappear when said gathering surface is not needed and which will deposit a maximum amount of material onto a material conveying means and carry a minimum amount of material beyond said material conveying means.

While I have herein shown and described one form of my invention, I do not wish to be limited to the precise details of construction or arrangements of parts herein shown and described except as specifically limited in the appended claims.

I claim as my invention:

1. In a loading machine, gathering and loading mechanism therefor comprising an apron, a drum carried by said apron for rotation with respect thereto, and a gathering arm pivotally mounted for movement in a plane parallel to the plane of said apron about a fixed axis within the limits of said drum and eccentric of the axis of rotation of said drum.

2. In a loading machine, gathering and loading mechanism therefor comprising an apron, a drum carried by said apron for rotation with respect thereto, and a gathering arm pivotally mounted for movement in a plane parallel to the plane of said apron about a fixed axis within the limits of said drum and eccentric of the axis of rotation of said drum, said gathering arm extending beyond the boundaries of said drum and having slidable engagement therewith whereby rotation of said drum causes rotatable movement of said gathering arm and slidable movement of said gathering arm with respect to said drum.

3. In a loading machine, gathering and loading mechanism therefor comprising an apron, a drum carried by said apron for rotation with respect thereto about an axis perpendicular to the plane of said apron, and a gathering arm mounted for pivotal movement about an axis located within the limits of said drum parallel to but eccentric of the axis of rotation of said drum.

4. In a loading machine, gathering and loading mechanism therefor comprising an apron, a drum carried by said apron for rotation with respect thereto about an axis perpendicular to the plane of said apron, and a gathering arm mounted for pivotal movement about an axis located within the limits of said drum parallel to but eccentric of the axis of rotation of said drum, said gathering arm extending beyond the boundaries of said drum and having slidable engagement therewith whereby rotation of said drum causes rotatable movement of said gathering arm and slidable movement of said gathering arm with respect to said drum.

5. In a loading machine, gathering and loading mechanism therefor comprising an inclined apron, a rotatable drum on said apron, and a gathering arm having slidable engagement with said drum and having pivotal movement about a fixed axis within the limits of said drum and disposed eccentric of the center of said drum.

6. In a loading machine, gathering and loading mechanism therefor comprising an apron, a rotatable drum carried by said apron for rotation about an axis perpendicular to said apron, a gathering arm supported for pivotal movement about an axis disposed eccentric of the axis of rotation of said rotatable drum, said gathering arm extending beyond and having operative connection with said rotatable drum whereby rotation of said rotatable drum causes rotatable movement of said gathering arm and slidable movement of said gathering arm with respect to said rotatable drum in a plane parallel to the plane of said apron.

7. In a loading machine, gathering and loading mechanism therefor comprising an apron, a drum on said apron, a gathering arm pivotally mounted for movement about an axis eccentric of the center of said drum and for extension from and retraction within said drum in a plane parallel to the plane of said apron, and means for extending said gathering arm from and retracting said gathering arm within said drum comprising drive means for rotating said drum about its center.

8. In a loading machine, gathering and loading mechanism therefor comprising an apron, a drum on said apron, a gathering arm extending in a plane parallel to the plane of said apron, a slotted portion formed by the sides of said drum and adapted to engage the sides of said gathering arm, said gathering arm being pivoted for movement about an axis located within said drum and disposed eccentric of the center thereof, and means for extending said gathering arm from and retracting said gathering arm within said drum comprising means for rotating said drum about an axis coaxial with its center and perpendicular to the plane of said apron.

9. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, an orbitally movable gathering arm disposed forwardly thereof, and means for orbitally moving said gathering arm comprising a rotatable drum adapted to receive said gathering arm and have slidable engagement therewith, said gathering arm being pivotally connected to a fixed pivot within the boundaries of said drum for pivotal movement about an axis parallel to but eccentric of the center of rotation of said rotatable drum.

10. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, an orbitally movable gathering arm movable towards and away from said conveyor in a plane inclined at an obtuse angle with respect to the ground, and means for orbitally moving said gathering arm towards and away from said conveyor comprising a rotatable drum adapted to receive said gathering arm and have slidable engagement therewith, said gathering arm being pivotally connected to a fixed point within the boundaries of said drum parallel to but eccentric of the axis of rotation of said rotatable drum.

11. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, an orbitally movable gathering arm disposed on each side of said conveyor, and means for orbitally moving said gathering arms towards and away from said conveyor comprising a pair of rotatable drums, each of said drums being adapted to receive one of said gathering arms and have slidable engagement therewith and said gathering arms being pivotally connected adjacent their inner ends to fixed points within the limits of said rotatable drums parallel to but eccentric of the center of rotation of said rotatable drums.

12. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, an orbitally movable gathering arm disposed on each side of said conveyor and movable in a plane substantially parallel to the plane of said conveyor

towards and away from said conveyor, and means for orbitally moving said gathering arms towards and away from said conveyor comprising a pair of rotatable drums, each of said drums being adapted to receive one of said gathering arms and having slidable engagement therewith and said gathering arms being pivotally connected adjacent their inner ends to fixed points within the limits of said rotatable drums parallel to but eccentric of the center of rotation of said rotatable drums.

13. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, an inclined apron disposed forwardly of and to each side of said conveyor, a pair of rotatable drums on said apron disposed at opposite sides of said conveyor and a pair of gathering arms having slidable engagement with said drums for extension therefrom, said gathering arms having pivotal connection with a fixed point eccentric of the center of rotation of said rotatable drums and within the limits thereof.

14. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, an inclined apron disposed forwardly of and to each side of said conveyor, a pair of rotatable drums on said apron disposed at opposite sides of said conveyor for rotation about axes perpendicular to the plane of said inclined apron, and a pair of gathering arms movable towards and away from said conveyor in a plane parallel to the plane of said apron having slidable engagement with said drums and having connection with a fixed point within the limits of said rotatable drums parallel with but eccentric of the axes of rotation of said rotatable drums.

15. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, an inclined apron disposed forwardly of and to each side of said conveyor, a pair of rotatable drums on said apron disposed at opposite sides of said conveyor for rotation in a plane parallel to the plane of said inclined apron, a pair of gathering arms having slidable engagement with said drums and having connection with fixed points eccentric of the centers of rotation of said drums, and means for extending said gathering arms from said drums forwardly of said inclined apron into a pile of material, thence transversely towards said conveyor and thence retract said gathering arms within said rotatable drums when leaving said conveyor comprising a drive connection for rotating said drums.

16. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, a drum disposed to one side of said conveyor for rotation about an axis inclined with repect to the perpendicular, and a gathering arm movable forwardly of said drum and laterally towards said conveyor driven by said drum and having slidable engagement with said drum and being pivotally movable with respect thereto about a fixed axis within the limits of said drum and eccentric of but parallel to the axis of rotation of said drum.

17. In a loading machine, gathering and loading mechanism therefor comprising a conveyor, a drum disposed on each side of said conveyor for rotation about parallel axes inclined with respect to the perpendicular, and gathering arms movable forwardly of said drums and laterally rearwardly towards said conveyor driven by said drums and having slidable engagement with said drums and being pivotally movable with respect thereto about fixed axes within the limits of said drums and eccentric of but parallel to the axes of rotation of said drums.

18. In a loading machine, a conveyor, gathering mechanism therefor comprising a rotatable drum disposed to one side of said conveyor and rotatable in a plane disposed transversely of said conveyor, a gathering arm pivoted within said drum for rotation about a fixed axis eccentric of but parallel to the axis of rotation of said drum and extending from and having slidable engagement with the sides of said drum, and means for extending said gathering arm from said drum forwardly of said conveyor into a pile of material, thence transversely towards said conveyor and thence retracting said arm within said rotatable drum when leaving said conveyor comprising means for rotating said drum for pivotally moving said gathering arm about said aforementioned fixed axis.

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