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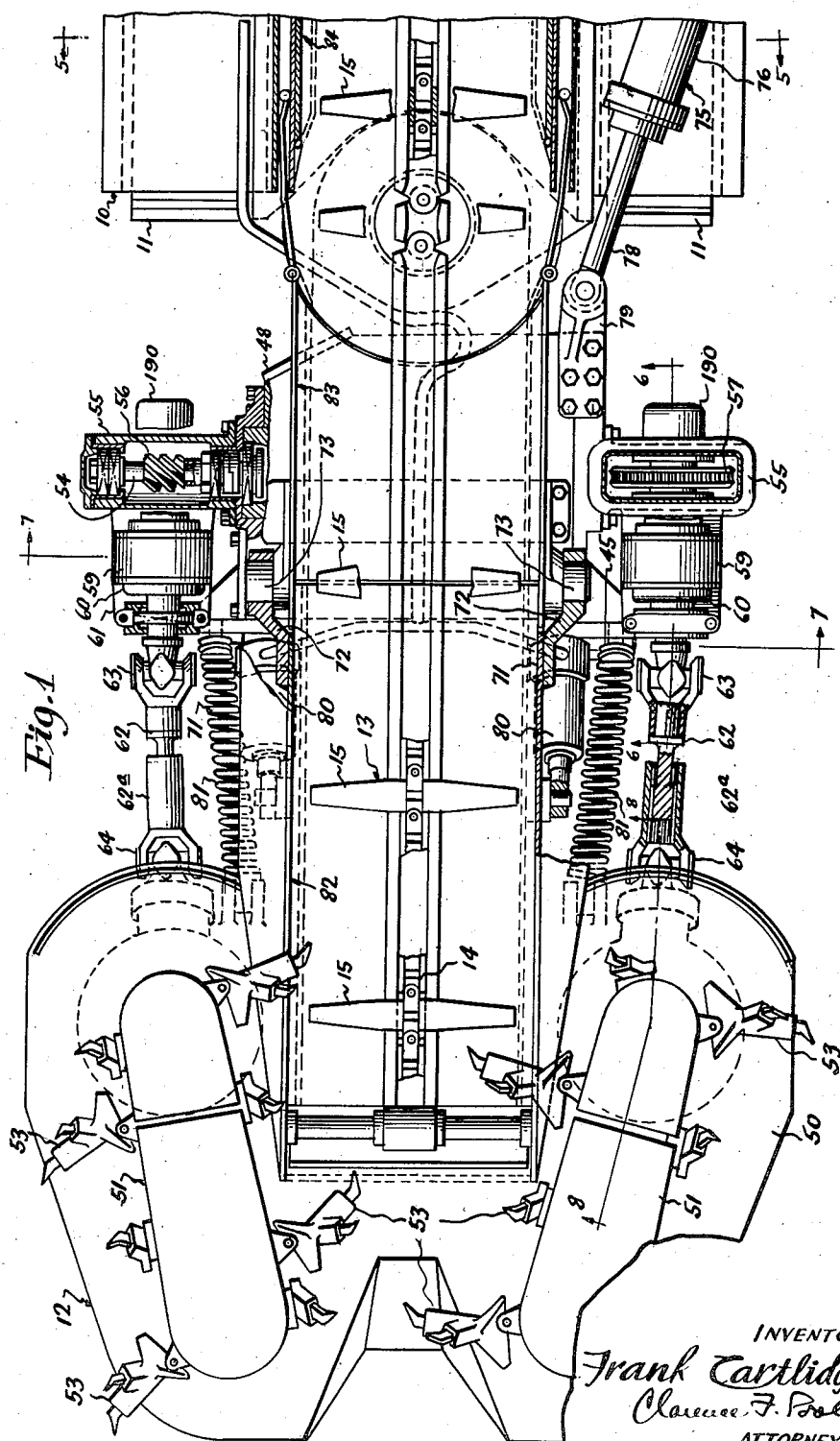
F. CARTLIDGE

2,358,849

GATHERING AND LOADING MACHINE

Original Filed Oct. 19, 1942

5 Sheets-Sheet 1



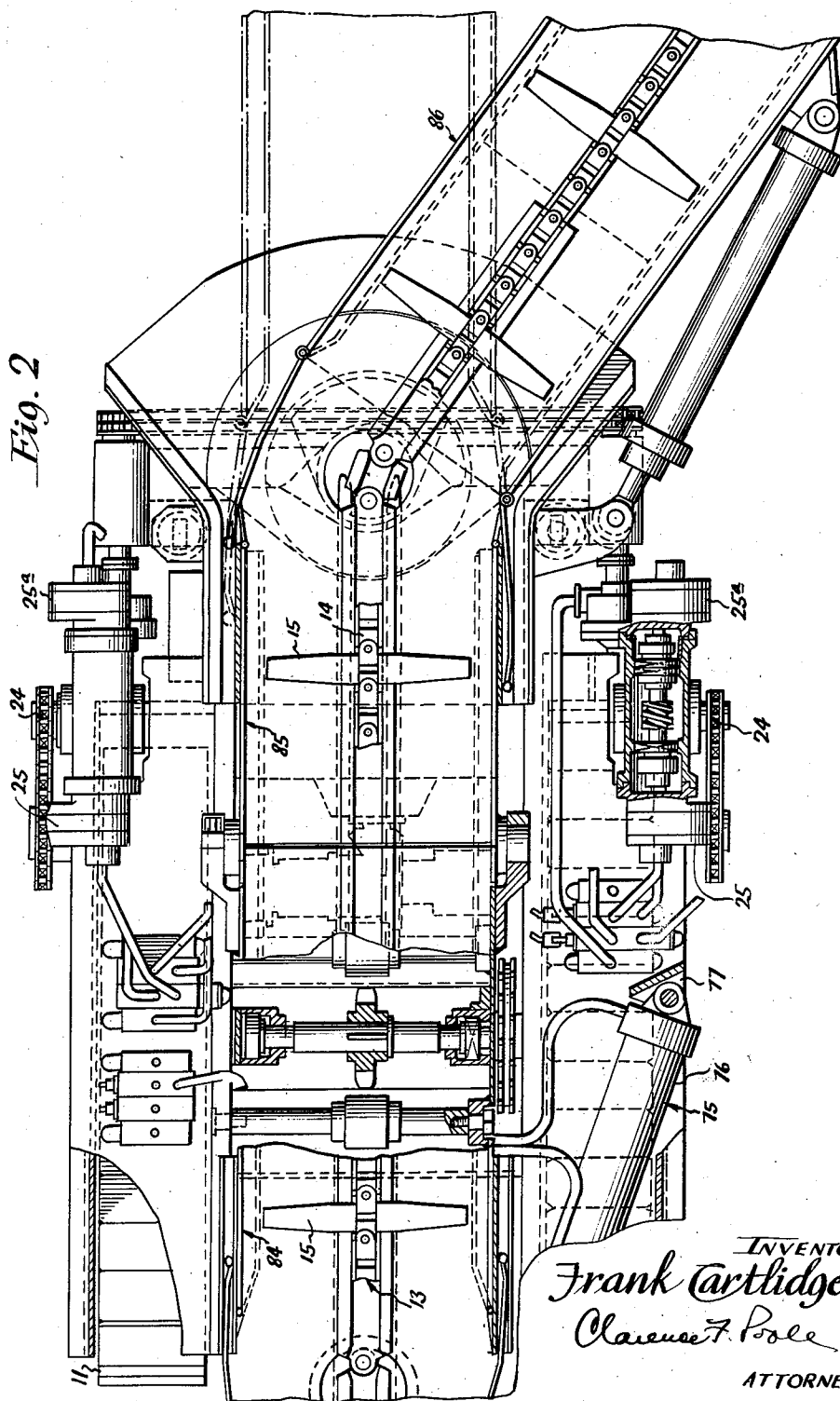
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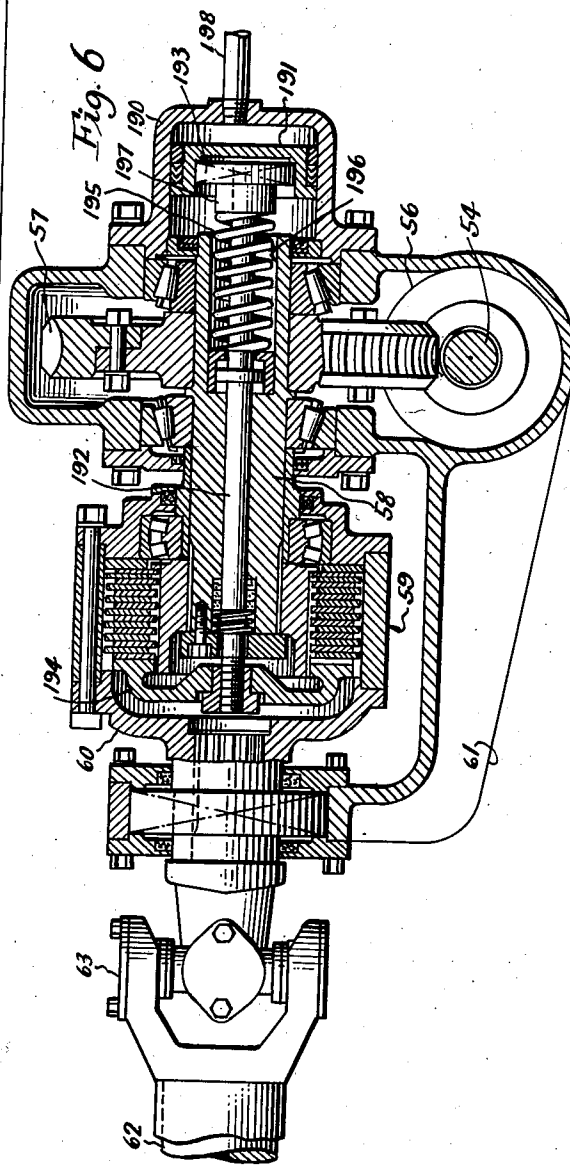
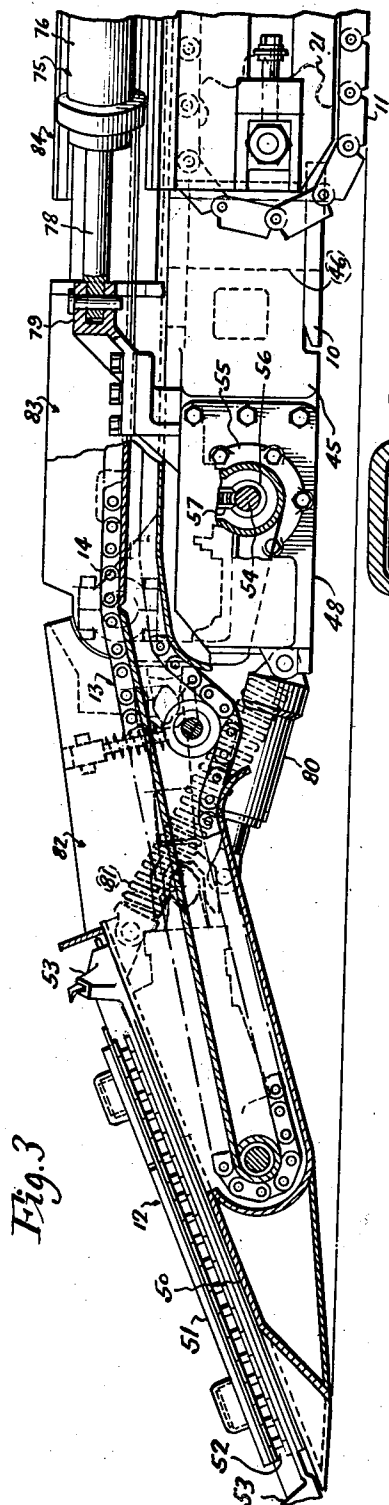
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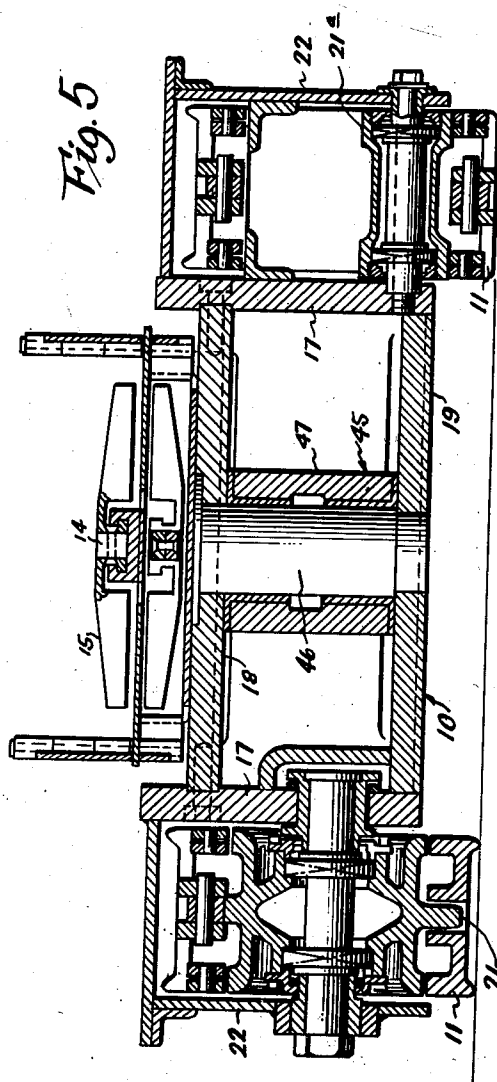
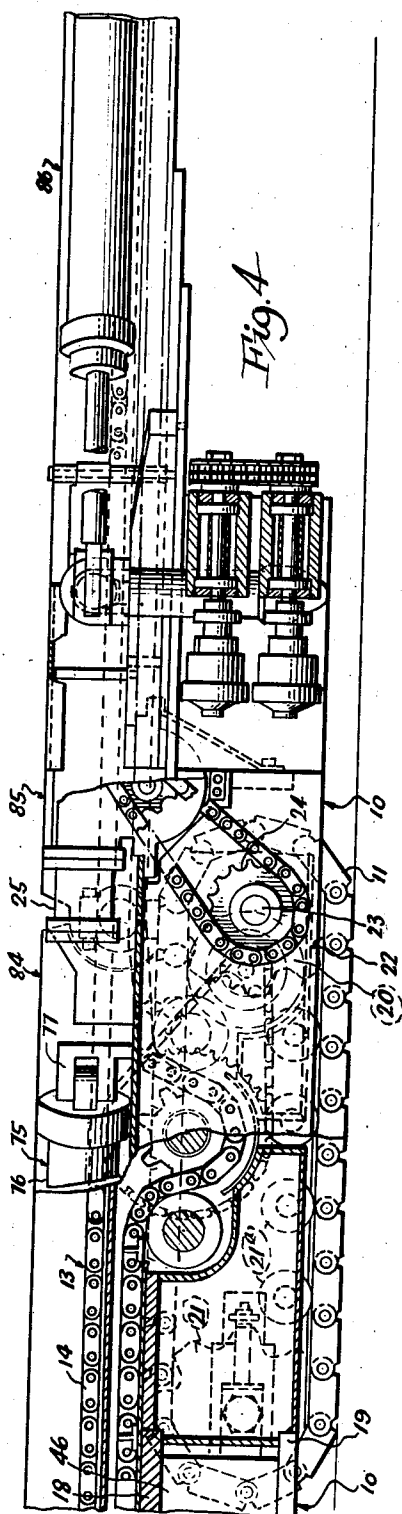
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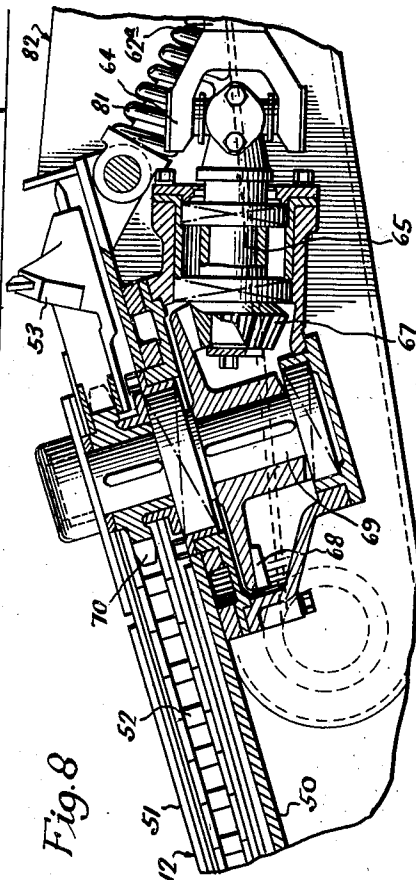
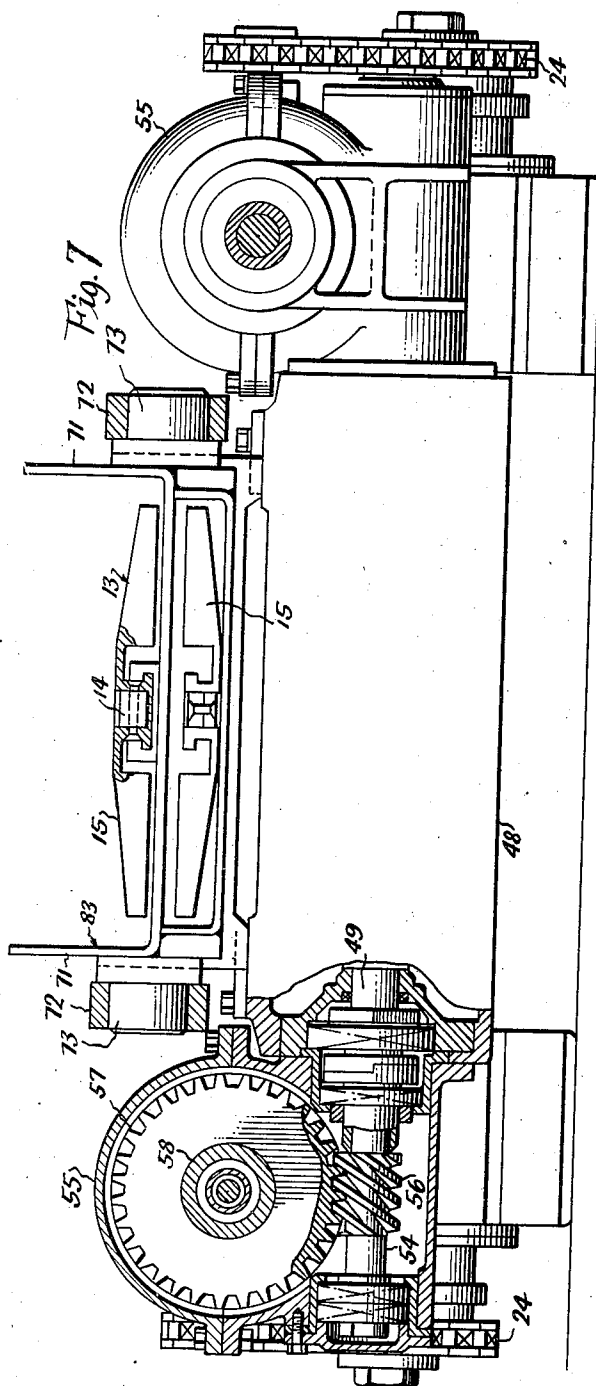
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2,358,849

GATHERING AND LOADING MACHINE

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Original application October 19, 1942, Serial No. 462,506. Divided and this application May 26, 1943, Serial No. 488,603

7 Claims. (Cl. 198—8)

This invention relates to improvements in gathering and loading machines adapted to load coal or other loose material at the working face of a mine.

The principal object of my invention is to provide an improved construction and arrangement of motor and drive connections for the gathering devices at the front end of the machine so as to provide an especially simple, compact and efficient construction requiring a minimum vertical clearance at the front end of the machine.

Other objects of the invention will appear from time to time as the following specification proceeds, and with reference to the accompanying drawings, in which:

Figure 1 is a fragmentary top plan view showing the front or gathering end of a machine constructed in accordance with my invention, with certain parts broken away and shown in section to show details of construction;

Figure 2 is a fragmentary top plan view forming in effect a continuation of Fig. 1, and showing the main part of the machine with the rear or discharge end of the main conveyor broken away, and with certain other portions shown in section;

Figure 3 is a vertical section taken on certain longitudinal planes, showing the front portion of the machine included in Figure 1;

Figure 4 is a vertical section taken on certain longitudinal planes, constituting in effect a continuation of Figure 3, and showing the main part of the machine;

Figure 5 is a transverse section taken on line 5—5 of Figure 1;

Figure 6 is an enlarged section taken on line 6—6 of Figure 1, showing details of the hydraulic clutch mechanism for the gathering chain drive;

Figure 7 is a transverse section taken generally on line 7—7 of Figure 1; and

Figure 8 is a section taken on line 8—8 of Figure 1, showing details of the gathering chain drive sprocket and its associated parts.

Referring now to details of the embodiment of my invention illustrated in the drawings, the main elements of the machine consist of a main frame 10 mounted on a pair of endless treads 11, 11 and having an inclined gathering element or loading head 12 disposed in advance of said main frame, and a conveyor 13 extending from the gathering element rearwardly over the main frame and beyond the rear end of the latter in overhanging position so as to discharge material into mine cars or the like. Said conveyor is of

the single center strand endless chain and flight type including an endless chain 14 having spaced apart flights 15, 15 secured thereto and projecting laterally therefrom in opposite directions.

The main frame 10 includes a pair of upright side frame members 17, 17, a deck plate 18 and a bottom plate 19 (see Figure 5). The endless treads 11, 11 are suitably mounted at opposite sides of the side frame members on drive sprockets 20, 20 near the rear end of the frame, idler sprockets 21, 21 at the front of the frame, and a plurality of intermediate bogie wheels 21a, 21a. Said sprockets and bogie wheels are supported on suitable shafts which have bearing at their inner ends on the main frame and at their outer ends in overhanging brackets 22 at opposite sides of the frame. Details of the endless tread structure and its supporting means need not be described further, as they form no part of the present invention, excepting to point out that drive shafts 23, 23 of the drive sprockets 20 project outwardly beyond the overhanging supporting brackets 22, 22 and have chain drive sprockets 24, 24 fixed thereon to provide independent driving connections for each of said endless treads from a pair of hydraulic motors 25, 25a mounted at each side of the main frame (see Figure 2).

The gathering element 12 is supported for vertical tilting movement on an intermediate frame 45, which in turn is pivotally connected at the front end of the main frame 10, for lateral swinging movement. The pivotal support for said intermediate frame is shown in Figures 3 and 5, and consists of an upright pivot post or king pin 46 mounted in and extending between the top plate 18 and the bottom plate 19 of the main frame. A cylindrical bearing member 47 of frame 45 is journaled on said post, and said frame projects forwardly therefrom beneath the conveyor 13, to form a support for a swivelling portion thereof, as will presently be described in detail. An electric motor 48 is mounted at the front end of said intermediate frame, to provide the motive power for the gathering chains of the gathering element.

The gathering element 12 herein shown is of the familiar type including an inclined gathering plate 50 extending along opposite sides of the front end of the conveyor 13 and across the front end thereof. A pair of chain guiding members 51, 51 having endless chains 52, 52 mounted for orbital movement thereabout, are mounted as usual on said plate, along opposite sides and forwardly of the conveyor. A plurality of gather-

ing arms 53, 53 are carried by said chains, for picking up material from the ground and moving it along said plate onto the conveyer.

The gathering chains 52 are driven from the electric motor 48 by similar gear trains connected to opposite ends of the transverse armature shaft 49 of said motor, as shown in Figures 1 and 7. Each gear train is supported in a casing 55 and consists of a worm 56 on a stub shaft 54 connected as by a flexible joint to the armature shaft 49, and meshing with a worm gear 57 on a longitudinal shaft 58. The latter shaft extends forwardly of casing 55 and forms the inner driving member of a multiple disc clutch indicated generally at 59 (see Figure 6). The outer driven member 60 of said clutch has bearing in a supporting bracket 61 extending forwardly of the casing 55 and is connected to one end 62 of a splined shaft by a universal joint 63. The other end 62a of said splined shaft is connected by a universal joint 64 to a shaft 65, journaled in a gear housing 66 secured to the under face of the gathering plate 50.

The shaft 65 has a bevel pinion 67 fixed on its forward end, meshed with a bevel gear 68 on an upright shaft 69. The latter shaft projects above the gathering plate and has a chain sprocket 70 fixed on its upper end which meshes with the gathering chain 52 at one side of the conveyer.

The clutches 59, 59 are controlled by hydraulic means as will hereinafter more fully appear.

The inclined plate is supported forwardly of the intermediate frame 45 by spaced upright side plates 71, flared outwardly along their upper margin and having trunnion bearings 72, 72 at their rear ends connected to trunnions 73, 73 fixed at opposite sides of the intermediate frame 45 (see Figures 1 and 7), so as to permit vertical tilting adjustment of the gathering element. The gathering element 12 and intermediate frame 45 are swung laterally relative to the main frame 10 by a hydraulic extension device 75, as herein shown, consisting of a cylinder 76 having its base pivotally mounted on a bracket 77 at one side of the main frame, and a piston rod 78 pivotally connected to a bracket 79 fixed at one side of the intermediate frame 45 (see Figures 1 and 2).

The gathering element has tilting adjustment on trunnions 72, 72 relative to the intermediate frame 45, by a pair of hydraulic cylinder extension devices 80, 80 of the usual cylinder and piston form, each having one end pivotally connected to the base of said intermediate frame, and the other end pivotally connected to the under side of the gathering element, as is best shown in Figure 3. A pair of coil springs 81, 81 are also interposed between the base of the intermediate frame and the rear end of the inclined plate 50, so as to yieldingly support a part of the weight of the gathering element in its various tilted positions.

The conveyer 13, which extends continuously from the gathering element 12 to the rear end of the machine, consists generally of a plurality of aligned trough sections, arranged in the following order: a front inclined trough section 82, tiltable vertically with the gathering head on a transverse axis; a horizontal trough section 83 mounted on and swinging laterally with the intermediate frame 45; a horizontal trough section 84 fixed on the forward part of the main frame 10; a vertically tilting trough section 85 connected thereto on a transverse axis near the rear end of the main frame (see Figures 2 and 4); and finally a laterally swinging trough section 86, pivotally

connected to the rear end of the section 85 and overhanging the rear of the machine, as shown in Figures 2 and 4.

The details of said conveyer and its articulated construction are disclosed in my co-pending application Serial No. 462,506, filed October 19, 1942, of which this is a division.

The hydraulic control system and the hydraulic actuating devices used in effecting the several operating or adjusting functions of the machine, will now be more fully described.

The hydraulic motor devices which operate by power in reverse directions, such as the cylinder 75 for swinging the gathering element 12 and intermediate frame 45 laterally, are double-acting cylinder and piston devices of a well known type which may be supplied with fluid pressure under manual control of valves, of any suitable form and arrangement. The hydraulic cylinder devices 80, 80 for elevating the gathering element 12 may be single-acting cylinder and piston devices controlled in any well known manner, so that no detailed description of these devices is necessary.

The construction of the hydraulic devices for operating the clutches 59, 59, controlling the operation of the gathering chains 52, 52 of the gathering head, is shown in detail in Figure 6 and includes a cylinder 190 fixed to one end of the gear casing 55 and having a piston 191 therein, with a piston rod 192 rotatably connected thereto by an anti-friction bearing member 193. The piston rod 192 extends concentrically through the shaft 58, and is connected to a pressure plate 194 at the opposite end of said shaft. The pressure plate normally engages the discs of the clutch 59 by compression of a coil spring 195 seated in a recess 196 in shaft 58 and engaging an abutment 197 on the piston rod 192. The resistance of said coil spring is overcome by fluid introduced through pipe 198 into the cylinder 190, so as to disengage the clutch when desired. Fluid pressure may be supplied to cylinder 190 under manual control of valve means, in the usual manner.

While I have herein shown and described one form in which my invention may be embodied, it will be understood that the construction thereof and the arrangement of the various parts may be altered without departing from the spirit and scope thereof. Furthermore, I do not wish to be construed as limiting my invention to the specific embodiment illustrated, excepting as it may be limited in the appended claims.

I claim as my invention:

1. In a loading machine, a main frame, a loading head mounted forwardly of said main frame, including an inclined gathering plate and a pair of gathering devices at opposite sides thereof, and drive means for said gathering devices including a motor mounted on said main frame adjacent the rear end and below the plane of said plate, and with its armature shaft extending transversely of the latter, and independent drive connections for said gathering devices from opposite ends of said armature shaft.

2. In a loading machine, a main frame, a loading head mounted for vertical tilting movement on a transverse axis forwardly of said main frame, including an inclined gathering plate and a pair of gathering devices at opposite sides thereof, and drive means for said gathering devices including a motor mounted on said main frame adjacent the rear end and below the plane of said plate, and with its armature shaft extending transversely of the latter, and independ-

ent drive connections for said gathering devices from opposite ends of said armature shaft.

3. In a loading machine, a main frame, a loading head mounted for vertical tilting movement on a transverse axis forwardly of said main frame, including an inclined gathering plate and a pair of gathering devices at opposite sides thereof, a supporting frame intermediate said main frame and loading head having pivotal connection with said main frame to swing on a vertical axis, and having pivotal connection with said loading head to permit the latter to tilt on a horizontal axis, and drive means for said gathering devices including a motor mounted on said intermediate frame adjacent the rear end and below the plane of said plate, and with its armature shaft extending transversely of the latter, and independent drive connections for said gathering devices from opposite ends of said armature shaft.

4. In a loading machine, a main frame, an intermediate frame mounted for lateral swinging movement at the front end of said main frame, a loading head, including an inclined gathering plate and gathering devices at opposite sides thereof, mounted for vertical tilting movement on a transverse axis forwardly of said intermediate frame, and a drive motor mounted on said intermediate frame below the plane of said gathering plate, and having driving connections with said gathering devices.

5. In a loading machine, a main frame, a loading head mounted forwardly of said main frame including an inclined gathering plate and a pair of gathering devices at opposite sides thereof, an upwardly and rearwardly inclined endless conveyer having its front end in position to receive material from said gathering devices, and drive means for said gathering devices including a motor mounted on said main frame beneath said elevating conveyer and rearwardly of said gathering plate and with its arma-

ture shaft extending transversely of the latter, and independent drive connections for said gathering devices extending from opposite ends of said armature shaft and along opposite sides of said elevating conveyer.

6. In a loading machine, a supporting frame, an intermediate frame mounted for lateral swinging movement, a loading head mounted for vertical tilting movement on a transverse axis forwardly of said supporting frame including an inclined gathering plate having a pair of gathering devices at opposite sides thereof, and an elevating conveyer having its front end in material receiving relation at the rear of said gathering devices and adjustable vertically with the latter, a drive motor mounted on said supporting frame below an elevating portion of said elevating conveyer and with its armature shaft extending transversely of the latter, and independent drive connections for said gathering devices extending from opposite ends of said armature shaft and along opposite sides of said elevating conveyer, including telescopic rotatable power shafts.

7. In a loading machine, a main frame, an intermediate frame mounted for lateral swinging movement at the front end of said main frame, a loading head mounted for vertical tilting movement on a transverse axis forwardly of said intermediate frame, said loading head including an inclined gathering plate and gathering devices at opposite sides thereof, and an elevating conveyer adapted to receive material from the rear of said gathering devices and carry it upwardly and rearwardly along said main frame, and a drive motor mounted on said intermediate frame below said elevating conveyer and having independent driving connections with said gathering devices extending along opposite sides of said elevating conveyer.

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