United States Patent

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[54] **LOADING AND CONVEYING MACHINE**
4 Claims, 6 Drawing Figs.

[52] **U.S. Cl.** **214/90,** 198/10
[51] **Int. Cl.** **B65g 41/02**
[50] **Field of Search** ..... 214/90, 92, 91, 93, 94; 198/7, 10; 37/(Inquired)

[56] **References Cited**
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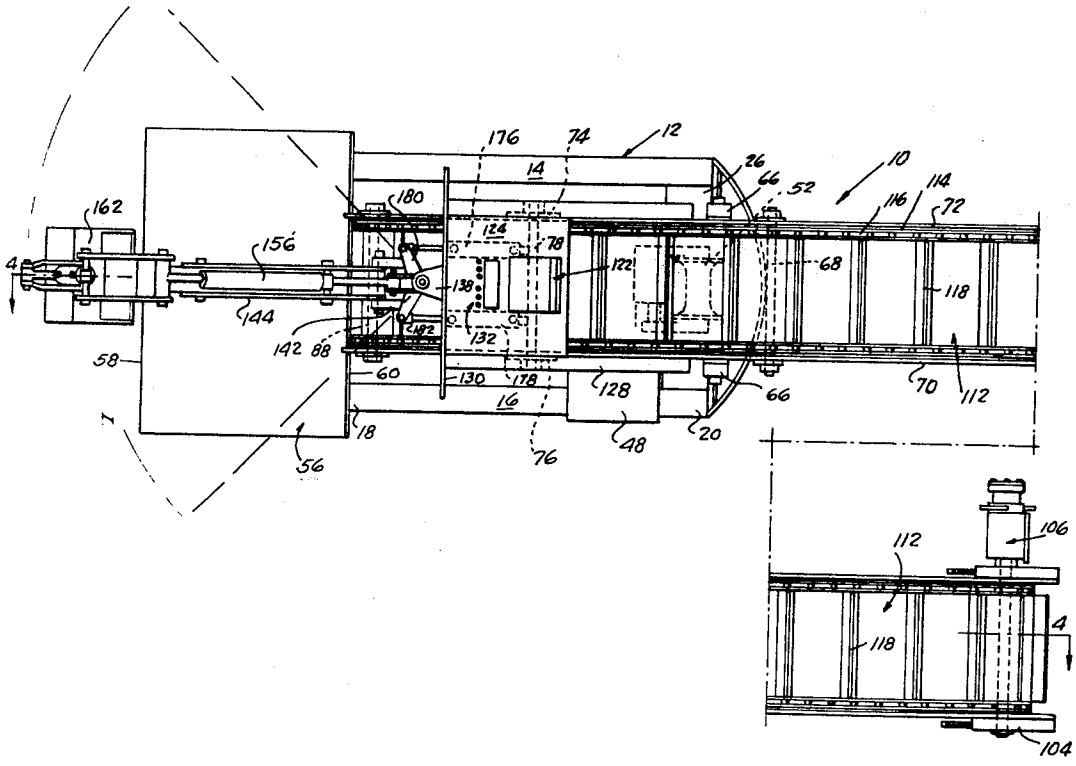
ABSTRACT: A loading and conveying machine having a forward pulling implement movable in both lateral and vertical axes to force material onto an inclined plate and to a conveyor means.



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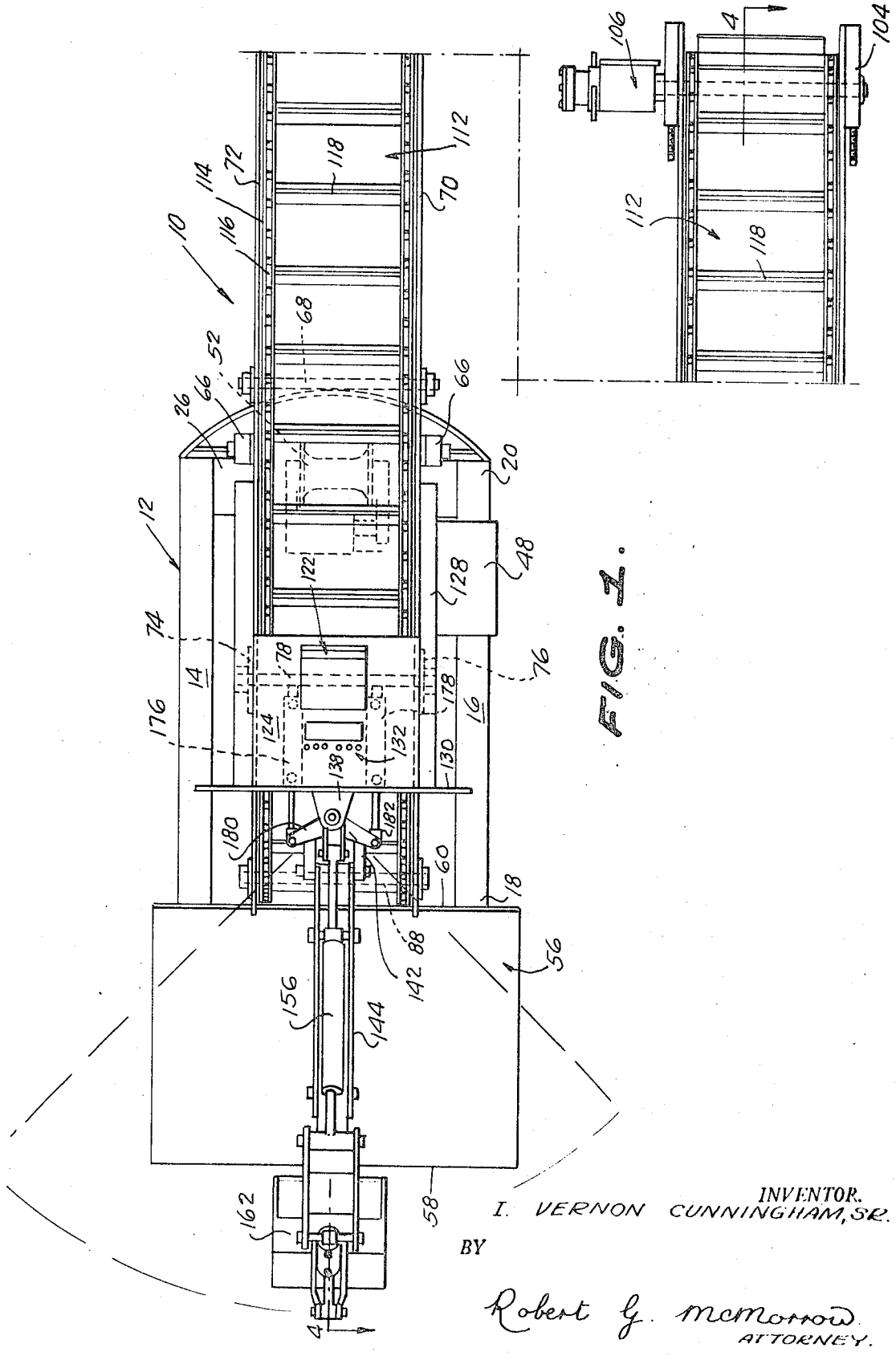

FIG. 1.

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FIG. 2.

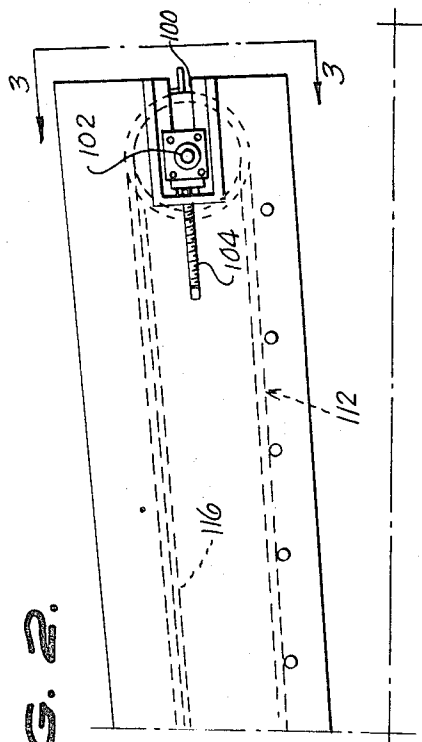
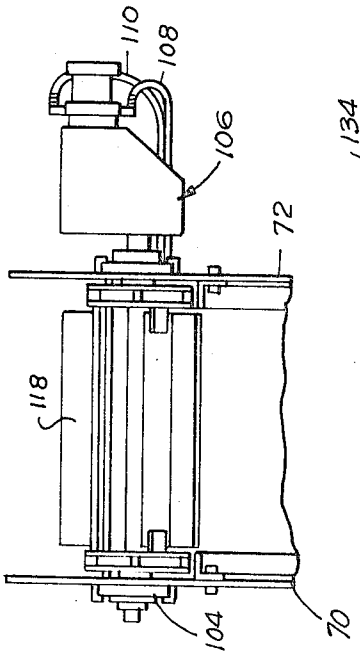


FIG. 3.



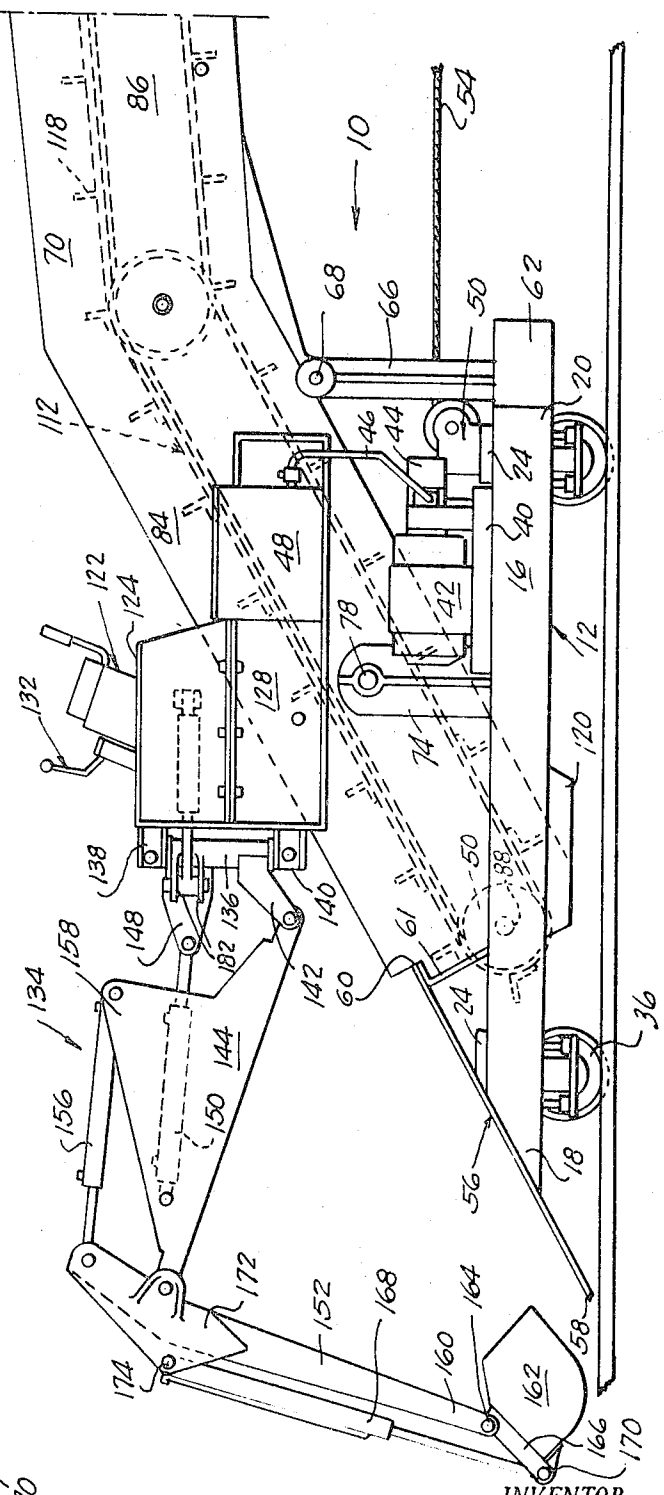


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FIG. 4.

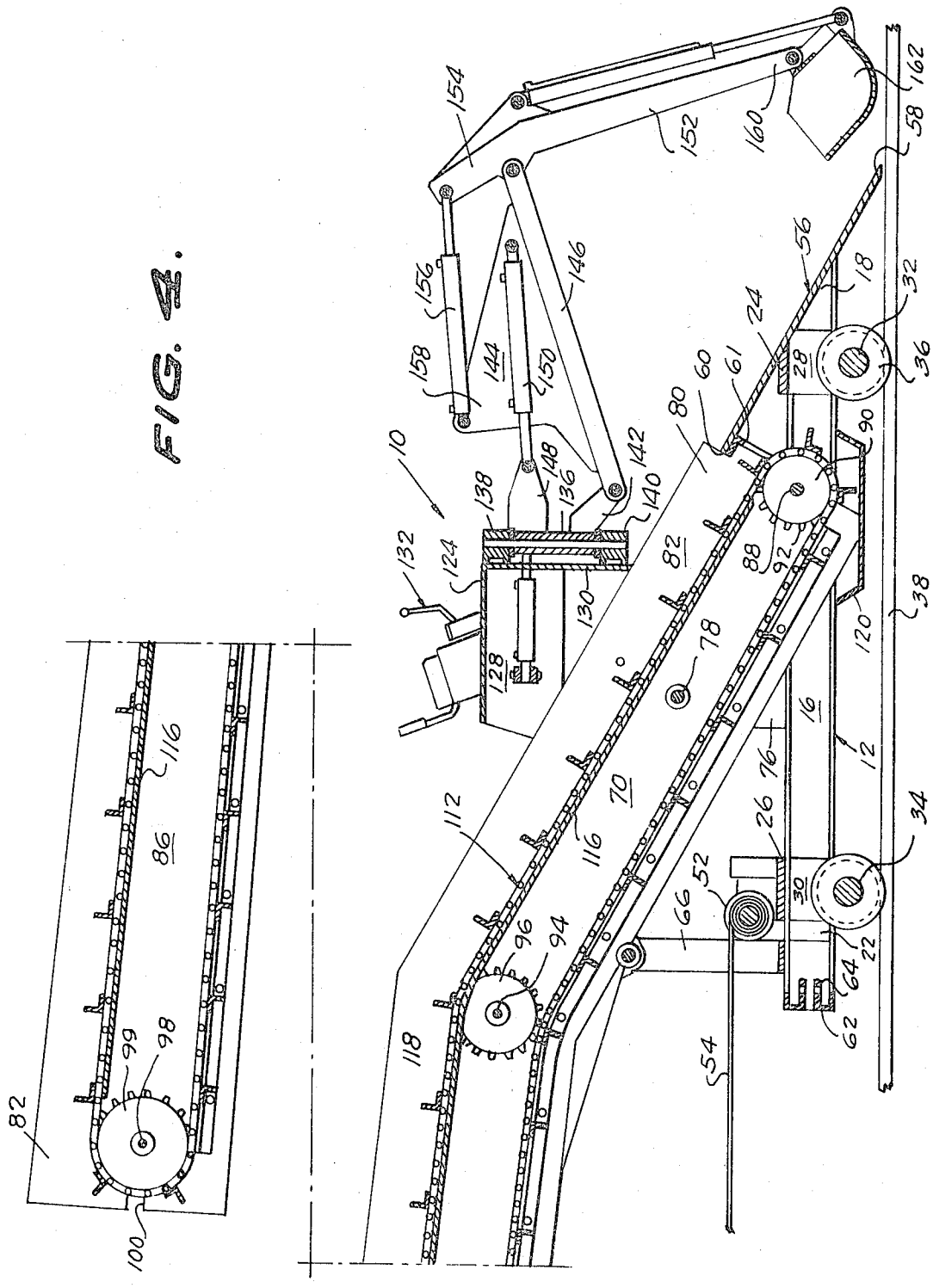

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FIG. 5.

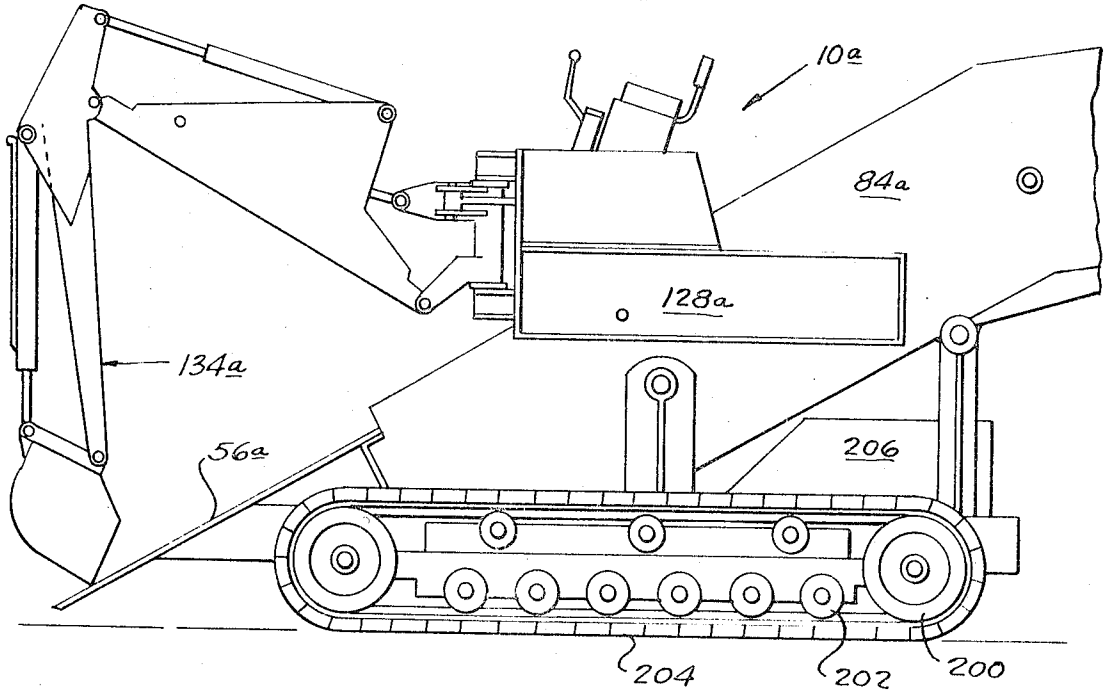
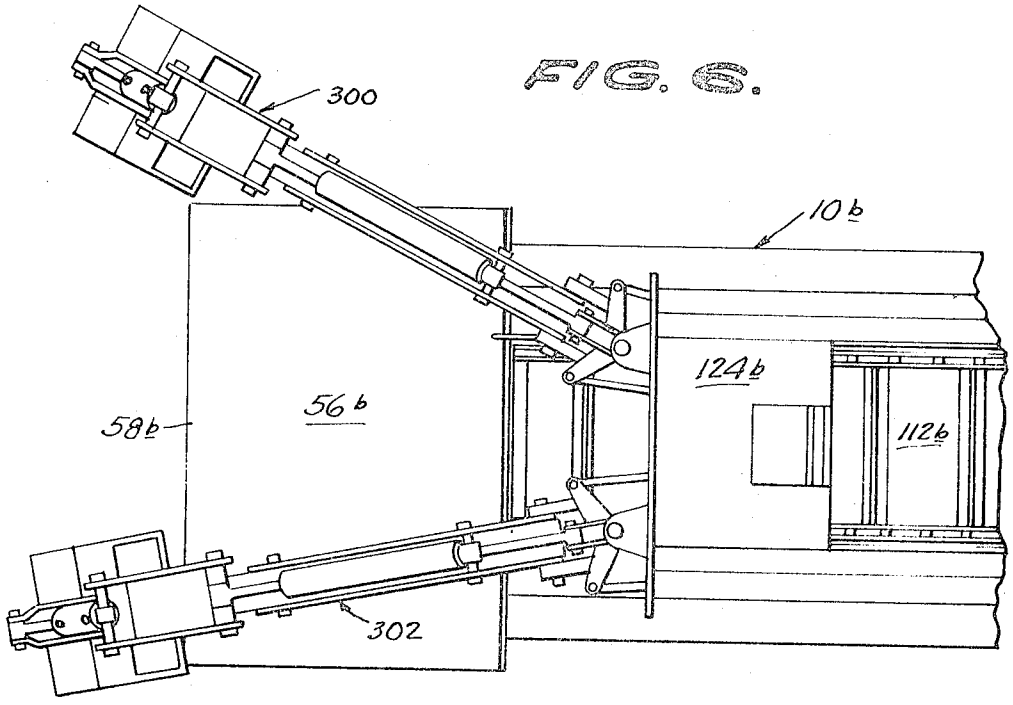


FIG. 6.



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LOADING AND CONVEYING MACHINE

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to means for gathering materials such as loose rocks, sand, ores, and similarly constituted substances for ultimate conveyance.

2. Description of the Prior Art

It has been previously proposed to provide loading devices involving vehicles with forward pulling implements to force materials onto a conveyor ultimate discharge in a further conveyor. Exemplary of such prior proposals is the device shown in prior U.S. Pat. No. 1,905,472 (Kraft, 1933). These prior devices however do not supply effective operation under conditions encountered in use principally in that they have been limited in respect of the available range of movement of the gathering implements thereof, and further in that the inclinations and lengths of the conveying belt systems have been subject to limiting structural features. In addition, the art has failed to supply an effective means for transfer of the materials from the implement to the conveying means.

SUMMARY OF THE INVENTION

The present invention is directed to a machine for gathering and conveying loose or partially loosened materials such as coal, ores, sand and other products of mining or excavation.

Primarily, the machine of this invention finds maximum utility in subterranean mine shafts, pits, steeply inclined open areas, and the like, where conventional loading and hauling apparatus is not adapted for use. The invention comprehends an assemblage of elements including an endless conveyor, an inclined angle plate having a discharge edge positioned over the conveyor, and implement means operable by pivoting in both horizontal and vertical planes to pull the material to be conveyed to an upon the angle plate for discharge on the conveyor. A basic objective of the invention resides in the provision of apparatus as aforesaid wherein the implement assembly is suitably articulated for movement in maximum arcs of travel forwardly thereof for gathering of material thereby permitting the machine to be mounted in a fixed position (or wherein circumstances require, a rail mounting) without unduly restricting its area of utility.

It is further an objective of importance to supply a system as described above wherein the conveyor is of the endless belt variety, having upper and lower flights, and wherein there is an initial relatively steeply inclined section, and a trailing section of flatter angularity. By virtue of this expedient, the apparatus is adapted for employment in low overhead environments. Additionally, there may be provided a series of conveyors arranged in a sequence such that discharge from the conveyor of the present invention is to a second conveyor, and to further conveyors leading to surface discharge locations.

A further object of the invention is to provide a conveyor and loader for subterranean use on a rail system, and one wherein the apparatus involves a winch system to provide mobility. Other embodiments of the invention may provide self-contained units and other and different surface conveyance means.

The present invention is preferably operated by a hydraulic system providing multiple functions, and is adaptable for construction in large part from readily available components. In the latter, it is to be observed that the invention incorporates standard implement means, making special construction of the gathering apparatus unnecessary. Thus, the device is of relatively manufacturing cost, and is trouble-free in operation and durable in use.

Other and further objects and advantages of the invention will become apparent to those skilled in the art from a consideration of the following specification when read in conjunction with the annexed drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a top plan view showing a loading and conveying machine constructed and assembled in accordance with the teachings of this invention;

FIG. 2 is a side elevational view thereof;

FIG. 3 is an enlarged, fragmentary, end elevational view taken substantially from the plane of the line 3–3 of FIG. 2, looking in the direction of the arrows;

FIG. 4 is a longitudinal cross-sectional view taken on the line 4–4 of FIG. 1, looking in the direction of the arrows;

FIG. 5 is a foreshortened side elevational view of a first modified form of the invention; and

FIG. 6 is a top plan view of a further modification.

DESCRIPTION OF THE PREFERRED EMBODIMENTS:

In FIGS. 1 through 4 the loading and conveying machine hereof is generally identified by reference numeral 10. The apparatus 10 includes a frame 12 comprising side members 14, 16, with angular leading ends 18 and having opposite trailing ends 20 connected by a back frame element 22. Cross plates 24, 26 extend transversely of the side member and have depending wheel support legs 28, 30, respectively, which extend between the frame sides. Axles 32, 34 are mounted between the legs and carry wheels 36 mounted on rails 38 to provide surface engagement means for the machine.

A support pallet 40 (FIG. 2) is secured on the upper side of the frame adjacent its trailing end, and has a motor 42 constituting a prime mover for hydraulic pump 44 connected by a line conduit 46 to a reservoir 48 mounted in a manner described below. A winch assembly 50 is provided, and includes a drum 52 and cable 54, the drum being in a bracket secured on the cross plate 26. The drum is powered by a connection (not shown) with the hydraulic power supply of the machine.

An important component of the machine comprises a forward angle plate 56 of heavy metallic construction. The plate 56 is connected to the inclined leading ends 18 of the frame sides and is thus inclined upwardly from its intake edge 58 to its discharge edge 60. The edge 60 is supported on an interior plate 61 secured to the frame and having a bifurcated central portion. It will be noted in FIGS. 2 and 4 that the intake edge 58 is positioned closely adjacent ground level, and in FIG. 1, that the plate is of a width substantially exceeding the width of the frame and its components. Thus, the plate accommodates all materials occupying the path of the machine.

The frame-trailing end has an arcuate rear reinforcing bar 62 thereon with an inboard hitch connection 64. Reinforced stanchions 66 are provided on opposing sides of the frame in the area of the bar and have fixed crossbars 68 extending therethrough for a purpose described below.

The conveyor assembly of the invention comprises elongated sidewalls 70, 72 fixed to the base frame and extending upwardly and rearwardly thereof. The walls abut the interior plate 61 at their leading ends, and the crossbar 68 extends therethrough as a support means adjacent the rear ends of the frame. Intermediately, the frame has a further pair of upright supports 74, 76 with a crossbar 78 which supports the sidewalls and which projects therethrough.

The sidewalls are substantially coextensive in length and have inboard ends 80 and opposite outboard ends 82. The walls are preferably of two-stage construction, including forward steeply inclined sections 84, and rearward sections 86 of more shallow angularity.

At the inboard ends 80 of the walls 70, 72 a cross axle 88 is rotatably mounted and carries wheels 90 at its ends, the wheels having gear teeth 92 thereon. At a central section of the walls, a second rotatable cross axle 94 spans the same and has toothed wheels 96, while adjacent the ends 86 of the walls, a third axle 98 is provided. The axle 98, with its gear wheels 99, is mounted in slots 100 in a bearing assembly 102 having a screw-type positioning means 104 at one side, and having a drive motor 106 (FIG. 3) at its opposite side. The drive motor

106 is hydraulically powered by the power supply means of the device, and input and return lines 108, 110 are connected in a manner not shown to the reservoir 48 and pump 44. An endless belt 112 is provided and has side portions 114 with link chain openings 116 engaged by the teeth of the wheels 90, 96 and 99. Thus, the belt is driven by the motor 106, and has upper and lower flights. The upper flight is supported by an elongated plate 116 which is connected at its sides to the conveyor sidewalls and is shaped to cause the belt to follow a path substantially similar to the configuration of the sidewalls.

The belt 112 has uprights 118 thereon at spaced intervals to hold the conveyed material. At its inboard end, the belt passes below the discharge edge 60 of the plate 56, and extends downwardly into a pan 120 depending from the frame. The pan prevents the loss of conveyed material and protects the inward extremity of the belt from possible damage in use.

An operator's seat 122 is mounted on a top plate 124 of a bracket spanning the conveyor sidewalls adjacent the forward end of the machine. The top wall is supported on opposite side plates 126, 128 and a front plate 130. Suitable handles 132, not illustrated in detail, are mounted on the top plate for control of the various hydraulic mechanisms, including the winch, conveyor belt drive, and an implement described below.

Movement of material for conveyance by the machine 10 is primarily accomplished by an implement assembly 134. The implement assembly is mounted on a sleeve 136 pivotally secured between connection ears 138, 140 on the forward plate 130. Spaced arms 142 are fixed to the sleeve and project forwardly thereof, and have elongated boom plates 144 pivoted thereat at a lower connecting channel 146. A pair of clevis plates 148 on the sleeve are pivoted to one end of a boom plate tilt cylinder 150, the opposite end of which is pivoted to the boom plate 144 adjacent their outer ends. A second elongated boom 152 is pivotally mounted on the outer ends of the first boom plate and has a projecting upper portion 154 connected to one end of a second tilt cylinder 156 — the inboard end of which is connected to the boom plate 144 at elongated triangular portions 158 thereof. Thus, the cylinders 150 and 156 accomplish vertical movements of the boom assembly. The second boom includes a distal end 160 to which is connected a bucket, flat plate, or other implement 162 (the implement configuration being dictated by the type of material being handled). The implement is pivoted, at a cross pin 164 to the boom, and has a top bracket 166 thereon. A cylinder 168 is connected to the bracket 166 at a pivot pin 170, and to a boom shroud 172 at a pin 174. The shroud is also connected to one end of the cylinder 156.

Lateral pivoting movements of the implement assembly 134 are controlled by swing cylinders 176, 178. Each of these cylinders has an interior end connected to the cross brace 78, and the extensible outer ends thereof are secured to pivot wings 180, 182 (FIG. 1) fixed on opposite sides of the sleeve 136. The swing cylinders function jointly in opposite manner such that extension of one cylinder is coequal with retraction of the other.

In operation, the device is lowered in an excavation such as a mine shaft, to the location of loosened material.

In operation, the device is lowered in an excavation such as a mine shaft, to the location of loosened The operator manipulates the control for the implement assembly and the implement forces the material onto the plate 56 and over the discharge end 60 of the plate. The material then gravitates to the upper flight of the conveyor and is deposited therefrom at the upper end either on a further conveyor or in some other type of transport mechanism. The operator may further control the positioning of the device through operation of the winch assembly.

In FIG. 5, the device 10*a* is constructed substantially as described above but is modified to provide a self-contained support system including drive sprockets 200, castors 202, and tracks 204. A suitably encased motor system 206 is also provided. FIG. 6 discloses a further modification wherein the machine incorporates two independently mounted implement assemblies 300, 302, but wherein the remainder of the device 10*b* is substantially as described above.

Having described and illustrated several embodiments of this invention in some detail, it will be understood that these descriptions and illustrations have been offered only by way of example, and that the invention is to be limited in scope only by the appended claims.

I claim:

1. A gathering and conveying machine for mined materials in a subterranean mine shaft or the like, the machine comprising:
- a base frame having a forward end and a trailing end and having mobile ground engagement means thereon;
- motor means mounted on the frame including a hydraulic source;
- an inclined forward angle plate connected to the leading end of the frame, having an intake edge adjacent ground level and an opposite, elevated discharge edge;
- a conveyor assembly, including conveyor sidewalls, gear wheels extended between the sidewalls with roller means therebetween and an endless belt trained about the rollers, the belt having upper and lower flights and being positioned such that a portion of the upper flight passes below the discharge edge of the plate, and a belt support plate below the upper flight of the belt;
- an elongated mounting bracket, having opposite sideplates, a forward plate and a top, the sideplates being secured to the conveyor sidewalls adjacent the forward end of the frame;
- an operator's seat and hydraulic control means on the top plate;
- pivot brackets on the forward plate;
- a gathering means comprising a first boom including a boom plate mounted on said pivot brackets for vertical and lateral movement responsive to extension and retraction of a group of hydraulic cylinders;
- a second boom pivoted to the boom plate and including a distal end;
- a gathering and pushing implement on the distal end of the second boom; and
- hydraulic cylinder means controlling the pivoting of each boom and the implement, the second boom and implement being adapted to gather said materials on the plate and to pull said materials thereto and off the discharge edge to the belt.

2. The invention of claim 1, wherein:
- the ground engagement means comprise wheels engaged on mine rails; and
- a cable connection connected to the frame for raising and lowering the machine in said shaft.

3. The invention of claim 1, wherein:
- the ground support means comprise a plurality of tracked rollers; and
- a prime mover on said frame for locating the rollers.

4. The invention of claim 1, wherein at least two gathering means are provided.