

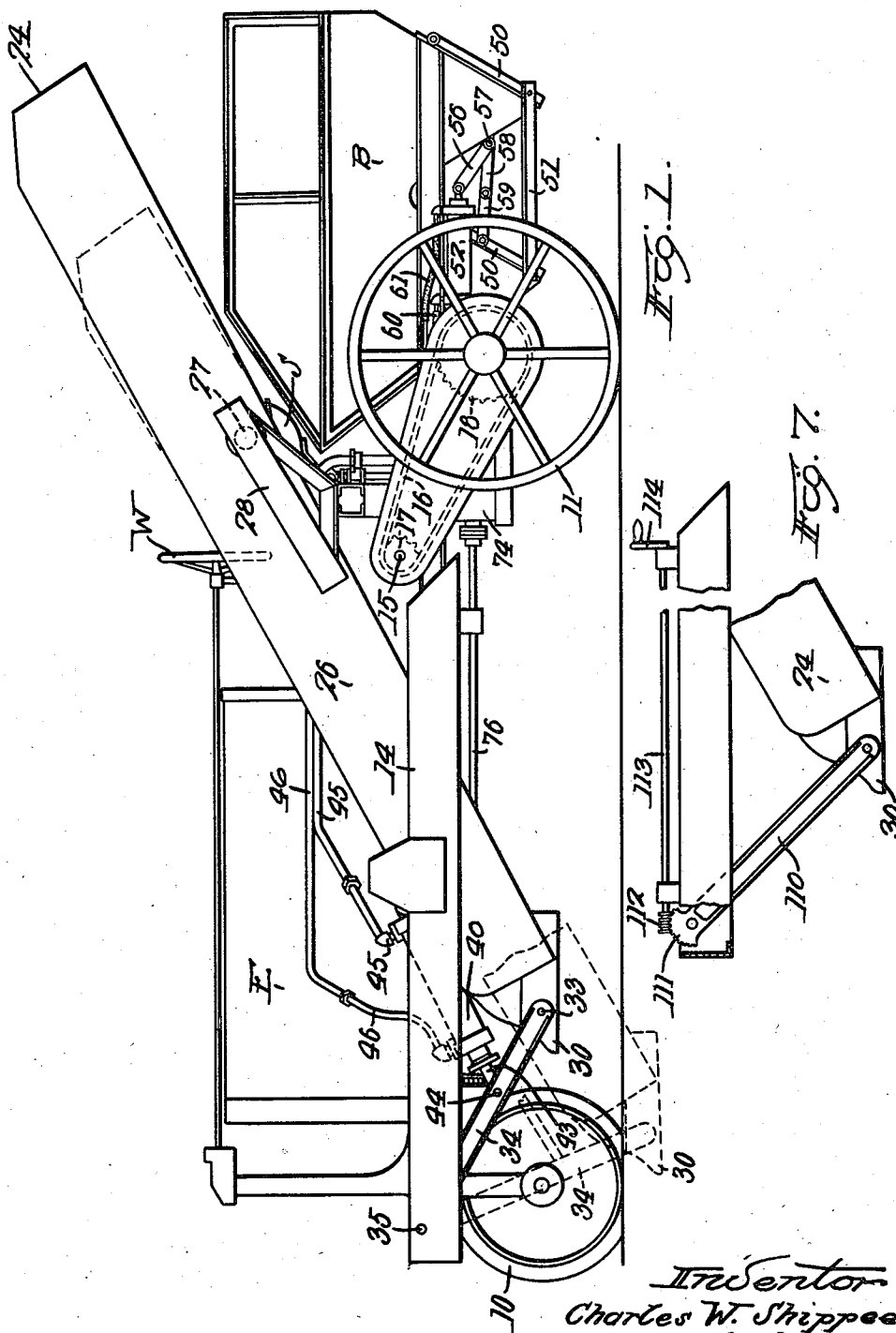
Oct. 15, 1935.

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EXCAVATOR AND LOADER

2,017,477

Filed Dec. 1, 1932

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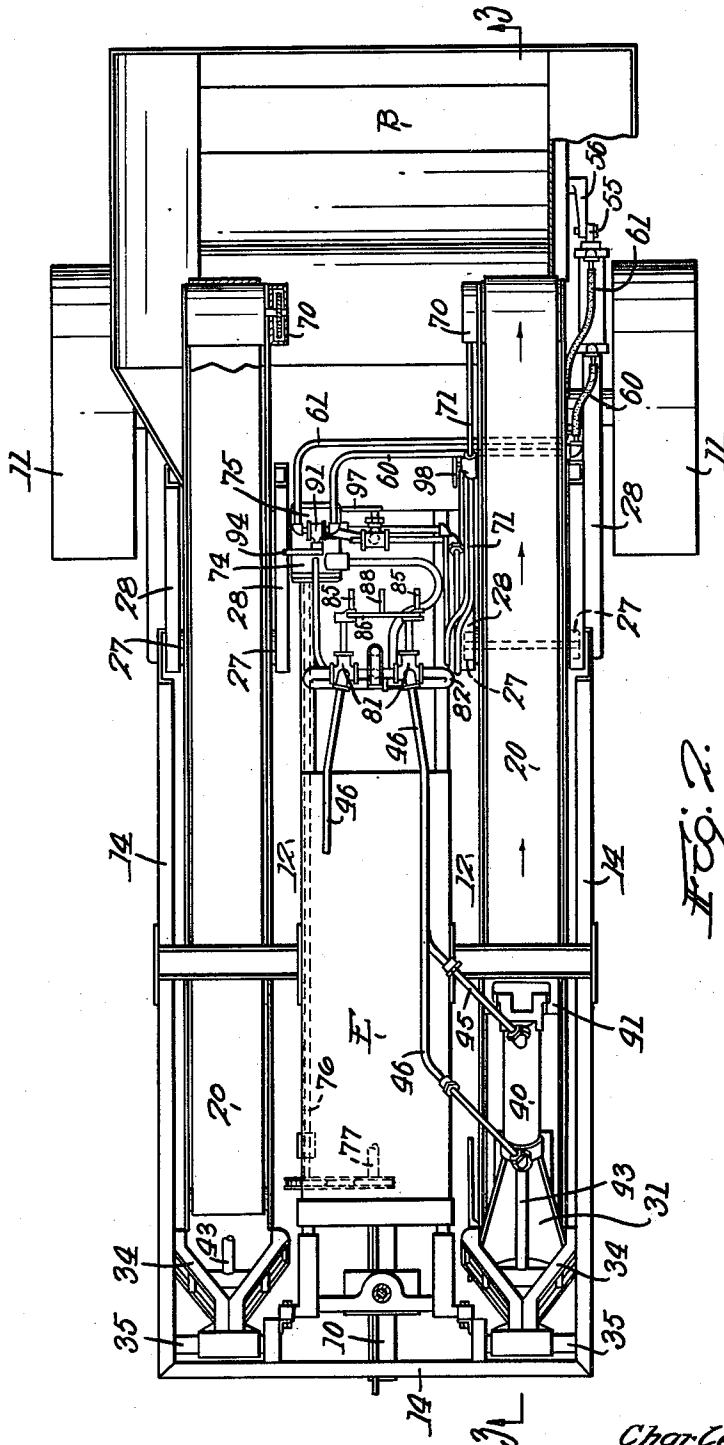
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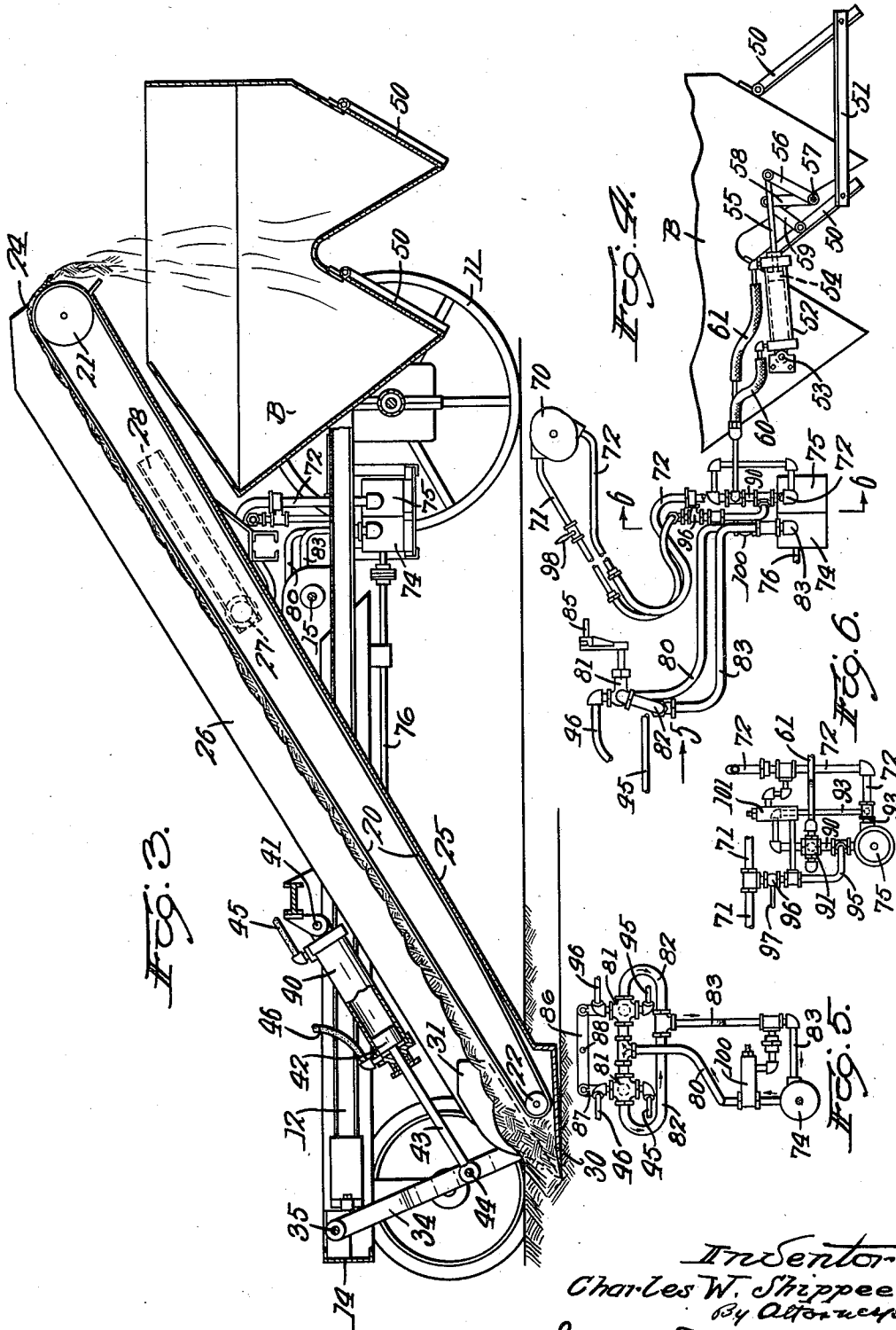
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UNITED STATES PATENT OFFICE

2,017,477

EXCAVATOR AND LOADER

Charles W. Shippee, Worcester, Mass.

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4 Claims. (Cl. 37—8)

This invention relates to a machine for removing loam or other easily loosened material from a ground surface to be stripped or excavated, and for loading the material into a suitable container for transportation.

It is the general object of my invention to provide a machine adapted to force a pair of scoops or shovels through the material to be removed, and to provide such a machine with improved means for raising and lowering each shovel and for applying downward pressure thereon.

A further object of the invention is to provide improved elevating and conveying mechanism associated with the shovels and preferably adjustable therewith toward and away from the operative position of the shovels.

My invention further relates to arrangements and combinations of parts which will be hereinafter described and more particularly pointed out in the appended claims.

A preferred form of the invention, together with a modification thereof, is shown in the drawings, in which

Fig. 1 is a side elevation of my improved excavator and loader;

Fig. 2 is a plan view thereof;

Fig. 3 is a longitudinal sectional elevation, taken along the line 3—3 in Fig. 2;

Fig. 4 is a side elevation of certain hydraulic operating mechanism;

Fig. 5 is an end elevation of certain parts, looking in the direction of the arrow 5 in Fig. 4;

Fig. 6 is a sectional end elevation of certain other parts, taken along the line 6—6 in Fig. 4, and

Fig. 7 is a side elevation, partly in section, showing a modified construction of the mechanism for raising the shovels and conveyors.

Referring to the drawings, I have shown my invention embodied in a motor vehicle preferably having a single front wheel 10, a pair of rear wheels 11, inner frame members 12 and outer frame members 14. The machine is provided with a seat S for the operator and with a steering wheel W connected to swing the front wheel 10. A cross shaft 15 (Fig. 1) is connected through suitable clutch mechanism to an engine E and may be continuously rotated thereby. Chains 16 connect sprockets 17 on the shaft 15 to sprockets 18 by which the wheels 11 are rotated. The motor vehicle may thus be driven and steered as desired.

A conveyor belt 20 at each side of the machine is mounted on a driving pulley 21 and a guide-roll 22, both mounted in bearings in an oblique-

ly positioned conveyor support 24. Each support 24 comprises a back portion 25 (Fig. 3) and raised side portions 26 which extend substantially above the upper run of the conveyor belt 20.

The support 24 is provided with guide-rolls 27 (Fig. 2) at each side thereof and said guide-rolls are positioned in guiding channel members 28 fixed to the frame of the machine at opposite sides of each conveyor support. The lower end of each support is also provided with a base portion 30 and with a scoop or shovel 31.

The lower end of each conveyor support 24 is pivotally connected at 33 (Fig. 1) to the lower end of a forked lever 34 (Fig. 2) mounted on a short shaft 35 pivoted in the frame of the machine. It is obvious that by swinging the lever 34, the conveyor support 24 and shovel 31 may be moved toward or away from the material to be excavated and loaded.

For moving the lever 34, I have shown in Fig. 3 a hydraulic cylinder 40 pivoted at 41 to the frame of the machine and having a piston 42 and piston rod 43. The rod 43 is pivotally connected at 44 to the forked lever 34. Pipes 45 and 46 connect the opposite ends of the cylinder 40 to a suitable source of supply of fluid under pressure, and by connecting one end of the cylinder to the fluid supply and the other end to the exhaust, the conveyor support 24 and shovel 31 may be moved obliquely toward or away from the material to be excavated.

The machine is preferably provided with a self-contained body B having one or more dump gates 50, connected by a link 51. In Fig. 4 I have shown hydraulic mechanism for operating the gates 50, said mechanism comprising a cylinder 52 mounted on a fixed pivot 53 and having a piston 54 pivotally connected by a rod 55 to an arm 56 mounted on a cross shaft 57. Additional arms 58 on the shaft 57 are connected by links 59 to one of the gates 50.

When pressure is applied through a pipe 60 to one end of the cylinder 52, the gates 50 will be moved to the open or dumping positions indicated in Fig. 4. When pressure is applied through a pipe 61 to the opposite end of the cylinder, the gates will be moved to the closed position shown in Fig. 1, in which position the arms 58 and links 59 form locking toggles.

Rotary hydraulic motors 70 (Figs. 2 and 4) are provided for the driving pulleys 21 by which the conveyor belts 20 are operated, each motor being provided with a supply pipe 71 and an exhaust or return pipe 72.

Oil or other fluid under pressure is provided by pumps 74 and 75 actuated through a drive shaft 76 having a chain and sprocket connection to the crank-shaft 77 (Fig. 2) of the engine E.

The pump 74 supplies fluid to a feed pipe 80 (Figs. 4 and 5) which is connected to a pair of four-way valves 81 (Fig. 5). The valves 81 are also connected through branch pipes 82 to an exhaust or return pipe 83 by which the fluid is returned to the pump 74. The pipes 45 and 46 from one lifting cylinder 40 are connected to one valve 81 and the pipes 45 and 46 from the other lifting cylinder 40 are connected to the other valve 81.

Handles 85 (Figs. 2 and 4) are provided for the valves 81, and by manual operation of the valves 81 either cylinder 40 may be caused to raise or lower the associated conveyor support 24 and the shovel and conveyor belt mounted thereon.

A link 86 (Fig. 2) is pivoted to one handle 85 and is notched as indicated at 87 in Fig. 5 to engage the other handle 85. An additional handle 88 (Fig. 2) is provided on the link 86. When the link 86 is in operative position, the two valves 81 may be operated simultaneously to raise and lower both conveyor supports, but if it is desired to separately manipulate one of the supports, the link 86 may be swung over to inoperative position.

The four-way valves 81 are of ordinary commercial structure and are so constructed that when one of the pipes 45 or 46 is connected to the feed pipe 82, the other pipe 45 or 46 will be connected to the exhaust or return pipe 83. The valves also have an intermediate position in which all pipes are closed so that there can be no circulation of fluid. When the valves 81 are in this latter position, each piston 42 is locked in its cylinder 40, thus holding the conveyor support substantially fixed in a selected position.

The pump 75 (Figs. 4 and 6) is provided with a feed pipe 90 having a four-way valve 91 (Fig. 6) to which the pipes 60 and 61 from the gate-operating cylinder 52 are connected. A return or exhaust pipe 93 connects the valve 91 to the return side of the pump 75.

A handle 94 (Fig. 2) is provided for manual manipulation of the valve 91, and by suitably setting the valve fluid under pressure may be admitted to one end or the other of the cylinder 52, or the piston may be locked in position in the cylinder, the operation being substantially the same as for the valves 81 previously described.

The feed or supply pipe 90 is also connected by a pipe 95 (Fig. 6) through a valve 96 to branch feed pipes 71 supplying pressure fluid to the conveyor belt motors 70 previously described. A handle 97 (Figs. 2 and 6) is provided for convenient manual operation of the valve 96. Additional hand-operated valves 98 are provided in each branch pipe 71 so that either motor 70 may be rendered selectively operative or inoperative. The return pipe 72 (Figs. 4 and 6) connects into the return pipe 93 previously described.

As the pumps 74 and 75 run continuously and the cylinders 40 and 52 and motors 70 are used intermittently, I provide pressure relief valves 100 and 101 (Figs. 5 and 6). The relief valve 100 (Fig. 5) forms a by-pass from the feed pipe 80 to the return pipe 83, through which fluid will flow when a given operating pressure is exceeded. The relief valve 101 (Fig. 6) similarly connects the feed pipe 95 to the return pipe 72, thus forming a pressure-controlled return for the pump 75.

Having described the details of construction of my excavator and loader, the method of opera-

tion thereof will be readily apparent. The conveyor supports 24 will be held in raised position until the machine reaches the selected place of operation. Fluid under pressure will then be admitted through the pipes 45 to the cylinders 40, forcing the pistons 42 downward and lowering the conveyor support and the parts mounted thereon.

When the desired lowered position has been reached, the valves 81 may be set to lock the pistons in the cylinders 40 as previously described.

In the meantime, pressure fluid is admitted to the motors 70, thus starting the conveyor belts in operation, and pressure fluid is also admitted to the gate cylinder 52 through the pipe 61, thus holding the gates firmly in the position shown in Fig. 1.

The vehicle is then moved forward by the drive wheels 11, forcing the scoops or shovels 31 into the loose soil which is pushed up through the open upper end of the shovels and is deposited on the conveyor belts 20 by which the dirt or other loose material is elevated and delivered to the body or hopper B.

When the body is full, the conveyor supports 24 are raised by admitting pressure fluid to the pipes 46, after which the load may be transported to a desired location and may be dumped by admitting pressure fluid to the cylinder 52 through the pipe 60, moving the gates to the position shown in Fig. 4.

Each excavator and loader is thus independent and no time is lost in waiting for other trucks to be loaded, as is the case where a single loading machine is used for a plurality of transporting trucks.

Under certain conditions, however, it may be desirable to use separate trucks for transportation of the material, in which case the body B may be readily removed so that a truck can be positioned under the upper ends of the belt conveyors.

I have thus provided a very simple and economical machine by which a desired thickness of loam or other soil or loose material may be removed from a selected area of ground and by which the excavated material may be loaded into a self-contained body or into a separate truck or wagon.

The three-wheel construction is advantageous, as it permits the shovels to operate at the sides 50 of the vehicle rather than in the center, as is necessarily the case where two front wheels and a central conveyor are used. My improved machine is thus adapted to work much closer to a wall or fence or other boundary of an area to be stripped.

In Fig. 7 I have shown mechanical means for raising and lowering the supports 24. In this construction the supporting levers 110 are each provided with a segmental worm gear 111 engaged by a worm 112 mounted on a worm shaft 113 having a handle 114 by which it may be manually operated. Similar mechanical mechanism may be provided for moving the gates 50.

Obviously the conveyor driving pulleys 21 may be driven directly from the cross shaft 15, but I prefer the fluid-operated mechanism shown and described in detail herein.

If desired, the pump 74 may be an air pump, in which case the shovels 31 will yield somewhat on encountering an obstruction, compressing the air in the cylinders 40.

Having thus described my invention and the advantages thereof, I do not wish to be limited

to the details herein disclosed, otherwise than as set forth in the claims, but what I claim is:—

1. An excavator and loader comprising a self-propelled vehicle having a frame and an obliquely
5 movable support, one of said parts having guide rolls at each side of said support and the other part having guide-ways extending longitudinally of said support, a shovel and a conveyor belt
10 mounted on said support, a lever to which the lower end of said support is pivotally connected, and means to swing said lever to raise and lower said support and the parts mounted thereon and to lock said lever in a selected position.

2. An excavator and loader comprising a motor
15 vehicle having a single front wheel, a shovel and conveying mechanism at each side of said machine, and fluid-operated means to raise and lower said shovels and conveying mechanism, and to definitely position said shovels at a
20 definite distance below the surface on which the vehicle is supported.

3. An excavator and loader comprising a self-propelled vehicle having a frame, supports mounted at each side of said frame and guided for raising and lowering movement thereon, a
5 shovel and a belt conveyor mounted on each support, fluid-operated means to raise and lower each support and the parts mounted thereon, a valve controlling the movements of each support, and means to operate said valves separately or
10 simultaneously.

4. An excavator and loader comprising a three-wheeled motor vehicle, a shovel and a belt-conveyor mounted at each side of the single front
wheel for movement toward and from the supporting surface, a load-receiving body having
15 gates mounted between the rear wheels, and power means to raise and lower the shovels and conveyors, to drive said conveyors and to open and shut said gates.

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