May 20, 1952 C. L. JEFFREY 2,597,496

EARTH MOVER AND LOADER

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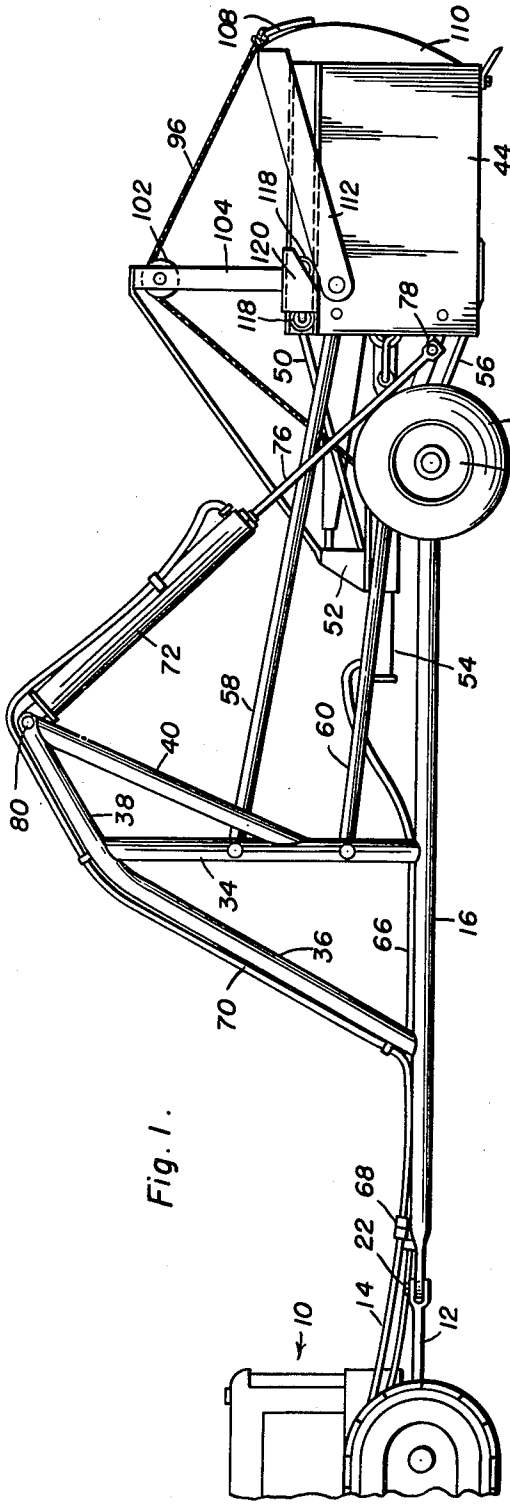


Fig. 1.

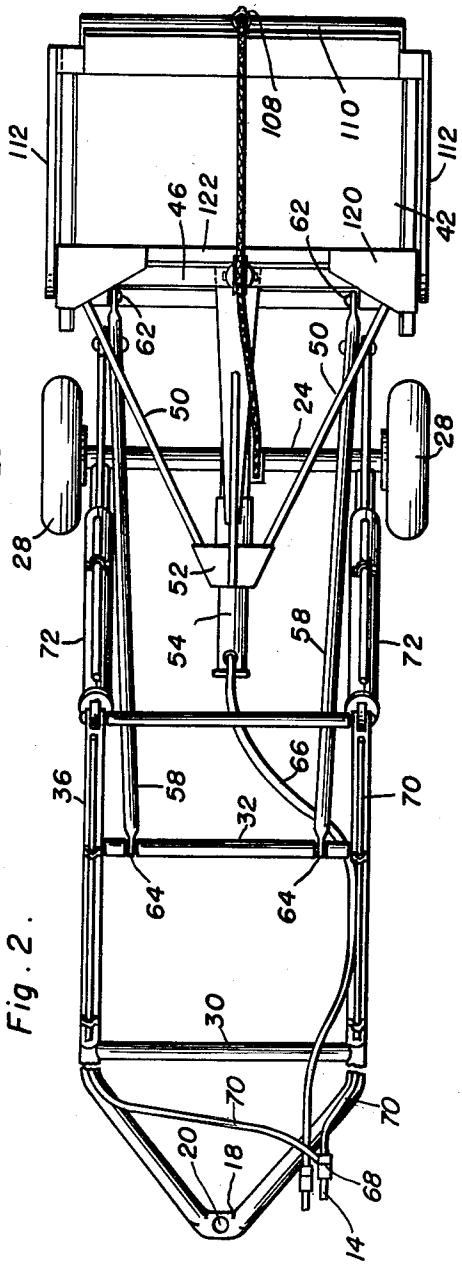


Fig. 2.

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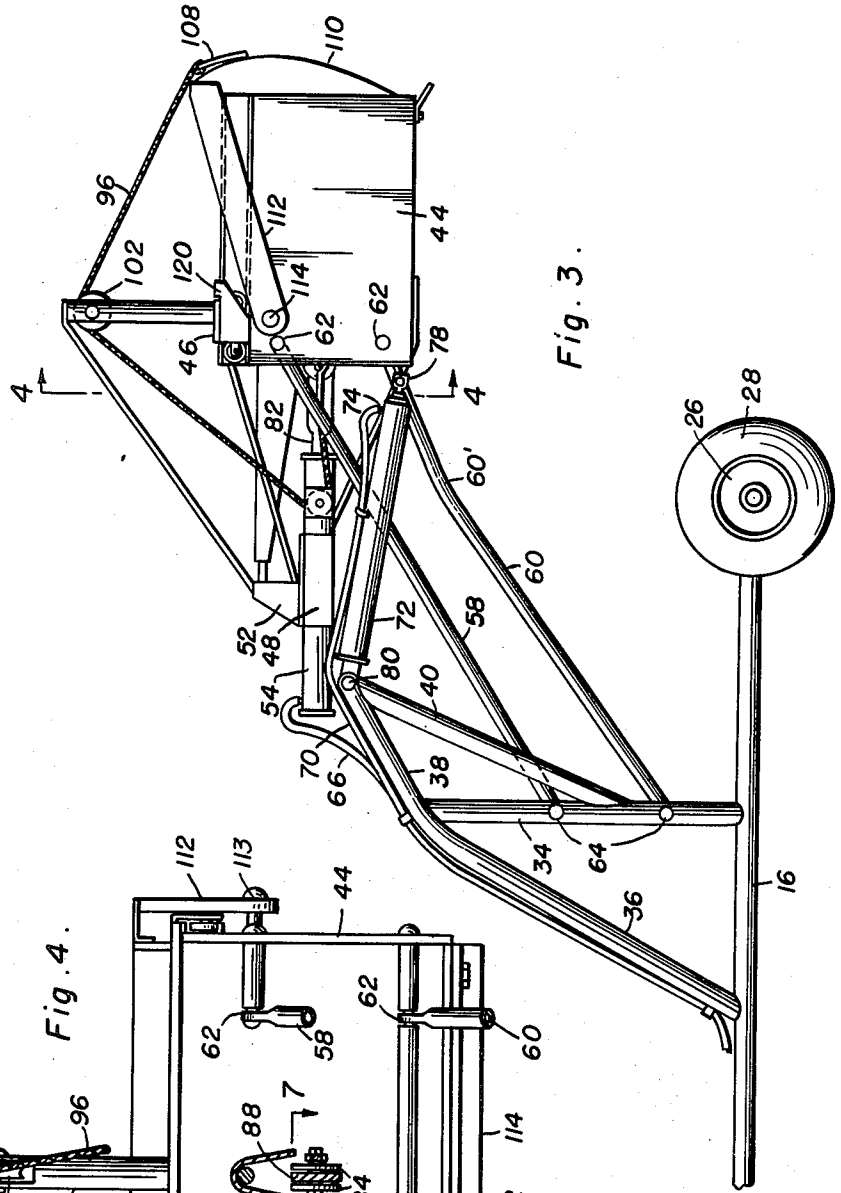


Fig. 3.

Fig. 4.

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Fig. 5.

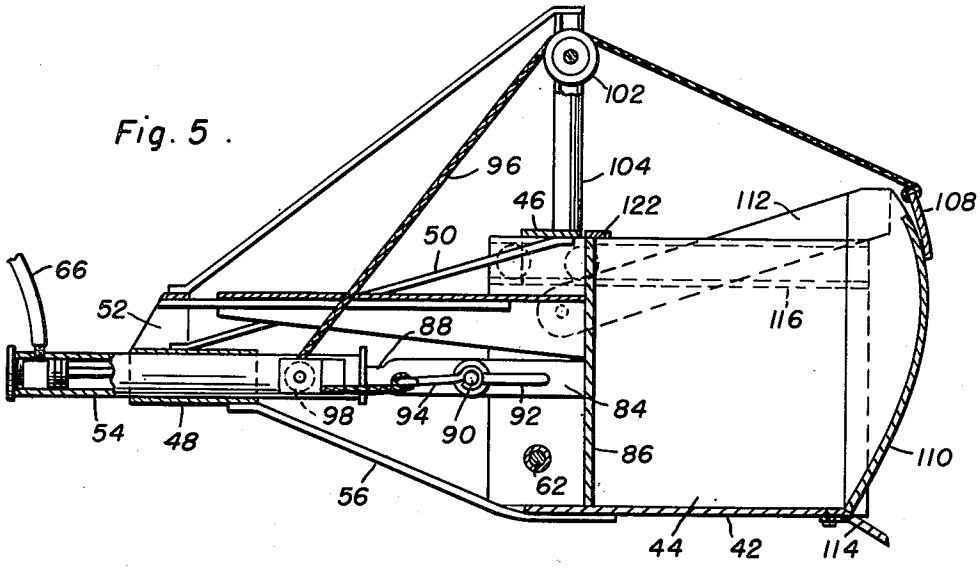


Fig. 6.

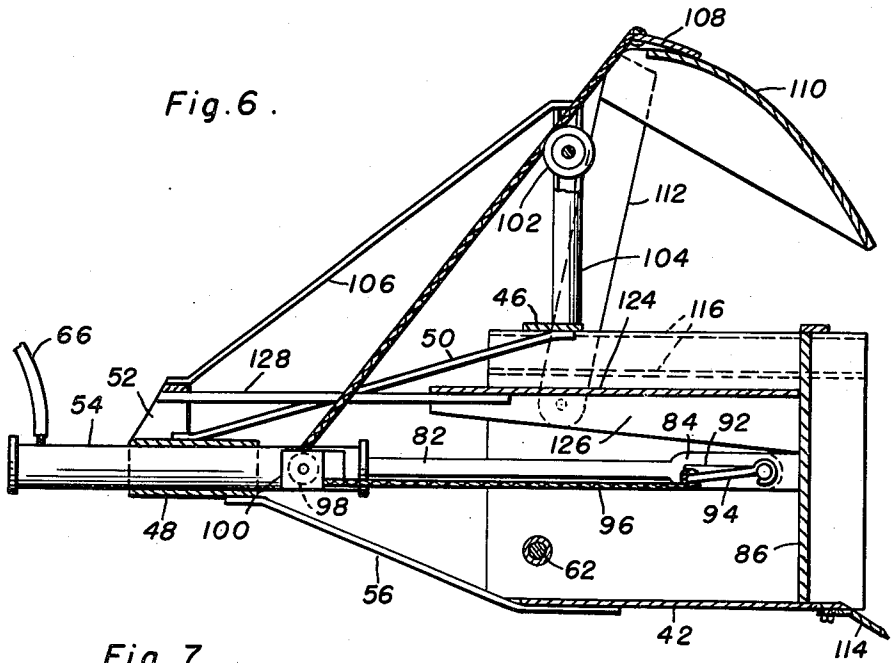
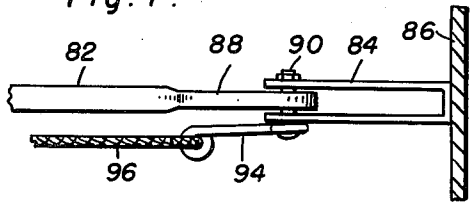


Fig. 7.



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UNITED STATES PATENT OFFICE

2,597,496

EARTH MOVER AND LOADER

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Application January 2, 1948, Serial No. 104

4 Claims. (Cl. 214—82)

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This invention relates generally to handling equipment, and more particularly to equipment of this character comprising a wheeled frame with an earth box mounted thereon for vertical movement, together with special means for unloading the earth from the earth box, the apparatus being particularly adaptable for use with a tractor having an air compressor thereon, or having a hydraulic pump thereon.

A primary object of this invention is to provide earth handling equipment which can be used to excavate as well as transport earth and like materials, the device being equipped with special means for retaining the load within the earth box during such transportation and during elevation of the earth box to any desired height within the limit of the machine.

Another object of this invention is to provide earth handling equipment with an earth box construction in which the said earth box can be raised without tilting the same from the horizontal.

Still another object of this invention is to provide in combination with an earth box special means for forcing the earth from the earth box while simultaneously raising a closure on the front open end of the earth box so as to allow removal of the load therefrom.

Yet another object of this invention is to provide special means whereby the said closure is raised slightly before the ejector means is actuated.

Yet another object of this invention is to provide means whereby the weight of the closure is used to retract the ejector to the rear of the earth box.

And another object of this invention is to provide special means whereby the ejector is made freely operative in the earth box, thus lessening the power necessary to operate the same and assuring smoother operation of the ejector and the closure.

And a last object to be specifically mentioned is to provide an earth handling apparatus which is relatively inexpensive to manufacture, all parts being constructed according to well-known and practicable manufacturing procedure, which is extremely simple, convenient, as well as versatile and safe in use, and which will give generally efficient and durable service.

With these objects definitely in view, together with other objects which will appear hereinafter as this description proceeds, these latter objects being of a specific nature, this invention resides in certain novel features of construction, combination and arrangement of parts and portions as will be hereinafter described in detail in the specification, particularly pointed out in the appended claims, and illustrated in the accompanying drawings which form a material part of this application, and in which:

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Figure 1 is a side elevational view of the assembled machine, shown in operative relationship with the front end of a tractor;

Figure 2 is a top plan view of the machine;

Figure 3 is a side elevational view of the machine with the earth box and contiguous structure in fully elevated position;

Figure 4 is a transverse vertical sectional view, taken on the line 4—4 in Figure 3;

Figure 5 is a longitudinal vertical sectional view of the earth box and contiguous structure, the view being taken substantially on a longitudinal center line of the machine;

Figure 6 is a similar view to that illustrated in Figure 5 but with the closure in fully opened position and the ejector fully advanced, as when the earth box has just been emptied; and

Figure 7 is an enlarged fragmentary detail view of a portion of the machine, the view being taken on the line 7—7 in Figure 4 and designed to illustrate how the closure and ejector are linked by a cable which is made operative raising the closure a short distance before the ejector is actuated.

Similar characters of reference designate similar or identical parts and portions throughout the specification and throughout the several views of the drawings.

Referring now to the drawings in detail, the environment wherewith this invention is adapted to be used includes a tractor, generally indicated by the numeral 10, and having a draw bar 12, ordinarily extending from the front of the tractor, and means to supply air under pressure in the air hose 14, or means to supply fluid under pressure in hose 14 by a hydraulic pump.

The earth moving and handling apparatus includes a frame having substantially horizontally disposed lateral members 16, joined together as at 18 and an attachment plate which is apertured as at 20 for connection by a bolt 22 to the draw bar 12 of the tractor. The lateral members 16 extend forwardly for rigid connection to an axle assembly 24 of any suitable character and including ground contacting wheels 26 which will preferably be rubber-tired as indicated at 28. The frame is braced by transverse braces 30 and 32 and a pair of uprights 34 are rigidly secured to the lateral members 16 intermediate the ends

thereof and extending upwardly for connection at their tops with forwardly and upwardly inclined brace members 36, these brace members being secured at their lower ends to the lateral members 16 and extending forwardly of the upright 34, as at 38, and these forwardly extending portions 38 are also braced on the upright 34 by the brace members 40.

An earth box having a floor 42 and vertical sides 44 is provided with a transverse top member 46 of rigid strap character terminally secured to the top edges of the vertical sides 44, near the rear ends thereof. A plurality of rigid bars 50 are terminally secured to end portions of the top member 46 and to a sturdy bracket member 52 which is rigidly secured to a sleeve 48 welded on cylinder 54, while similar rigid bars 56 are terminally secured to the floor 42 with the rear end of the bars being welded or otherwise directly secured to the sleeve 48.

Pairs of rigid link bars which may be designated as the upper bars 58 and the lower bars 60 are disposed in substantially parallel relation and terminally secured to upper and lower portions of the side walls 44 of the earth box and to upper and lower portions of the upright 34, the connection of these parallel bars being pivotal both on the earth box and on the upright, these pivotal connections being indicated at 62 and 64. The lower bars 60 may be bent slightly at 60' to accommodate the axle 24. The cylinder 54 is connected by means of an air hose 66 with the air hose 14 leading from the tractor 10, there being provided a coupling 68 whereby branches 70 of a second air hose, separately connected to a source of air pressure on the tractor and separately controllable, are lead upwardly along the inclined brace member 36, on each side of the machine to a pair of hydraulic cylinders 72. It will be noted that the air hoses 70 are led into the cylinder 72 by means of nipples 74 disposed at the forward ends of the cylinders 72. The hydraulic cylinders mentioned above are all provided with pistons and with piston rods, the piston rods associated with the cylinders 72 being indicated at 76 and being pivotally and terminally secured, as at 78, to the forward portions of the lower link bars 60, while the upper ends of the cylinders 72 are pivotally mounted, as at 80, to plates formed integral with the joined ends of the braces 40 and forward extending members 38 of the frame. It will be clear that air pressure or hydraulic pressure, as the case may be, applied to the cylinder 72 will cause the lifting of the earth box, and pressure applied to the cylinder 54 will similarly cause actuation of the piston rod 82, this piston rod being associated with the cylinder 54 and having the outer end thereof slidably mounted between the parallel arms 84 of a bracket member rigidly secured to a rear face of the ejector 86, as best illustrated in Figure 7. The forward end 88 of the piston rod 82 carries a bolt 90 which extends through elongated slots 92 in the said arms 84, so that the piston 82 may move forwardly from its fully retracted position the length of the elongated slots 92 before the said piston will begin to actuate the ejector 86 in its forward movement. The ejector will be described in greater detail hereinafter and it may now be noted that the bolt 90 carries a cable terminal 94 to which is secured the cable 96. This cable 96 extends rearwardly to a pulley 98 mounted on a bracket 100 which is secured on the cylinder 54, the cable then extending forwardly and upwardly over another pulley 102 freely rotatably mounted on a standard 104 carried by the top member 46 of the earth box. This standard is braced at the top by a rigid bar 106 extending from the top of the standard 104 to the bracket 52. From the pulley 102 the cable 96 extends forwardly for terminal connection to an attachment bracket 108 on the upper forward side of the arcuate closure 110.

This closure 110 may be arcuate vertically only and is of a dimension adapting it for closing the open mouth at the forward end of the earth box, when the closure is in the position indicated in Figure 5. The closure 110 is rigidly mounted on the forward end of a pair of arms 112, the rear ends of these arms being pivoted, as at 113 on the side walls 44 of the earth box, adjacent the upper rear corners of the same. A plate 114 may be secured to the lower front edge of the floor 42 of the earth box, this plate being preferably sharpened and downwardly and forwardly inclined to aid in scooping earth and similar material into the earth box when the machine is in operation.

Referring now to the ejector 86, it may first be noted that this invention includes means to make this ejector very freely operating. To this end, the vertical walls 44 of the earth box have incorporated with their upper outer sides pairs of horizontally outwardly disposed rails 116, the upper rail being at the upper edge of the earth box and the rails being spaced apart to receive pairs of rollers 118 carried by flange plates 120 of angle iron character and rigidly secured to the outer ends of a flat bar 122 rigidly mounted on the top edge of the ejector 86, it being understood that the rollers 118 are freely rotatably mounted on the vertical flange portions of the flange plate 120 and that the rollers are disposed on the outer sides of the vertical wall 44 and between the rails 116.

In order to prevent earth or other materials from fouling the cylinder 54 and cooperating structure, an inverted U-shaped guard 124 is rigidly secured to the rear face of the ejector 86, the depending flange portions of this guard preferably being inclined downwardly and forwardly as indicated at 126 in Figure 6, and a rigid bar 128 is slidably associated with this guard 124, the rear end of the bar 128 being rigidly secured to the bracket 52. This guard and bar may serve as auxiliary means to guide the ejector 86.

The operation of this invention will be clearly understood from the foregoing description of the mechanical details thereof, taken in connection with the above recitation of the objects sought to be achieved with this invention. In recapitulation, it need only be added that the earth box will be filled in a well-known manner by operation of the tractor 10, whereafter the earth box may be raised by supplying pressure to the cylinders 72. In emptying the earth box, the delayed action of the ejector has already been described.

Obviously many minor variations may be made in the details of construction and the proportionment of parts without departure from the spirit and scope of this invention, the foregoing specification and the drawings being illustrative rather than limiting. Accordingly, limitation of this invention should be only as demanded by a proper interpretation of the subjoined claims.

Having described the invention, what is claimed as new is:

1. Earth handling equipment comprising a wheeled frame, an upright thereon, an earth box

having an open mouth and secured by pairs of parallel arms to said upright for level lifting, power means to raise said earth box, an ejector slidably mounted on the earth box for horizontal reciprocation in said earth box, means to move said ejector, a closure for the mouth of the earth box, and means to lift said closure above said mouth, said means to move the ejector comprising a hydraulic cylinder having a piston rod connected to said ejector, and the means to lift the closure comprising a cable operatively connecting said ejector with said closure, said closure being hinged on said earth box, the ends of the cable being secured to said ejector and to said closure, and a complement of cable guiding pulleys, said cable being arranged so that the closure in falling by gravity into closed position retracts the ejector in said earth box.

2. Earth handling equipment comprising a wheeled frame, an upright thereon, an earth box having an open mouth and secured by pairs of parallel arms to said upright for level lifting, power means to raise said earth box, an ejector, and means to move said ejector, said earth box having vertical side walls and horizontal rails outwardly extending from said side walls adjacent the top thereof, said ejector having a member extending laterally beyond and above said side walls, and rollers on said member carried on said rails, a top member extending transversely of the earth box and having a vertical standard thereon, a closure for the mouth of said earth box and hinged on said earth box, a pulley on said standard, and a cable having one end connected to said closure, and the other end connected to the ejector, said cable being trained over said pulley, said means to move the ejector having a pulley carried thereby, and said cable being also trained over the last mentioned pulley.

3. Earth handling equipment comprising a wheeled frame, an upright thereon, an earth box having an open mouth and secured by pairs of parallel arms to said upright for level lifting, power means to raise said earth box, an ejector slidably mounted on the earth box for horizontal reciprocation in said earth box, means to move said ejector, a closure for the mouth of the earth box, and means to lift said closure above said mouth, said second mentioned means comprising a hydraulic cylinder having a piston rod connected to said ejector, and the last mentioned

means comprising a cable operatively connecting said ejector with said closure, an elongated guide member extending rearwardly from and secured to said ejector and of inverted U-shape in cross section, and a bar rigidly secured to said cylinder and extending horizontally and forwardly from said cylinder, said guide member being slidably mounted on said bar.

4. Earth handling equipment comprising a wheeled frame, an upright thereon, an earth box having an open mouth and secured by pairs of parallel arms to said upright for level lifting, power means to raise said earth box, an ejector slidably mounted on the earth box for horizontal reciprocation in said earth box, means to move said ejector, a closure for the mouth of the earth box, and means to lift said closure above said mouth, said second mentioned means comprising a hydraulic cylinder having a piston rod connected to said ejector, and the last mentioned means comprising a cable operatively connecting said ejector with said closure, said piston rod being mounted on said ejector for limited horizontal movement relative thereto, the cable being secured between said closure and piston without slack, so that said closure is positively raised partially before said ejector is moved when the piston is moved forwardly.

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