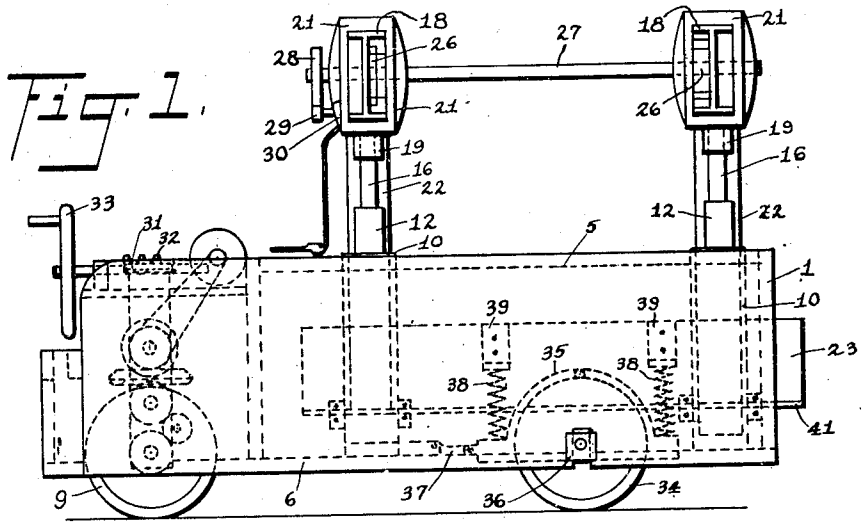
Oct. 21, 1941. J. EVANS 2,259,558

UNIVERSALLY MOVABLE FLOOR CRANE

Filed May 20, 1940 2 Sheets-Sheet 1

Fig. 1.



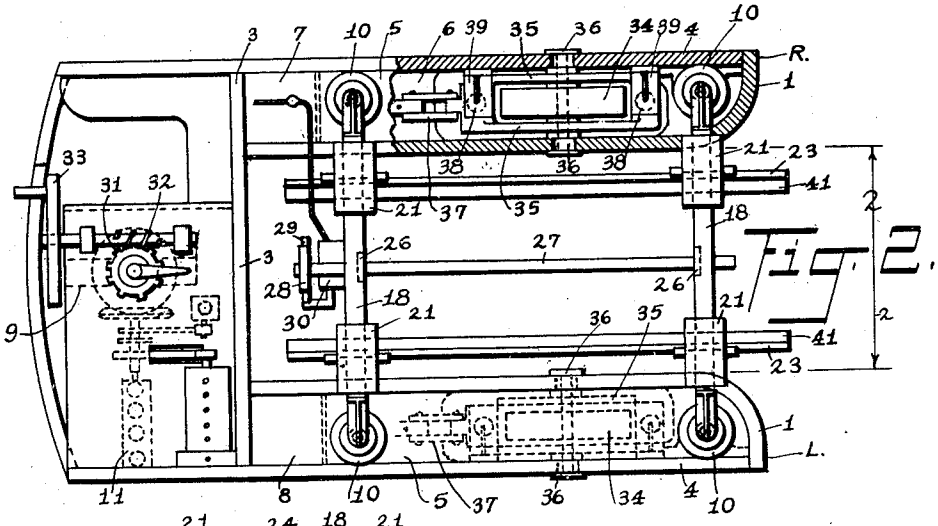
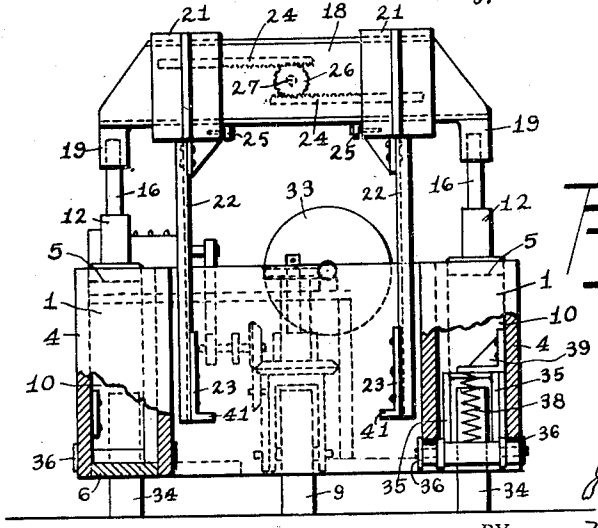


Fig. 2.

Fig. 3.



John Evans INVENTOR.

BY N. S. Amstutz

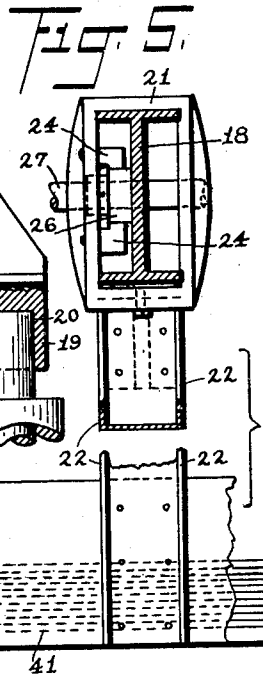
ATTORNEY.

Oct. 21, 1941. J. EVANS 2,259,558

UNIVERSALLY MOVABLE FLOOR CRANE

Filed May 20, 1940 2 Sheets-Sheet 2

Fig. 5.



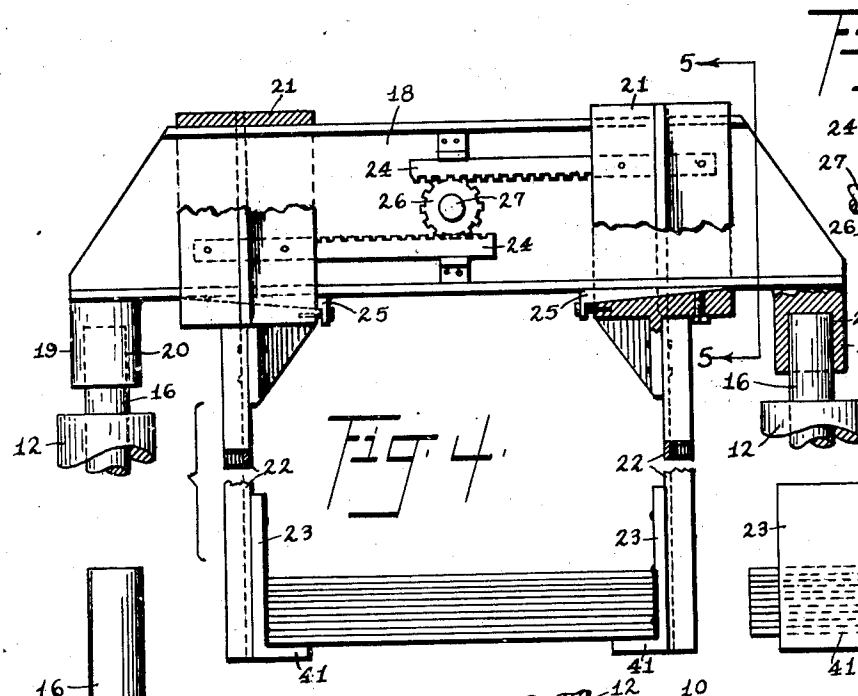


Fig. 4.

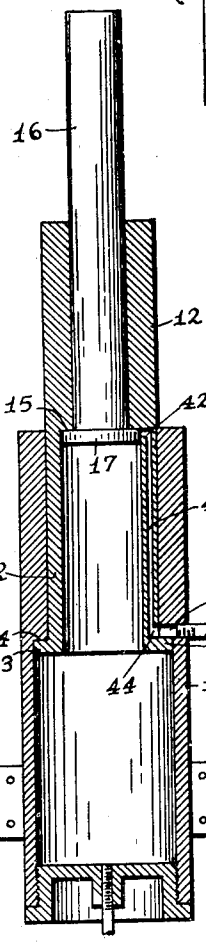


Fig. 6.

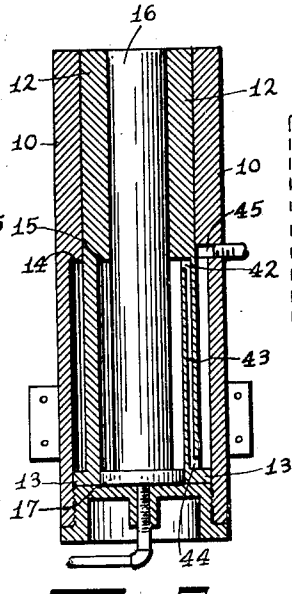


Fig. 7.

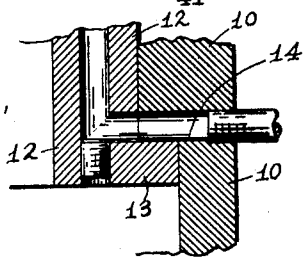


Fig. 8.

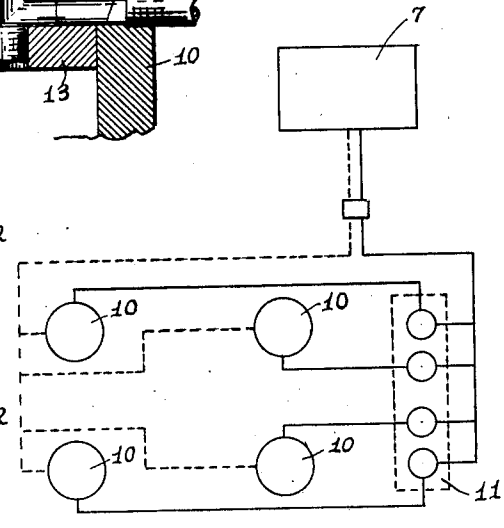


Fig. 9.

John Evans INVENTOR.

BY M. S. Armstrong

ATTORNEY.

Patented Oct. 21, 1941

2,259,558

UNITED STATES PATENT OFFICE

2,259,558

UNIVERSALLY MOVABLE FLOOR CRANE

John Evans, Indiana Harbor, Ind.

Application May 20, 1940, Serial No. 336,143

6 Claims. (Cl. 212—141)

My invention relates to improvements in universally movable floor cranes and it more especially consists of the features pointed out in the annexed claims.

The purpose of my invention is to provide a self-contained body supported on three wheels, the front wheel serving as a tractor and the rear wheels serving to support most of the weight of the metal plates that are to be transferred from storage in a producing mill to freight cars through narrow passageways and restricted spaces; that is provided with means for adjustably positioning a pair of lifting plates to different widths of sheets; that utilizes a plurality of hydraulic rams for raising the plates out of their storage position and lowering them into final position in freight cars for shipment; that also utilizes separate hydraulic means for adjusting the lifting plates horizontally toward or away from each other; that makes independent provision for each trailing wheel that it may have independent movement up and down in suitable guideways; that uses a worm geared hand wheel for steering the tractor wheel; and that may include any desired modification of the body or chassis structure.

This invention is related to my application, Serial No. 286,113, filed July 24, 1939, now Patent No. 2,202,650, granted May 28, 1940.

With these and other ends in view I illustrate in the accompanying drawings such instances of adaptation as will disclose the broad idea of the invention without limiting myself to the specific details shown thereon and described herein.

Fig. 1 is a side elevation.

Fig. 2 is a plan view of Fig. 1, showing parts in section.

Fig. 3 is a rear end elevation also showing parts in section.

Fig. 4 is an enlarged detached elevation of a supporting beam and related supporting plates.

Fig. 5 is an end elevation of Fig. 4 on line 5—5.

Fig. 6 is a detached elevation in section of a multiple piston ram showing the pistons in their extended relation.

Fig. 7 is a view similar to Fig. 6, showing the parts in their collapsed relation.

Fig. 8 is an enlarged detail in section showing the drainage feature between a tubular piston and a casing.

Fig. 9 is a diagrammatic "flow sheet."

In using my invention I may adopt whatever equivalents of structure or alternatives of function that the exigencies of varying conditions may demand without departing from the broad spirit of the invention.

Any desired form of body may be used. Its structure, in the main, comprises two side portions 1, leaving an open space 2 between them. The front end where the steering caster wheel is located is closed at 3. The side portions 1 may be relatively hollow and formed of side plates 4, top plates 5 and bottom plates 6. At the front end of these sides, to the rear of the partition 3, one of the sides 1 may have a tank 7 for oil, and the other side a tank 8 for gasoline. An engine for driving the tractor wheel 9 is mounted in front of the partition 3. The connection of this to the tractor wheel may be one of any conventional type, not shown in detail. In each one of the two sides L and R, there are two hydraulic rams 10. A suitable pump 11 is located at the front. There is a separate plunger in the pump for each ram. The plungers are all driven from a common crank shaft.

The construction of the rams 10 includes an outer cylinder or casing in which a tubular piston 12 is positioned. It has a flange 13. There is a reduction in the inside diameter of the casing so as to form a shoulder 14 to act as a stop when the flange 13 of the tubular piston 12 engages it. The inside of the tubular piston 12 also has a reduced diameter which forms a stop 15 for the upward movement of an inner piston 16 provided with a flange 17 at its lower end. This flange engages the shoulder 15 in the tubular piston 12. Oil is pumped into the casing below the tubular piston and the inner piston. The tubular piston 12 is not closed at its bottom end. Oil admitted against both pistons will raise them to approximately fifteen inches more or less until the flange 13 engages the shoulder 14 in the casing. A further inlet of oil under pressure will be exerted against the lower end of the inner piston 16 thus raising it another fifteen inches more or less until the flange 17 engages the shoulder 15. A release of pressure will permit the pistons to drop into their lowest position.

There is a transverse beam 18 reaching from one side of the crane to the other directly above the two rear rams 10. A similar beam 18 is placed above the two forward rams 10. At the end of each beam 18 on its lower face there is a shoe 19. A socket 20 in the shoe receives the upper end of an inner piston 16.

There is a pair of cross heads 21 slidable on each beam 18, toward or away from each other. Each cross head is attached to a depending channel 22. A pair of channels on one side of the

crane has attached a bottom lifting plate 23. A duplicate lifting plate 23 and channels 22 attached to a second pair of cross heads 21 is positioned along the inside of the other half of the open-ended body.

The cross heads 21, slide to and fro on these supporting beams 18. These may be of I-beam cross-section. Each one comprises a cage that surrounds the I-beam. Beneath the bottom flange of the I-beam 18, a suitable take-up gib 25 may be provided. Attached to the inside of each cross head, there is a toothed rack 24. A pinion 26 is positioned between a pair of adjacent racks 24. The rack from one cross head engages the pinion 26 above its center and the rack from the other cross head engages the pinion beneath its center. A shaft 27 reaches from one transverse beam 18 to the other. It carries a pinion 26 for each beam and at the front end of the shaft there is a toothed wheel 28 that engages a rack 29 that is operated by a hydraulic cylinder 30, which when oil under pressure is admitted to its one end will move the rack 29 in one direction and when alternatively oil is admitted only to the other end of the cylinder, the rack 29 will move in the other direction. This to and fro movement of the rack is imparted to the racks 24 on each transverse beam 18. The operator has control of the oil admission to the cylinder 30, for moving the lifting plates 23 nearer to each other or farther apart as needed through the simple operation of a two-way valve, positioned alongside the operator seat, or elsewhere.

Instead of operating the tractor wheel to turn it in different directions on a vertical axis by means of a hand wheel as shown in my application referred to above, I may use a worm gear 31 on the vertical extension of the caster wheel yoke and engage it by a worm 32 to which a hand wheel 33 is attached. This arrangement relieves the operator of any shocks that may be produced by the tractor wheel 9 engaging obstacles or any stresses that may be incurred when turning the wheel on its vertical support while power is being applied. This arrangement absolutely locks the position of the wheel 9 in any orientation in which it may be placed.

Each rear wheel 34 is supported in a pair of side plates 35 which are joined together at the front and the rear of the wheel. On the outside of each side plate there is a flanged extension 36 which serves to engage the walls of each of the sides 1 of the crane in which the hydraulic rams 10 are located. The side plates of the wheel 35 are pivotally attached to short links 37 and the links are pivotally attached to the body so as to permit the wheel to have free up and down movement. At the front of the wheel and also at its rear a cushioning spring 38 is located. These springs 38 abut brackets 39 secured on the inside of an outer body plate 4. The front end of the crane body may have a curved bumper plate of considerable width.

The operation of my device is exceedingly simple. It is moved adjacent a pile of sheets that are usually stored a short distance above the floor so that the open space 3 of the crane is moved endwise to receive the stacked sheets for the full length of the open part 2 of the body. The lifting plates 23 are lowered to the floor by removing the oil pressure from the rams 10 and then they are moved toward each other by the cross heads 21 so that the bottom lengthwise flange 41 of each plate will pass under the pile of sheets, at one edge as directed by the operator through the movement of the cross heads on the transverse beams.

By the operation of another valve oil under pressure is admitted to the rams 10 which raises the lifting plates and the pile of sheets off from its blocking and the entire load is transferred under the control of the driver to the inside of a freight car, or otherwise. It is immaterial whether the crane is moved forward or backward. Once it is in the desired position to where the pack of sheets is to be deposited, the operator releases the pressure from the rams 10 and the entire pack is lowered into its final resting place and the lifting plates 23 are moved away from under the pack and the crane is ready to proceed to the storage space for another load.

There is a unique feature in my device which obviates the use of packing around the pistons and the usual packing glands where the tubular piston 12 leaves its casing and where the inner piston 16 leaves the tubular piston 12. This is accomplished through the formation of an opening 42 at the shoulder 14 of the casing to form a by-pass connected to a tube leading back to the oil tank 7 to take care of any leakage that there may be at this point. The tubular piston 12 at its shoulder 13 has an opening 44 from its inside leading to a passageway 43 formed lengthwise in its wall and terminating into an outside opening 45, adjacent its flanged end 13. This permits any leakage that might develop when the flanged end 17 of the inner piston 16 engages the shoulder 15 of the tubular piston 12 to be directed into a downward passageway 43 and out to the oil tank 7 through the opening 45 in the side wall of the casing.

The two sides 1 of the body may be composed of vertical plates and transverse plates top and bottom, to form a shell in which the gasoline tanks 8 and oil tanks 7 may be placed and an open space is provided for the rear wheels 34. All the rams 10 are also enclosed in this space excepting the pistons when they project.

The body structure may be modified in many ways, consistent with engineering practice. Whatever changes that may be made they must include cooperative structure which will transmit the weight of the product handled onto the steering wheel and the supporting wheels regardless of chassis modifications.

What I claim is:

1. In a floor crane a body open at one end and closed at the other end forming two independent sides, a power-driven tractor wheel at the steering end, means for orienting the tractor wheel as desired, independent supporting wheels one for each side of the open-ended body, a pair of hydraulic rams positioned in each side, differential pistons in the rams, a transverse beam for each pair of rams on opposite sides of the open space of the body, lifting plates suspended in pairs from the beams, hydraulic means for raising and lowering the beams and the lifting plates, and separate hydraulic means for moving the lifting plates toward or away from each other.

2. A floor crane having a body with an elongated rear end opening power-driven tractor wheel at the closed front end of the body, a supporting wheel for each side of the body, a pair of lifting plates in the open portion of the body, means for hydraulically and simultaneously moving the plates toward or away from each other, and separate hydraulic means supported by the body for simultaneously raising and lowering the

lifting plates said means being at each end of the lifting plates.

3. In universally movable floor cranes, an open-ended body, single tractor means and separate supporting means under the body, a pair of lifting plates positioned inside of the body opening, means for moving the plates toward or away from each other simultaneously to engage and disengage the underside of a pack of sheet metal plates, and separate hydraulic means for simultaneously raising and lowering the lifting plates at each end of the sheet metal pack.

4. A floor crane comprising a body open at one end and closed at the other end, a single tractor means beneath the closed end of the body, separate supporting wheels in each portion of the body alongside the lengthwise opening therebetween, a pair of rams in each side portion of the body, transverse beams associated with each transverse pair of rams, separate cross heads on each beam, depending channels from each cross head, a lifting plate secured to a pair of channels so as to position the plate parallel to the inside of the open body, hydraulic means for moving the cross heads toward or away from each other, and hydraulic means for raising or lowering the transverse beams with the suspended lifting plates as desired.

5. A universally movable floor crane comprising an open-ended body, a single power-driven tractor wheel at the closed end of the body, a pair of independently positioned supporting wheels near the rear of the body, lifting means within the open portion of the body, means for simultaneously moving the lifting means on a horizontal plane, separate means for moving the lifting means on a vertical plane, means for orienting the position of the tractor wheel comprising a worm gear connection and a hand wheel on the worm whereby the oriented position of the tractor wheel remains locked against accidental movement.

6. In a universally movable floor crane, a two-sided open-ended body, a pair of hydraulic rams on each side, a transverse beam resting upon the pistons of a pair of transversely located rams, a separate transverse beam positioned on a second set of transversely positioned pistons, means on the transverse means for supporting lifting plates said means comprising cross heads slidable on the beams, a separate rack from each cross head on each beam, a shaft reaching from beam to beam and separate pinions on the shaft positioned between the respective racks whereby through the rotation of the shaft in either direction the cross heads will be correspondingly moved to shift the lifting plates horizontally.

JOHN EVANS.