

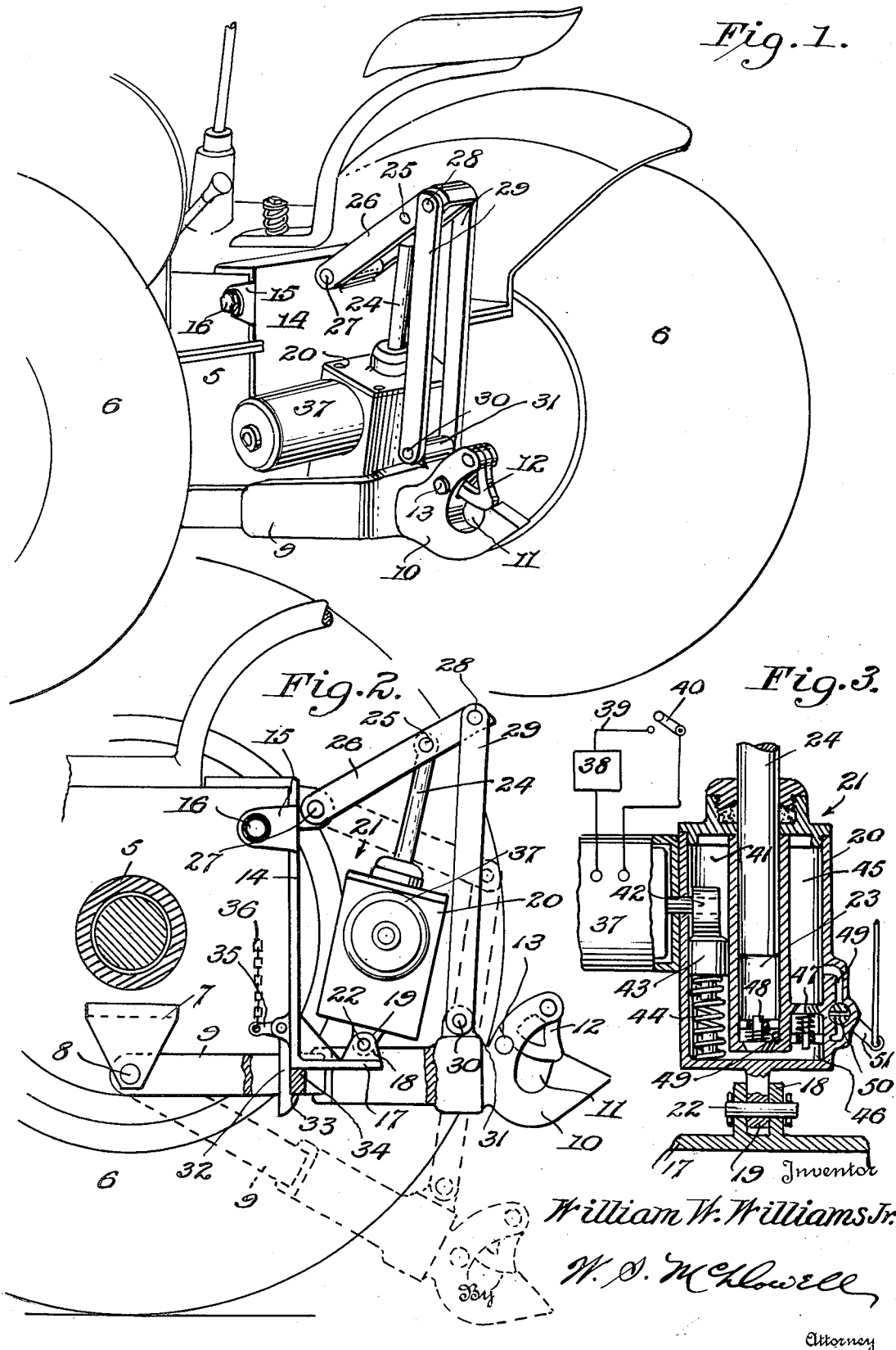
May 15, 1945.

W. W. WILLIAMS, JR

2,375,970

HYDRAULIC DRAWBAR LIFT FOR TRACTORS

Filed Oct. 19, 1942



UNITED STATES PATENT OFFICE

2,375,970

HYDRAULIC DRAWBAR LIFT FOR TRACTORS

William W. Williams, Jr., Columbus, Ohio

Application October 19, 1942, Serial No. 462,613

3 Claims. (Cl. 280—33.44)

This invention relates to an improved hydraulic drawbar lift for tractors.

It is a common practice to locate or mount the drawbar of a tractor in a fixed position of vertical elevation, with the result that considerable time, labor and difficulty are encountered in lifting the draft tongue of an associated trailer vehicle in order to unite the same with the coupling device provided on the outer or rear end of the drawbar.

In efforts to overcome this condition, use has been made of pivotally mounted drawbars adapted for movement between lowered positions of coupling to elevated active positions of operation. However, in such prior lifts, the power employed in raising the same is obtained, directly or indirectly, from the tractor engine and this has produced resultant mechanical or structural complications. Thus it has been proposed to actuate the lift by pneumatic means in which compressed air, drawn from a storage tank, is admitted under valve regulation into a cylinder containing a sliding piston, whereby through movement of the piston, the drawbar or lift is raised or lowered, the tank being supplied with air under pressure by a compressor driven through the engine of the tractor. It has also been proposed to employ hydraulic means for raising and lowering such lifts in which the power transmission of the tractor, or power take-off, is used to operate a hydraulic motor or pump which, in turn, through valve operated means develops adequate fluid pressure to actuate the lift.

Such prior arrangements are characterized by their mechanical complexity, added weight and costs and, therefore, it is an object of the present invention to simplify such drawbar lifts, to reduce the weight and cost thereof and to permit the same to be operated with improved convenience from the position occupied by the operator of the tractor.

It is another object of the invention to provide a drawbar lift wherein a pivot drawbar is raised or lowered by means of a hydraulic ram or jack mechanism connected by a system of levers with the drawbar, the pump of the ram or jack mechanism being operated by an electric motor carried bodily by the casing of said mechanism, the motor, in turn, being energized by current derived from a standard storage battery of the ordinary electrical system of the tractor.

For a further understanding of the invention, reference is to be had to the following description and the accompanying drawing, wherein:

Fig. 1 is a perspective view of the hydraulically actuated drawbar mechanism forming the present invention;

Fig. 2 is a view partly in vertical section and side elevation of the drawbar and its actuating means;

Fig. 3 is a vertical sectional view taken through the motor driven hydraulic jack utilized by the present invention.

Referring more particularly to the drawing, the numeral 5 designates the rear axle housing of a tractor. This housing includes the usual differential and transmission and carries at the opposite ends thereof the rubber tired traction wheels 6, all of standard construction. The housing 5 carries a pair of brackets 7 to which are pivotally connected as at 8 the forward ends of a substantially V-shaped drawbar 9. The rear end of the drawbar is provided with a coupling head 10, the same being formed, as usual, to include a slot 11 which is adapted to be opened and closed by a pivoted detent 12 which may be positively held in its closed position by a pin 13. The coupling is adapted to receive the forward end of a tongue or arm, not shown, provided upon any suitable type of trailer vehicle which the tractor is adapted to draw or pull. By pivotally mounting the drawbar as at 8, the same may swing in a vertical plane so that when lowered, as shown in dotted lines in Fig. 2, the coupling head may be readily united with the draft tongue of the trailer vehicle, power actuated means being then provided for elevating the drawbar to its normal operating position, as shown in full lines in Fig. 2, in which it is mechanically held independently of the power actuated lifting mechanism.

In order to elevate the drawbar, I mount upon the housing 5, a bracket 14, the latter being fastened to the housing by means of the ears 15 and the bolts 16. This construction is used when the lift is applied to the tractor as an attachment, otherwise, the housing 5 may be formed to dispense with the use of the bracket, as will be readily understood. In this instance, however, the lower end of the bracket 14 is provided with the rearwardly directed foot 17, formed with upstanding ears 18 which receive between them a corresponding ear 19 depending from the bottom of the casing 20 of a hydraulic jack mechanism 21. The ears 18 and 19 are apertured to register with each other and to receive a pivot pin 22 about the axis of which the casing 20 may fulcrum. Within the casing 20, there is provided a chamber 23 in which is slidably mounted one end of a piston rod 24. The outer or upper end of the rod 24 is pivotally connected as at 25 with the intermediate portion of a lever 26. The inner or forward end of this lever is pivoted as at 27 to the upper part of the bracket 14, while the outer or rear end of the lever 26 is pivotally joined as at 28 with the upper ends of a pair of links 29. The lower ends of the links 29 are pivotally connected as at 30 with an apertured boss 31 formed with the rear part of the drawbar 9.

It will be seen that as the piston rod is projected upwardly, the lever 26 will be rocked to

elevate the drawbar 9. When in its position of maximum elevation, as in Fig. 2, the drawbar is mechanically fastened by providing the lower part of the bracket 7 with one or more pivoted latches 32. The shouldered faces 33 of these latches are adapted to engage with the under surfaces of a transversely extending bar 34 disposed intermediately and rigidly of the drawbar 9. Preferably, the latches 32 are spring-pressed so that they will be positively maintained in positions adapted for latching engagement with the bar 34. However, in order to lower the drawbar, the latches 32 have their shorter arms 35 joined with a chain 36, which leads to the operator's position on the tractor and which, upon manual operation, may be operated to swing the latches to positions in which the shouldered faces of the latches 32 will be removed from contact with the bar 34, thus permitting of the lowering of the drawbar to its coupling position.

In order to operate the jack mechanism 21, the casing 20 thereof at one side is provided with a small electric motor 37. This motor may be of the type commonly used in connection with the starting systems of tractors or other automotive vehicles, and is adapted to operate on current supplied thereto from a standard storage battery 38. The motor includes an operating circuit 39 in which the battery 38 is situated, said circuit containing a manually operated control switch 40 adapted to be disposed adjacent the tractor operator's position.

The armature shaft of the motor 37 is extended through the walls of the casing 20 to occupy a pump chamber 41 formed within said casing. Attached to the armature shaft is an eccentric 42, the perimeter of which engages with a pump piston 43 which is slidably mounted within and has engagement with the walls of the chamber 41. A spring 44 engages with the under side of the piston 43 to maintain the latter normally in engagement with the peripheral surface of the eccentric 42, so that as the motor shaft rotates, the piston 43 will be reciprocated.

Formed within the casing 20 is a fluid-receiving chamber 45. This chamber communicates with the chambers 23 and 41 by means of a passage 46 in which is located a spring pressed valve 47. In addition to the valve 47, there is a second spring-pressed valve 48 for controlling fluid flow between the passage 46 and the chamber 23. The valves 47 and 48 are automatically operated and open and close in accordance with the pulsations of the pump piston 43, thereby drawing fluid from the chamber 45 and forcing the same under pressure into the bottom of the chamber 43 to effect the elevation of the piston rod 24. In addition, there is a restricted passage 49 which leads from the fluid chamber 45 to the bottom of the chamber 23 at a point above the valve 48. Within the passage 49, there is provided a rotatable valve 50, the operating positions of which may be manually governed by a control 51 which leads to the operator's position. With the valve 50 set to close the passageway 49, as in Fig. 3, the piston 43 may be operated by the motor 37 to elevate the piston rod 24. When the desired degree of elevation has taken place, and the drawbar lifted so that it engages with and is supported by the latches 32, the valve 50 may be rotated to open the passageway 49, thus permitting of fluid flow from the chamber 23 back to the fluid chamber 45 and the controlled descent of the piston rod 24 when

the latch devices 32 are subsequently released to provide for the lowering of the draft bar.

In view of the foregoing, it will be seen that the present invention provides an efficient and simplified hydraulic means for effecting the raising and lowering of the pivoted drawbar of a tractor. The mechanism comprises a unit which may be readily applied to the differential and transmission housing of a tractor without altering or changing in any way the general construction of the tractor vehicle. The mechanism is simple and positive in its actuation and operating principles and its construction is such that, if for any reason, the automatic lift mechanism fails to function, the drawbar could be operated mechanically or manually until suitable repairs or adjustments can be made.

What I claim is:

1. Drawbar mechanism for tractors comprising a drawbar having the forward portion thereof pivotally mounted in connection with the rear axle housing of a tractor and adapted for bodily swinging movement in a vertical plane, a jack unit embodying a casing having a hydraulically actuated piston element mounted for sliding movement in connection therewith, means for mounting one end of said casing in connection with said housing, a lever system having end portions thereof pivotally united with said housing and the outer part of said drawbar, an intermediate part of said lever having actuating engagement with said piston element, an electric motor carried bodily by said casing and movable in unison therewith, said motor having an armature shaft, and a pump mechanism disposed within said casing operated by said shaft.

2. Apparatus for raising and lowering a vertically swinging drawbar of an engine powered tractor, comprising a jack unit embodying a casing having a hydraulically actuated piston element slidably mounted therein, means movably supporting the lower end of said casing in connection with associated stationary tractor structure, a lever system having end portions thereof pivotally united with said tractor structure and the outer portions thereof with said drawbar, the intermediate portions of said lever system having actuating engagement with said piston element, an electric motor directly and bodily united with said casing for movement in unison therewith, said motor having an armature shaft, and a pump mechanism disposed within said casing and operated by said shaft for actuating said piston element.

3. Apparatus for raising and lowering the vertically swinging drawbar of an engine powered tractor, comprising a base member formed for attachment with stationary structure of the tractor, a jack unit embodying a casing having a hydraulically actuated piston element slidably carried thereby, means movably uniting the lower end of said casing with said base member, a lever pivoted at one end to said base member, a link pivotally uniting the other end of said lever with the tractor drawbar, the intermediate part of said lever having actuating engagement with the upper end of said piston element, an electric motor directly and bodily united with said casing for movement in unison therewith, said motor having an armature shaft, and a pump mechanism disposed within said casing actuated by the rotation of said shaft for actuating said piston element.

WILLIAM W. WILLIAMS, JR.