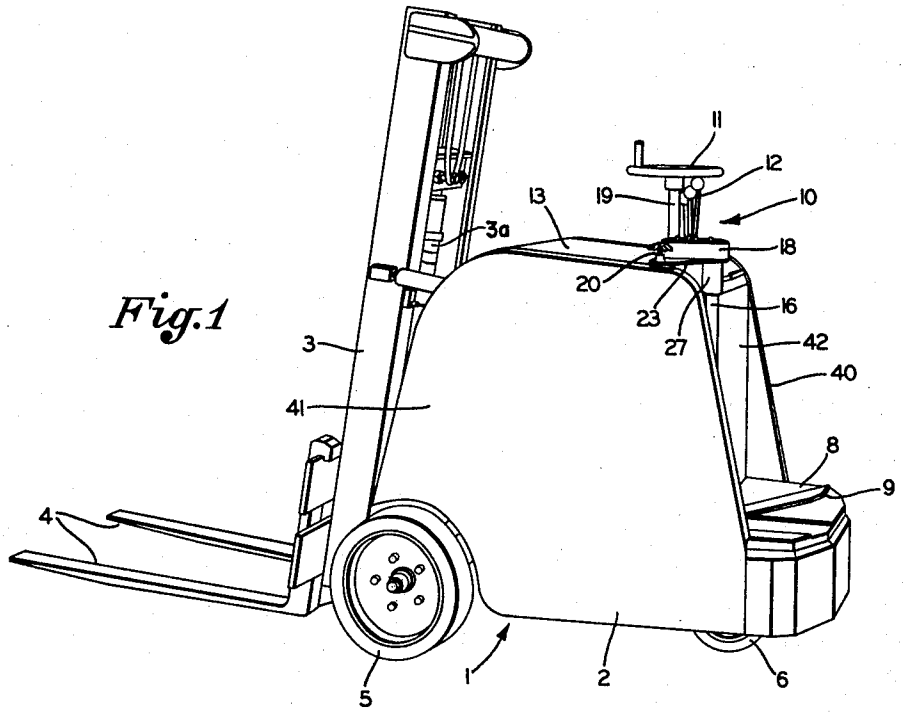
Nov. 8, 1960 H. R. ROGANT 2,959,425

STEERING MECHANISM FOR FORK LIFT TRUCK

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Fig. 1



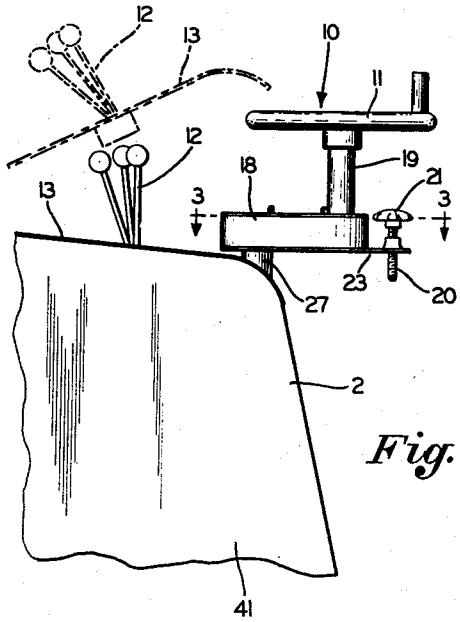


Fig. 2

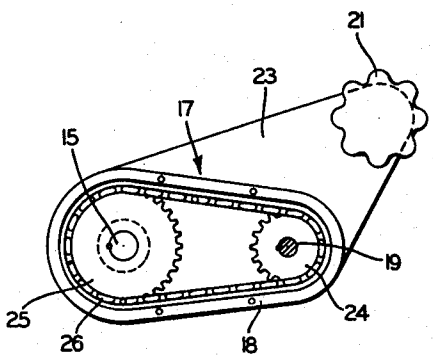


Fig. 3

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STEERING MECHANISM FOR FORK LIFT TRUCK

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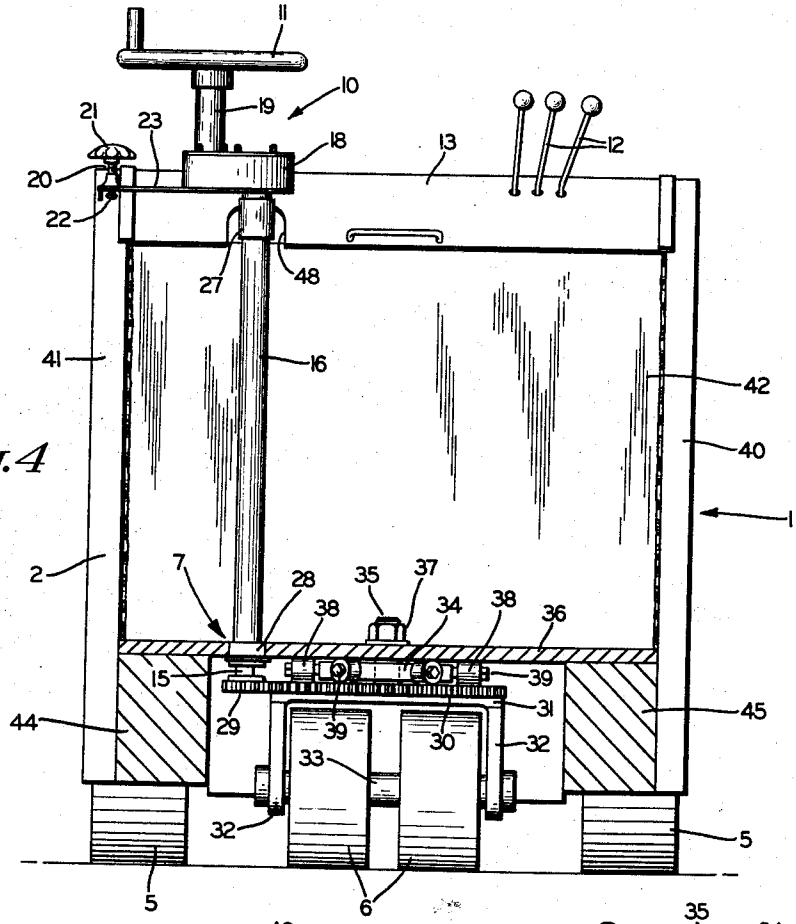


Fig. 4

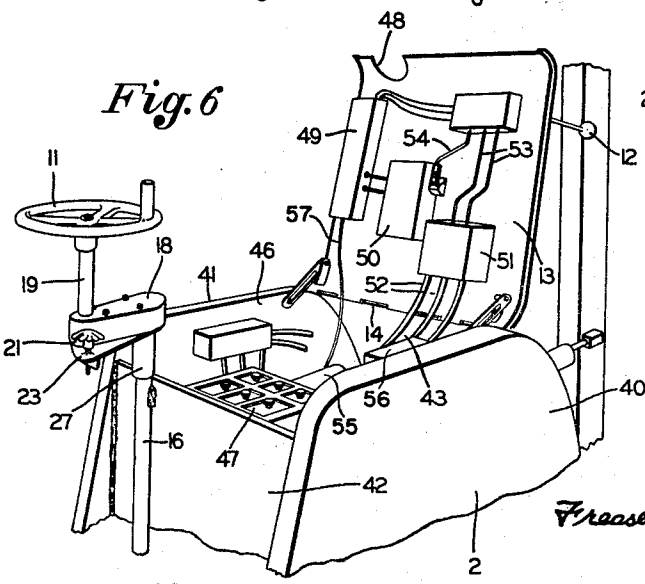


Fig. 6

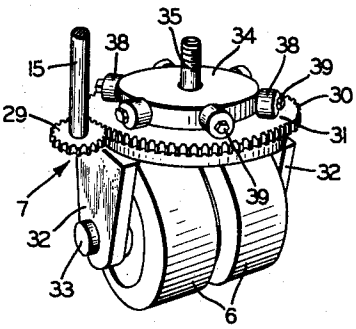


Fig. 5

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STEERING MECHANISM FOR FORK LIFT TRUCK

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4 Claims. (Cl. 280—87)

This invention relates to fork lift trucks and more particularly it pertains to such trucks equipped with a battery-powered motor and hydraulic actuating means.

Fork lift trucks have been widely accepted by industry for expediting the movement of materials within a plant. The trucks usually include a pair of load-carrying arms or lifting forks, a fork elevator which is mounted on a wheel-mounted housing which includes the prime mover, and control and steering parts at the operator's position. Although most fork lift trucks have been maneuverable, there has been a continued effort to increase maneuverability, particularly in congested areas.

One way to increase maneuverability is to reduce the size of the truck housing including the chassis as much as possible to achieve greater compactness without sacrificing the minimum structure necessary to handle heavy loads. In an effort to reduce the size of the truck housing many prior fork lift truck constructions have sacrificed another requisite of fork lift trucks, namely the accessibility of operating parts for easy repair and maintenance.

Still another problem in achieving greater maneuverability of fork lift trucks has been the provision of more adequate steering mechanism. Some fork lift truck constructions are provided with steering mechanisms which give substantial maneuverability. However, the mechanism is complicated, cumbersome, and difficult to repair and maintain.

The device of the present invention provides a fork lift truck which is compact in construction and therefore highly maneuverable in small congested areas. At the same time, the truck includes operating parts which are readily accessible and are not located in out-of-the-way places which make for higher production costs due to increased downtime and delays in operation of the motorized truck.

Accordingly, it is a general object of this invention to provide a fork lift truck which is highly maneuverable.

It is another object of this invention to provide a fork lift truck which is compact in construction without sacrificing accessibility to vital operating parts.

It is another object of this invention to provide a fork lift truck having a steering mechanism which is not only convenient for the operator's efficiency but which is also direct and uncomplicated.

It is another object of this invention to provide a fork lift truck having a steering mechanism which is rotatable between operating and non-operating positions to enable removal of a hood or access cover to the interior of the truck housing.

Finally, it is an object of the present invention to provide an improved fork lift truck construction by which the described problems and difficulties are overcome and the foregoing objects and desiderata are obtained in a simple, effective and inexpensive manner without creating maintenance, repair and adjustment problems in maintaining efficiency.

These and other objects apparent to those skilled in the art from the following description and claims may be obtained, the stated results achieved, and the described difficulties overcome by the discoveries, principles, apparatus, parts, elements, combinations and subcombinations which comprise the present invention, the nature of which is set forth in the following general statement, a preferred embodiment of which—illustrative of the best mode in which applicant has contemplated applying the principles—is set forth in the following description and shown in the drawings, and which is particularly and distinctly pointed out and set forth in the appended claims forming part hereof.

The nature of the improvements in the fork lift truck construction of the present invention may be stated in general terms as including a body housing having walls forming a compartment containing prime mover means for the truck, the body also having an operator's platform adjacent the compartment, a hood or access cover for the compartment movable between closed and open positions, some parts associated with the prime mover means mounted on the inner surface of the hood, truck control means including a steering wheel mounted on a steering column having an offset portion for rotating the steering wheel between operative and non-operative positions, the operative position of the steering wheel extending through the path of opening the compartment hood, a turning wheel mounting the truck body, and means operatively connecting the steering wheel to the turning wheel.

In the drawings which are illustrative of the preferred embodiment of the invention, by way of example, and in which similar numerals refer to similar parts thereof:

Figure 1 is a perspective view of a fork lift truck showing the steering wheel disposed in operating position over one end of the hood of the truck housing;

Fig. 2 is a fragmentary elevational view showing the steering wheel in the non-operating position to provide clearance for opening of the hood;

Fig. 3 is a horizontal sectional view taken on the line 3—3 of Fig. 2, showing chain reduction gear means for the steering wheel;

Fig. 4 is a rear end view of the truck taken partly in section to show the steering mechanism and dual rear wheel;

Fig. 5 is a perspective view showing the mounting for the dual rear wheel and connection with the steering column; and

Fig. 6 is a fragmentary perspective view showing the hood in the open position with electric and hydraulic control parts mounted on the undersurface thereof.

In Fig. 1 a fork lift truck is generally indicated at **1**. It includes a truck body or housing **2** and a fork elevator **3** with a pair of load-carrying arms or lifting forks **4** movable up and down the fork elevator by hydraulic means.

The truck body **2** is mounted on a pair of forward drive wheels **5** and dual steer or turning wheels **6** (Fig. 4). The dual steel wheels include turning means generally indicated at **7**. In addition, the truck body includes an operator's platform **8** having a foot pedal **9** extending therefrom. Control means for maneuvering the truck are generally indicated at **10** and include a steering wheel **11** and a number of levers **12**, all of which are conveniently located above and forwardly of the platform **8** at the top of the truck body.

The truck body also includes a hood or access cover **13** which is horizontally disposed in the closed position as shown in Fig. 1 and which is mounted on a hinge **14** for raising the hood to the open position as shown in Fig. 6.

The steering wheel **11** is a part of a turning mechanism which includes the turning means **7**, a steering shaft **15** extending through a tubular steering column **16**, a reduc-

tion gear means generally indicated at 17 (Fig. 3) within a reduction gear housing 18 at the upper ends of the shaft 15 and column 16, and a steering wheel shaft 19 at the top of which the steering wheel is mounted.

As shown in the several views of the drawing, the upper end of the turning mechanism is offset from the lower portion by a distance equal to the distance between the shafts 15 and 19 so that during normal operation of the truck 1 the upper end of the turning mechanism, namely the steering wheel 11 and steering wheel shaft 19, are forward of the steering shaft and column 15 and 16. In the forward position the steering wheel 11 is disposed over a portion of the hood or access cover 13 and is within convenient reach of the operator.

When it is necessary to raise the hood for access to the operating parts within the truck housing 2, the steering wheel 11 is turned about the steering shaft 15 to a position where it no longer extends over the hood 13 as shown in Figs. 2 and 6. During operation of the truck 1 the steering wheel 11 is maintained in its operative position over the hood 13 by a locking pin 20 having a handle 21 which pin is insertable into an aperture 22 in the housing 2. The pin 20 is threadedly engaged in a flange or plate 23 extending from the reduction gear housing 18.

The reduction gear means 17 as shown in Fig. 3 includes a sprocket 24 mounted at the lower end of the steering wheel shaft 19, a sprocket 25 mounted at the upper end of the steering shaft 15, and a continuous sprocket chain 26 extending over and around the sprockets. The shaft 19 is journaled in upper and lower portions of the reduction gear housing 18 in a conventional manner. Likewise, the steering shaft 15 is journaled at 27 and 28 within the steering column in a conventional manner.

At the lower end of the steering column 15 a pinion 29 is mounted for engagement with a ring gear 30 that is peripherally disposed about a rotating plate 31 as shown in Figs. 4 and 5. At opposite sides of the plate 31 a pair of brackets 32 is provided for mounting of the dual steer wheels 6 on an axle 33 extending between the brackets.

In addition to the foregoing, the turning means includes a bogey wheel 34 which is rotatably mounted on a shaft 35 extending centrally upwardly from the rotating plate 31 through a shaft-receiving aperture (not shown) in an underplate 36 of the housing 2. The shaft 35 is retained in place by a nut 37 engaging the threaded upper portion of the shaft. A plurality of rollers 38 are mounted on individual roller shafts 39 extending radially outwardly from the periphery of the bogey wheel 34. The rollers 38 operate between the underplate 36 and the rotating plate 31 to facilitate steering of the truck 1 and the bogey wheel 34 absorbs shock. In operation, the steering wheel 11 functions through the steering shafts 15 and 19, the reduction gear means 17, and the turning means 7 to turn the dual steer wheels 6.

As shown more particularly in Fig. 6, the truck body or housing 2 includes oppositely disposed side plates 40 and 41, a back plate 42, a front plate 43, the underplate 36 which, as shown in Fig. 4, is mounted between chassis members 44 and 45, and the hood or access cover 13.

The plates 40–43 and hood 13 provide a compartment 46 within which battery means 47 are provided together with other operating members such as a motor 55 for propelling the truck and hydraulic flow means including pump 56 for operating the cylinder 3*a*. For opening and closing of the hood 13, the hood back edge has a recess 48 to provide clearance for the upper end of the steering column 16 and journal 27. The undersurface of the hood 13 is provided with electrical controls such as relays and switches diagrammatically indicated at 49 and 50 connected by cable 57 to the motor 55, as well as hydraulic controls such as valves diagrammatically indicated at 51, and hydraulic hoses 52 connecting the valves 51 to the hydraulic flow means including the pump 56. In addition, connecting rods 53 extend between the hydraulic valves 51 and the lower ends of two of the levers 12. Another connecting rod 54 extends from the lower end of a third lever 12 to the electric switch 50. Thus the several electrical and hydraulic controls 49 to 54 are conveniently disposed on the undersurface of the hood 13 where they are available for ready access when the hood is lifted to the open position as shown in Fig. 6.

Accordingly, the present invention provides an improved fork lift truck construction which avoids prior art difficulties and obtains described results by providing a compact maneuverable fork lift truck having a steering wheel and associated turning mechanism which are directly interconnected. In addition the fork lift truck includes readily accessible electric and hydraulic control means which are mounted on the undersurface of the hood or access cover of the housing of the truck for quick and easy maintenance and repair.

In the foregoing description, certain terms have been used for brevity, clearness and understanding; but no unnecessary limitations are to be implied therefrom beyond the requirements of the prior art, because such terms are utilized for descriptive purposes herein and not for the purpose of limitation and are intended to be broadly construed.

Moreover, the description of the improvements is by way of example and the scope of the present invention is not limited to the exact details illustrated, or to the specific mechanisms shown.

Having now described the features, discoveries and principles of the invention, the construction, operation and use of the improved mechanisms and the advantageous, new and useful results obtained thereby; the new and useful parts, elements, constructions, mechanisms, combinations, subcombinations, and arrangements, and mechanical equivalents obvious to those skilled in the art, are set forth in the appended claims.

What is claimed is:

1. Truck control means for a fork lift truck having a body-forming compartment containing prime mover means for the truck, an operator's platform adjacent the compartment, and a hood movable between closed and opened position at the top of the compartment, said truck control means comprising a turning wheel, an upright steering column, a steering shaft journalled in the steering column and operatively connected to the turning wheel, a radially offset housing at the upper end of the steering column, a horizontal steering wheel rotatably mounted upon said offset housing, means in said offset housing operatively connecting the steering wheel to the steering shaft, said offset housing being rotatable upon the steering column in a horizontal plane between operative position with the steering wheel located above the compartment in the path of movement of the hood between its opened and closed positions and non-operative position with the steering wheel located away from said hood, and means for normally holding said offset housing in operative position.

2. Truck control means for a fork lift truck having a body-forming compartment containing prime mover means for the truck, an operator's platform adjacent the compartment, and a hood movable between closed and opened position at the top of the compartment, said truck control means comprising a turning wheel, an upright steering column, a steering shaft journalled in the steering column and gear and pinion means operatively connecting the steering shaft to the turning wheel, a radially offset housing at the upper end of the steering column, a horizontal steering wheel rotatably mounted upon said offset housing, means in said offset housing operatively connecting the steering wheel to the steering shaft, said offset housing being rotatable upon the steering column in a horizontal plane between operative position with the steering wheel located above the compartment in the path of movement of the hood between its opened and closed positions and non-operative posi-

tion with the steering wheel located away from said hood, and means for normally holding said offset housing in operative position.

3. Truck control means for a fork lift truck having a body-forming compartment containing prime mover means for the truck, an operator's platform adjacent the compartment, and a hood movable between closed and opened position at the top of the compartment, said truck control means comprising a turning wheel, an upright steering column, a steering shaft journalled in the steering column and operatively connected to the turning wheel, a radially offset housing at the upper end of the steering column, a horizontal steering wheel rotatably mounted upon said offset housing, reduction gear means in said offset housing operatively connecting the steering wheel to the steering shaft, said offset housing being rotatable upon the steering column in a horizontal plane between operative position with the steering wheel located above the compartment in the path of movement of the hood between its opened and closed positions and non-operative position with the steering wheel located away from said hood, and means for normally holding said offset housing in operative position.

4. Truck control means for a fork lift truck having a body-forming compartment containing prime mover means for the truck, an operator's platform adjacent the compartment, and a hood movable between closed and opened position at the top of the compartment, said truck control means comprising a turning wheel, an upright steering column, a steering shaft journalled in the steering column and operatively connected to the turning wheel, a radially offset housing at the upper end of the steering column, a horizontal steering wheel rotatably mounted upon said offset housing, sprocket and chain means in said offset housing operatively connecting the steering wheel to the steering shaft, said offset housing being rotatable upon the steering column in a horizontal plane between operative position with the steering wheel located above the compartment in the path of movement of the hood between its opened and closed positions and non-operative position with the steering wheel located away from said hood, and means for normally holding said offset housing in operative position.

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