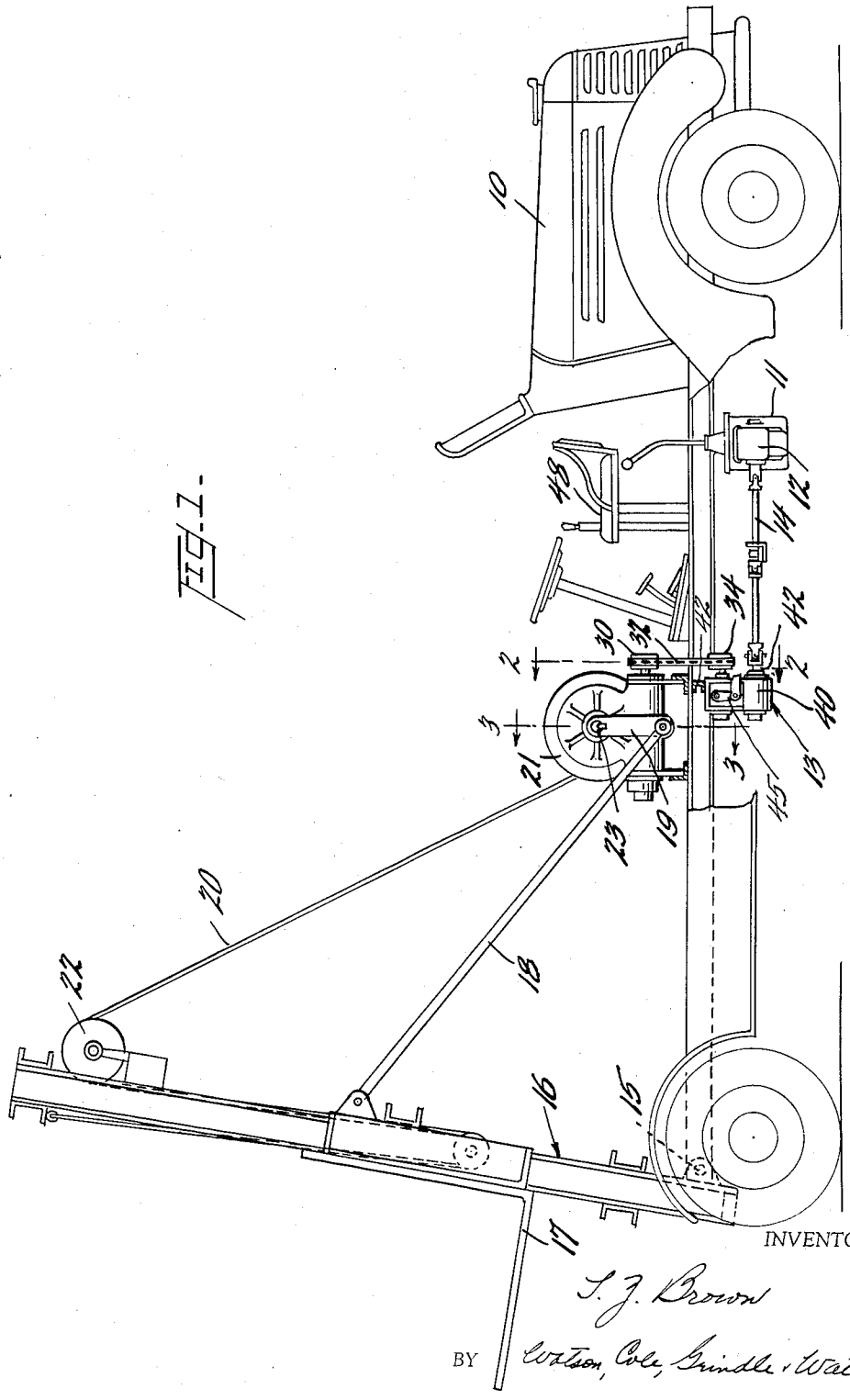
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FORK LIFT TRUCK

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FIG. 1.



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FIG. 2.

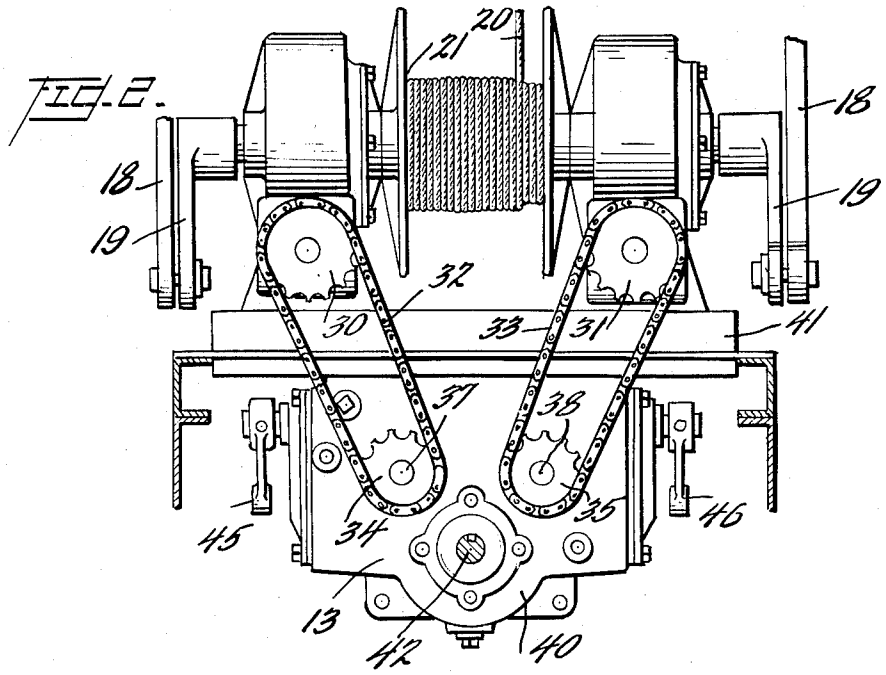
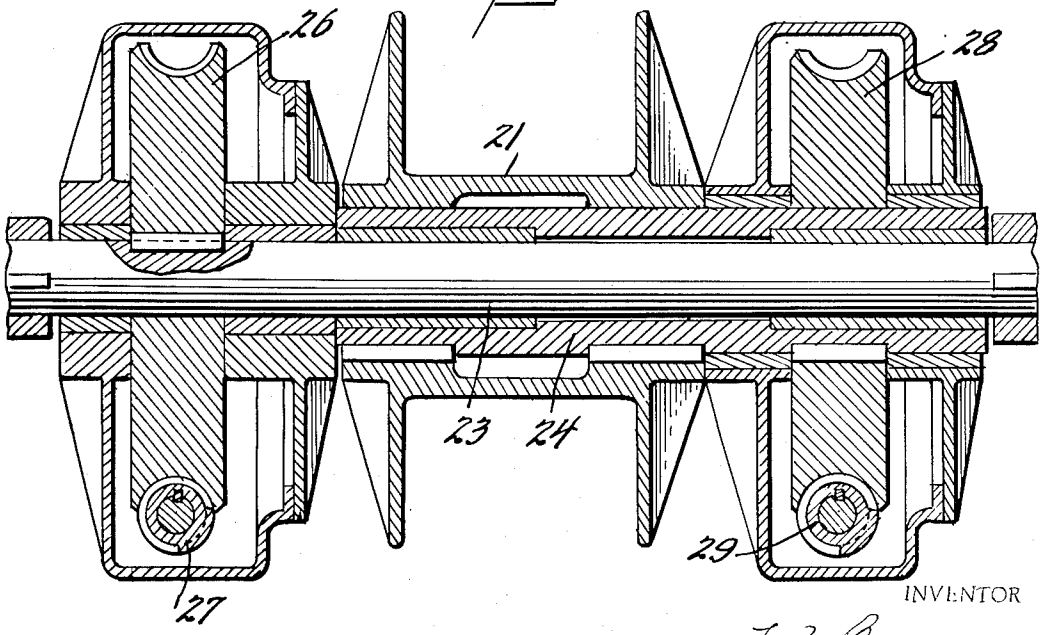


FIG. 3.



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FORK LIFT TRUCK

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Application August 13, 1952, Serial No. 304,147

3 Claims. (Cl. 214—672)

The fork lift truck, as now known to those engaged in the business of handling and shipping commodities of all kinds, comprises a mobile unit in the nature of a chassis equipped with a power plant of some kind, a frame which extends in a generally vertical direction, a fork movable longitudinally of the frame, and a connection between the power plant and the fork whereby the fork may be lifted and lowered, as desired.

In one form of such mobile unit, with which the present invention is particularly concerned, the fork frame is mounted for tilting movement about a horizontal axis and in a direction fore and aft of the chassis of the unit, means being provided for effecting tilting of the fork supporting frame under the close control of the operator. The power plant thus is called upon to provide power for three purposes, that is to move the unit from place to place as desired, to elevate and lower the fork, and to tilt the fork supporting frame to the position found to be most efficient for carrying out any certain operation.

Mechanisms for transmitting power from the power plant, which is usually the engine of the truck, to the devices to be adjusted or manipulated have heretofore been generally rather complicated and space consuming. It is the purpose of the present invention to provide an improved mechanism for taking power from the power plant and transmitting it to the fork and the fork frame under the operator's control, greater efficiency of operation being realized from the re-arrangement of the various operating parts, as well as greater compactness and a substantial reduction in the number of power transmitting parts, certain clutches, for instance, heretofore considered to be necessary in a mechanism of this character, being completely dispensed with.

The invention contemplates the use of a crank and linkage immediately connected to the tilting fork frame and the utilization of a cable and drum for communicating motion to the rising and falling fork and, for the purpose of improving the operation, simplifying the mechanism and rendering it much more compact, a new and efficient arrangement of cable winding drum, crank shaft, and means for driving drum and shaft independently of each other has been evolved. In the preferred form of the invention the crank shaft and drum shaft are coaxial, the drum shaft being hollow and encircling the crank shaft. To each such shaft is keyed the worm wheel of a worm drive, one wheel being positioned to either side of the drum which is fixed centrally of the mechanism and keyed to the outer surface of the tubular shaft. The arrangement is compact and balanced as well as embodying a minimum number of operating parts, the worm drive elements being irreversible and the shafts being movable independently of each other so that they may be rotated in the same or in opposite directions or either may be rotated while the other is stationary.

The embodiment of the invention selected for disclosure by way of example is illustrated in the accompanying drawings, in which,

Figure 1 is a diagrammatic showing of a form of truck with which the invention may be employed with advantage, the truck chassis being broken away in order that the essential elements of the invention may be more clearly perceived and portion of the mechanism and truck being diagrammatically illustrated;

Figure 2 is a section on line 2—2 of Figure 1; and

Figure 3 is a section on line 3—3 of Figure 1.

The truck's chassis need not be described in detail nor conventional mechanisms such as the power take-off be fully illustrated. The power plant of the truck is not shown but it will be understood to be housed within the hood **10**. The transmission is diagrammatically indicated at **11** and the power take-off at **12**. A power divider mounted upon the frame of the truck is indicated at **13** and the shaft communicating power from the power take-off **12** to the power divider is indicated at **14**. Tiltably mounted upon the frame of the truck for rotation about a horizontally extending pivot **15** is the frame **16** which comprises a generally vertically extending trackway or guide for the lift fork **17**. The frame may be rocked about the axis **15** into a vertical plane, or into a plane which departs from the vertical to a substantial extent, by means which includes links and crank arms, one of the links being indicated at **18** and one of the crank arms at **19** in Figure 1. The fork itself is elevated by means of a cable **20** one end of which is attached to the fork frame and the other end of which encircles the winding drum **21**, the cable passing over a pulley **22** mounted upon the tilting frame **16** adjacent the upper end of that frame.

The cranks **19** are disposed in parallelism and are mounted upon, respectively, the opposite ends of a crank shaft **23**, to which shaft they are affixed by keys. Shaft **23** extends transversely of the chassis of the truck and is encircled by a second shaft **24** in the form of a sleeve, suitable bearings being interposed between the solid inner shaft **23** and the hollow shaft **24** which encircles and is supported by the shaft **23**. The winding drum **21** is supported upon and keyed to the hollow shaft **24**, the drum being located approximately midway between the ends of the solid central shaft **23**. Rotary motion is imparted to the shaft **23** through a worm and worm wheel driving mechanism, the worm wheel being indicated at **26** and the intermeshing worm at **27**. The hollow shaft **24** may be rotated by a similar driving means including worm wheel **28** and worm **29**. Worms **27** and **29** are mounted upon shafts to which are non-rotatably affixed sprocket members **30** and **31** and sprockets **30** and **31** are connected by chains **32** and **33** to sprockets **34** and **35**, respectively, which are affixed to shafts **37** and **38** forming elements of the power divider of conventional character the operating elements of which are contained within the casing **40** affixed to the truck. Preferably the power divider is directly below the cross beam **41** upon which the casing of the crank and drum operating shafting is directly mounted.

The power take-off shaft **14** enters the casing of the power divider at **42** and, through the gearing contained within the casing **40**, which may be any suitable conventional gearing, shafts **37** and **38** are driven, this resulting in the selective operation of shafts **23** and **24** through the sprocket and chain connections and the worm gearing previously described. It will be understood that the power divider includes means for establishing or disconnecting at the will of the operator the connection between the input shaft **42** and the two output shafts **37** and **38**, the respective devices for making or breaking connections to shafts **37** and **38** being operated by means of oscillating shafts provided with external operating arms **45** and **46**, respectively, which are connected by

suitable linkage or operating rods to handles positioned conveniently adjacent the driver's seat **48**.

From the description as given the manner in which the fork may be lifted or the fork frame tilted by power derived from the power plant of the truck will be clearly understood. The details of construction of the power takeoff, and power divider, may be widely varied as will be apparent to one skilled in the art, all without modification, in an overall sense, of the manner in which the mechanism operates. Due to the utilization of the compact and simple arrangement of drum and crank operating shafts, and the power connections thereto, a mechanism of greater efficiency and compactness, as well as one which may be constructed at lowest cost, is realized.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In a fork lift truck of the tilting frame type, mechanism for tilting the frame and vertically moving the fork, said mechanism including a power plant, a horizontally disposed shaft, means operatively connecting the ends of said shaft to the tilting frame to effect rocking of the frame when the shaft is rotated, a sleeve rotatably mounted on said shaft intermediate the ends thereof, a drum mounted upon and rotatable with said sleeve, a cable connecting the drum and fork, worm wheels coaxial with said shaft, one on each side of said drum, one worm wheel being mounted on and rotatable with the shaft and the other being mounted upon and rotatable with the sleeve, worms meshing with said worm wheels, respectively, and means for selectively transmitting power to said worms from said power plant.

2. In a fork lift truck of the tilting frame type, mechanism for tilting the frame and vertically moving the fork, said mechanism including a power plant, a horizontally disposed shaft, means operatively connecting the ends of said shaft to the tilting frame to effect rocking of the frame when the shaft is rotated, a sleeve rotatably mounted on said shaft intermediate the ends thereof, a drum mounted upon and rotatable with said sleeve, a cable connecting the drum and fork, worm wheels coaxial with said shaft, one on each side of said drum, one worm wheel being mounted on and rotatable with the shaft and the other being mounted upon and rotatable with the sleeve, worms meshing with said worm wheels, respectively, and means for selectively transmitting power to said worms from said power plant, said last mentioned means including a power divider and a shaft connecting the power divider to said power plant.

3. The combination set forth in claim 1 in which the means operatively connecting the ends of the shaft to the tilting frame comprise cranks affixed to the shaft ends respectively, and links connecting the cranks and tilting frame.

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