

- [54] **VERSATILE UTILITY CARRIAGE FOR MOBILE LOADERS**
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- [73] Assignee: **Lull Engineering Company, Inc.**, Minneapolis, Minn.
- [22] Filed: **June 8, 1972**
- [21] Appl. No.: **260,761**
- [52] U.S. Cl. **294/88, 214/147 G, 214/654, 214/731, 294/67 BC**
- [51] Int. Cl. **B66c 1/22**
- [58] Field of Search 294/88, 67 BC, 67 R, 104, 294/106; 214/147 R, 147 G, 653, 654, 620, 731

- [56] **References Cited**
UNITED STATES PATENTS
- | | | | |
|-----------|--------|---------------|---------|
| 2,788,148 | 4/1957 | Parcell | 214/653 |
| 3,127,209 | 3/1964 | Faust | 294/88 |
| 3,206,052 | 9/1965 | Kennedy | 214/313 |

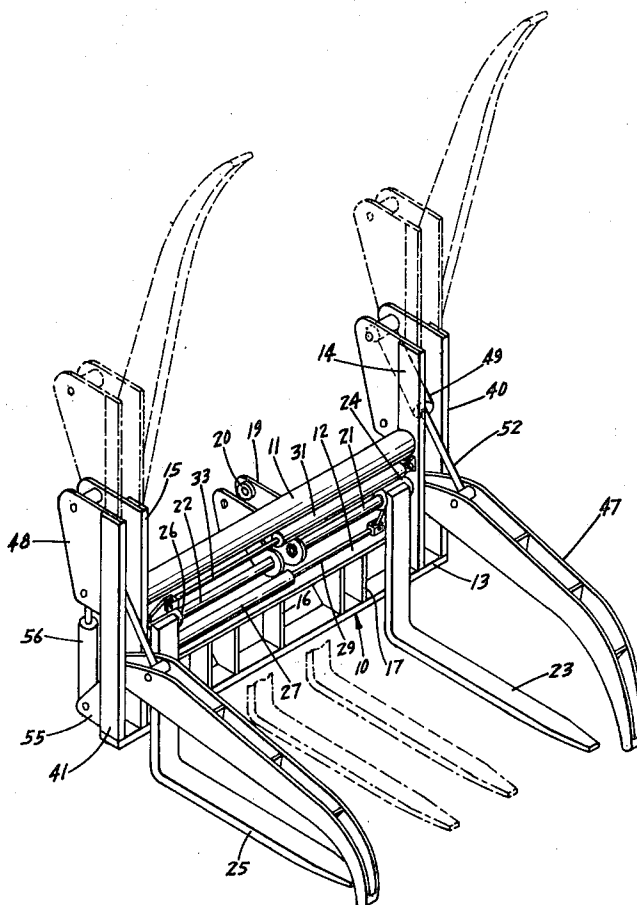
3,409,157 11/1968 Lull..... 214/654

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Assistant Examiner—James L. Rowland

[57] **ABSTRACT**

A versatile utility carriage for mobile loaders which is capable of lifting and carrying a variety of objects of varying sizes and shapes including long pipe, conduits and poles, spools and coils and crates of varying sizes. The carriage is characterized by lift forks which are movable laterally to accommodate pallets of varying sizes and hold-down fingers carried in vertically movable slides for grasping and holding articles, or for out-of-the-way vertical placement to permit the carriage to accommodate large bulky objects. The carriage is mountable on the boom structure of a front end loader for the usual movements including vertical lifting movement, longitudinal movement for stacking and unstacking, tilting movement, and the like.

10 Claims, 13 Drawing Figures



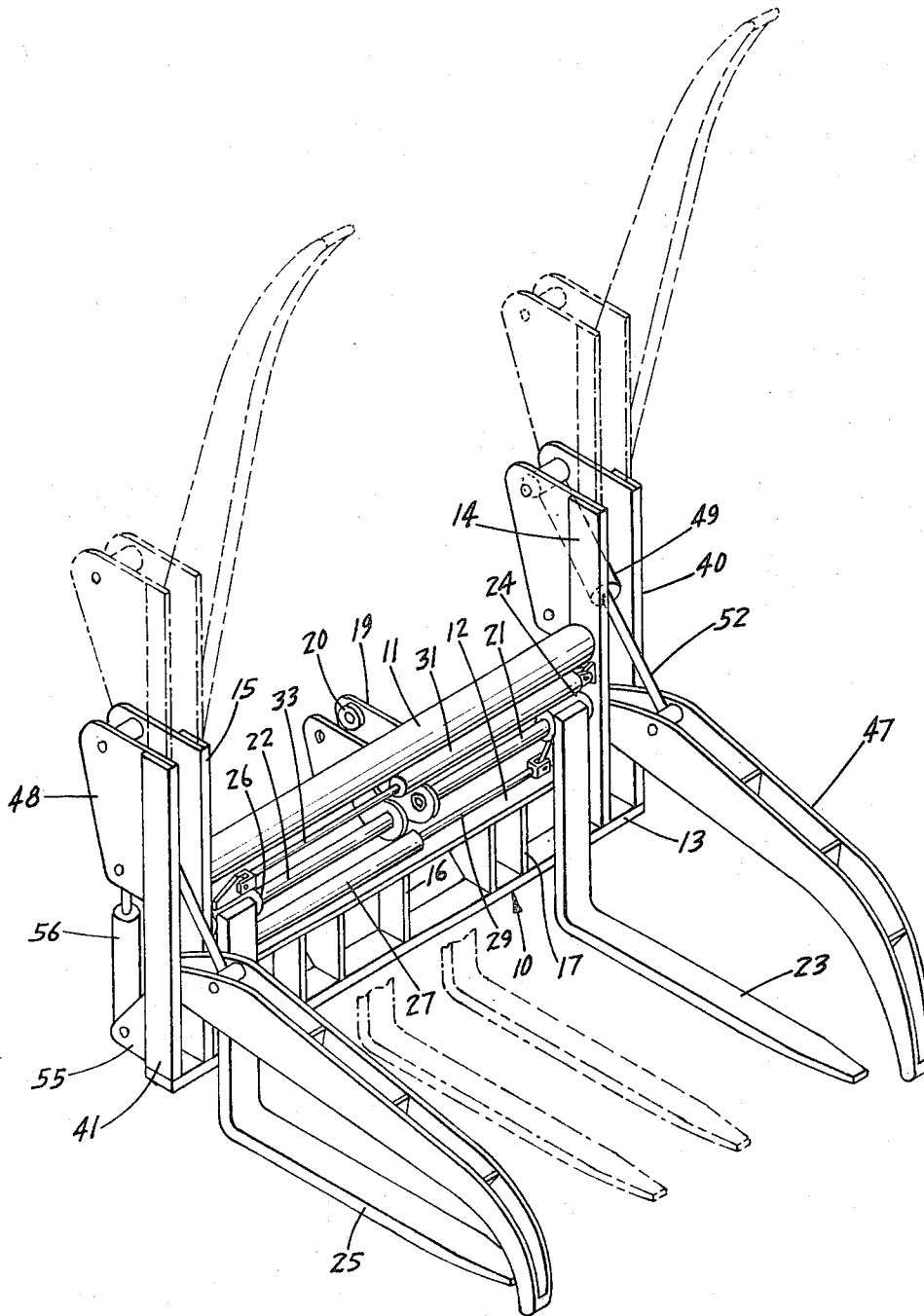


FIG. 1

FIG. 4

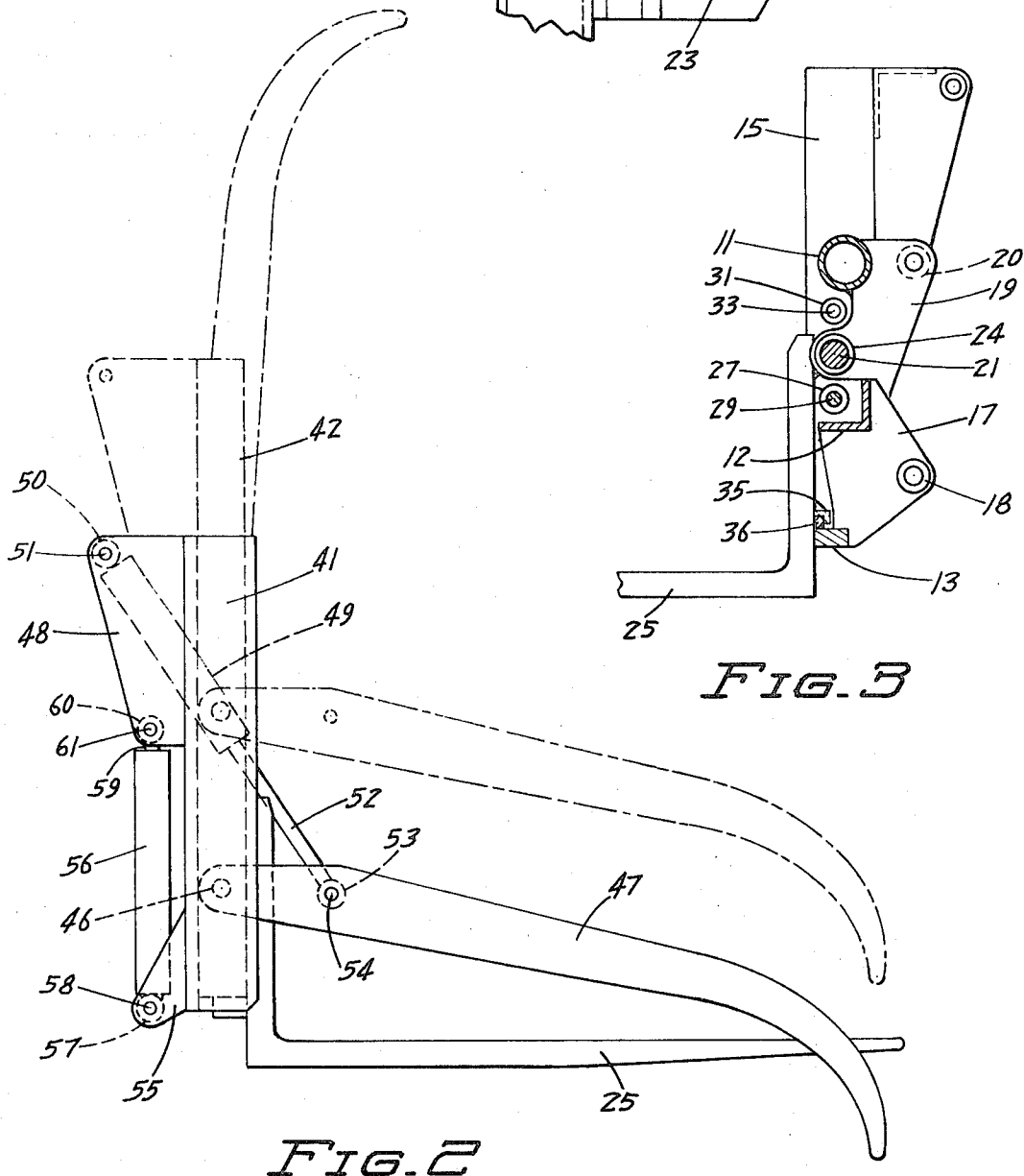
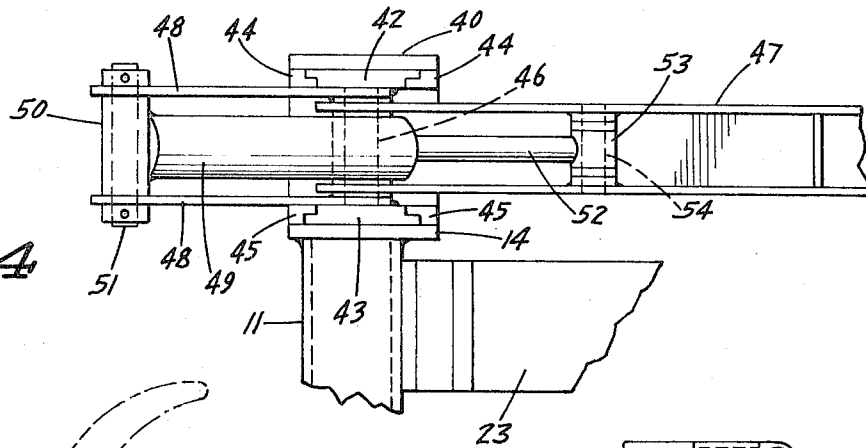


FIG. 3

FIG. 2

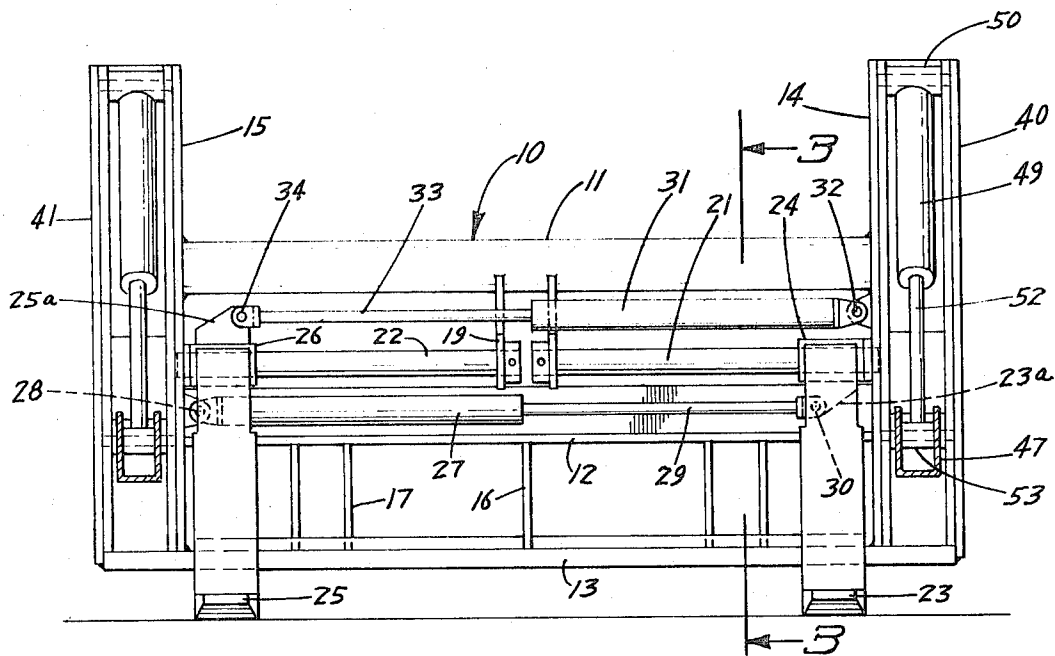


FIG. 5

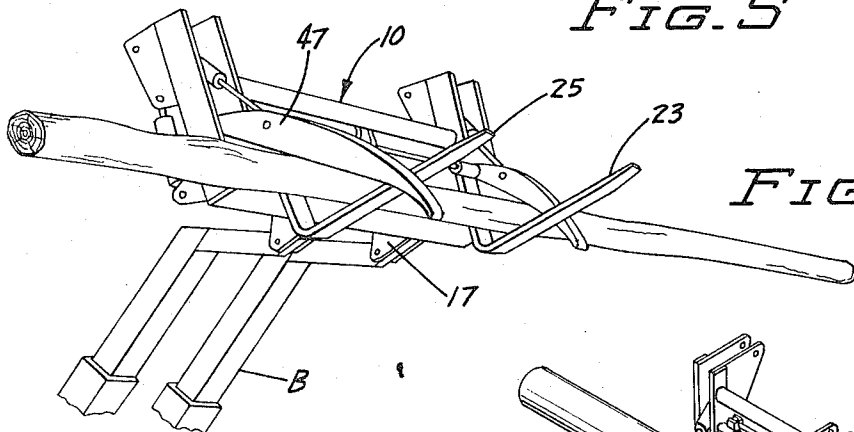


FIG. 7

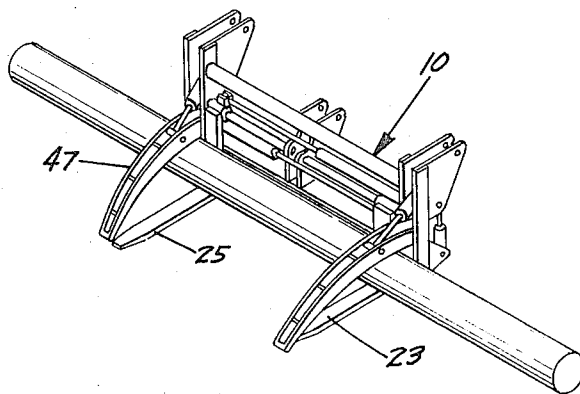


FIG. 8

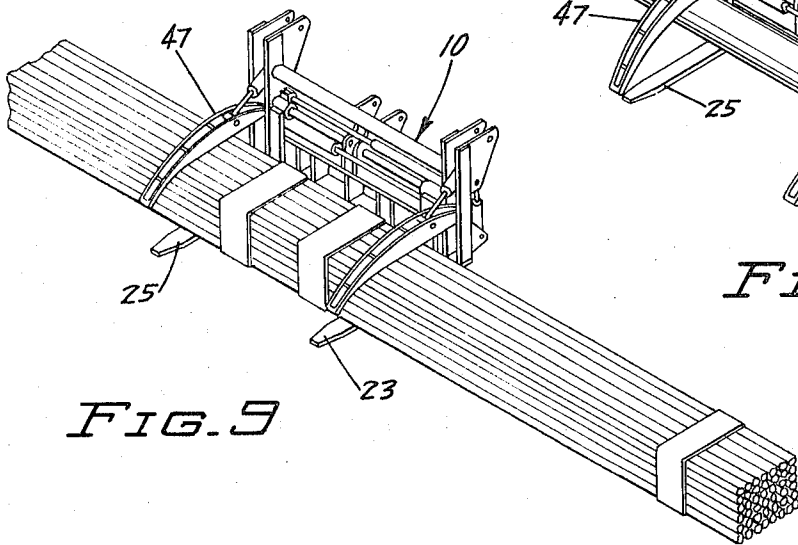
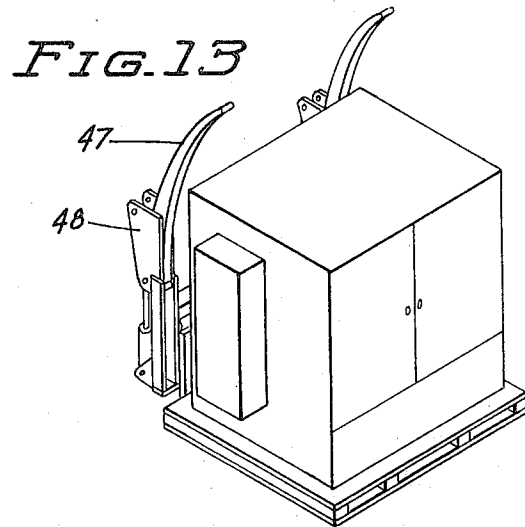
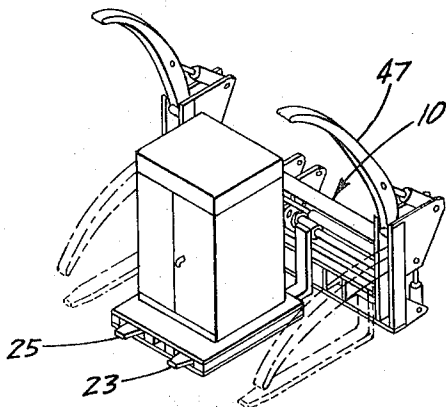
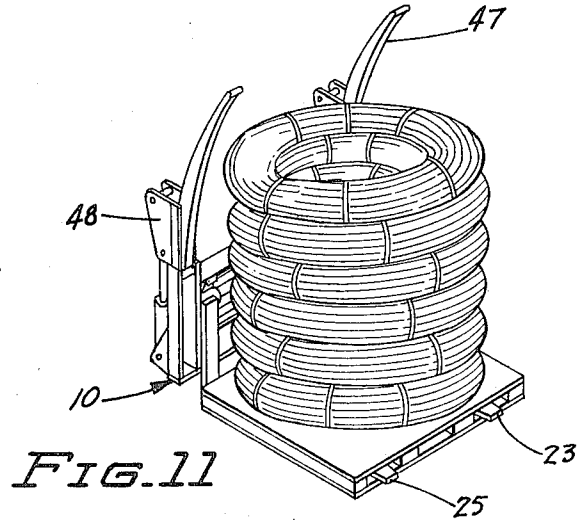
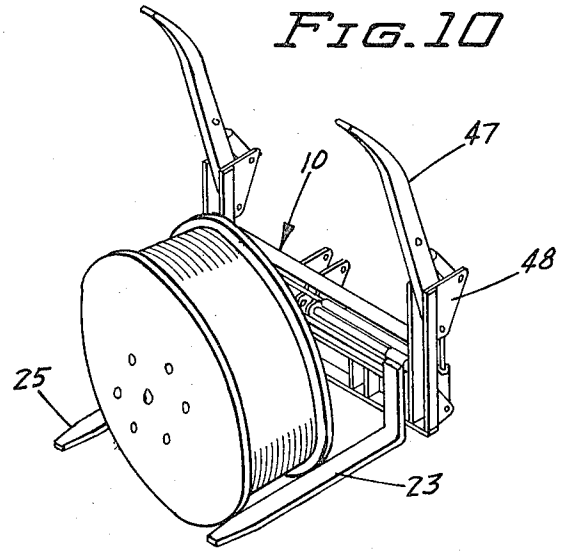
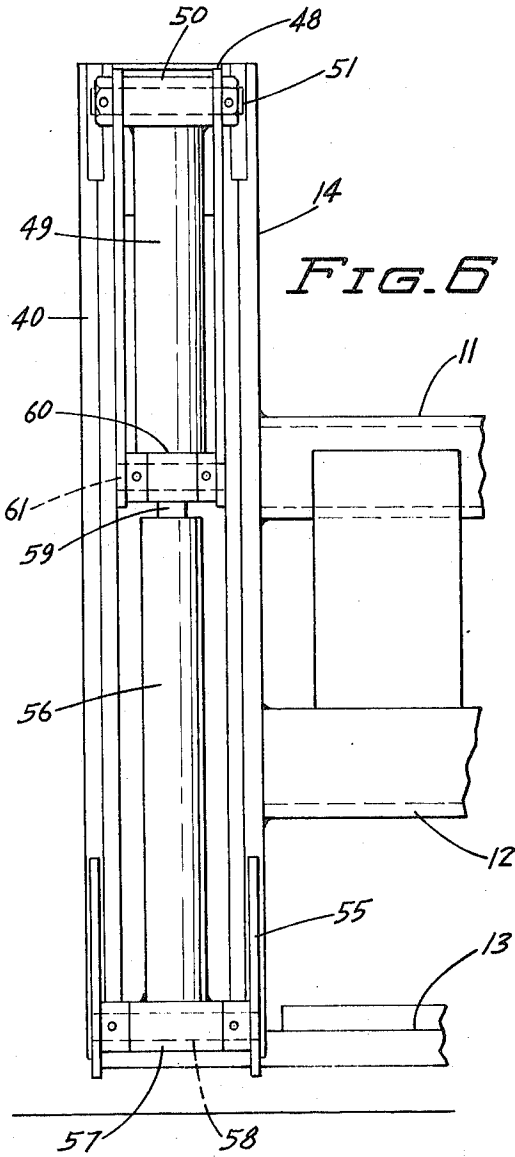


FIG. 9



VERSATILE UTILITY CARRIAGE FOR MOBILE LOADERS

This invention is directed to a versatile utility carriage for use in connection with a front and mobile loader for the purpose of engaging, holding, carrying and discharging of a variety of objects of varying sizes and shapes. These include such diverse objects as elongated pipes, tubular conduits, utility poles, and the like, either singly or in bundles and in lengths as long as 75 feet; large cylindrical spools of wire and cable; coils of wire, cable, plastic and metallic tubing and conduit, and the like; palletized objects of all sizes; large and small crates of various sizes; and the like. Most prior art loaders are designed to perform one or more related functions but, if in a given situation a variety of objects are to be handled, generally more than one type of specialized loader is required. It is the object of this invention to provide a single utility carriage permitting a front end loader to do a wide variety of work.

The invention is illustrated in the accompanying drawings in which:

FIG. 1 is a perspective view of the carriage from the front and showing the lift forks and hold-down fingers in different positions in broken lines;

FIG. 2 is a left side elevation;

FIG. 3 is a fragmentary elevation, partly in section taken on the line 3—3 of FIG. 5;

FIG. 4 is a fragmentary top plan view of the right hand side of the carriage;

FIG. 5 is a front elevation;

FIG. 6 is a fragmentary rear elevation of the right hand side of the carriage;

FIGS. 7 through 9 (sheet 3) and FIGS. 10 through 13 (sheet 4) are perspective views illustrating various types of loads which can be handled by the carriage, according to the present invention.

Referring now to the drawings, the utility carriage, according to the present invention, comprises a frame, indicated generally at 10, adapted to be carried transversely at the forward end of a boom of a mobile loader, such as, for example, the loader of the type shown in my U.S. Pat. No. 3,327,879. Frame 10 is made up of a series of structural members including a tubular horizontal top member 11, an intermediate horizontal angle plate member 12 and bottom horizontal plate 13, all supported between vertical side members 14 and 15 at the right and left sides, respectively, of the carriage when viewed from the front.

A plurality of vertical struts 16 and 17 extend between the intermediate angle plate 12 and bottom plate 13 to impart strength and rigidity to the frame. As seen in FIG. 3, vertical struts 17 extend rearwardly from the frame and are equipped with suitable apertured bearing means 18 to receive pivot pins which serve to connect the carriage to a boom B of a loader (FIG. 7).

A pair of parallel spaced apart vertical plates 19 are positioned midway between side members 14 and 15 extending between horizontal members 11 and 12 and rearwardly thereof. Plates 19 are each fitted with suitable apertured bearing means 20 to receive pivot pins which serve to connect the carriage to the piston rod of a hydraulic cylinder (not shown) carried by the boom of a front end loader to permit tilting or rocking movement of the carriage.

A pair of horizontal shafts 21 and 22 are supported by their ends in one of plates 19 and side plate 14, and

one of plates 19 and side plate 15, respectively. A lift fork 23 welded to a sleeve or bushing 24 is supported from shaft 21 for transverse movement. A corresponding lift fork 25 welded to sleeve or bushing 26 is supported from shaft 22. It will be noted that the vertical leg portion 25a of fork 25 is longer than the vertical leg portion 23a of fork 23. Fork 23 is moved transversely relative to the longitudinal axis of the loader along shaft 21 between the full line and broken line positions shown in FIG. 1 by virtue of a hydraulic cylinder 27 mounted below shaft 22 and pivotally attached at 28 (FIG. 5) to vertical plate 15, the piston 29 being pivotally attached at 30 to fork 23. Similarly fork 25 is moved transversely by virtue of hydraulic cylinder 31 which is mounted above shaft 21 and is pivotally attached at 32 to vertical side plate 14 and whose piston 33 is pivotally attached at 34 to the top end 25a of fork 25. By virtue of the use of a flow divider, hydraulic fluid is distributed uniformly to cylinders 27 and 31 to cause uniform lateral movement of forks 23 and 25 inwardly and outwardly to accommodate pallets or other loads of varying widths. As shown in FIG. 3, each fork 23 and 25 is desirably provided on its rearward surface with an angle guide member 35 which engages and slides along a track such as rod 36 secured to the top surface of frame plate 13.

Frame bottom plate 13 extends transversely beyond the frame inner vertical side plates 14 and 15. An outer side plate 40 extends vertically from the end of bottom plate 13 spaced from and parallel to inner side plate 14. Similarly, an outer side plate 41 extends vertically from the opposite end of bottom plate 13 parallel to inner side plate 15. A pair of vertical slide plates 42 and 43 are positioned in face-to-face relation against the inner surfaces of outer vertical plate 40 and inner vertical plate 14, respectively. Each slide plate 42 and 43 is held in a slideway formed between a pair of slide guides or retainers 44 and 45, respectively. Similar slide means are disposed between vertical plates 15 and 41.

A short shaft 46 extends between slide plates 42 and 43 spaced upwardly from the lower ends thereof. One end of a hold-down finger or clamp 47 is mounted to rotate on shaft 46. A pair of spaced apart parallel rearwardly extending plates 48 are secured to the upper ends of slide plates 42 and 43 to move therewith. A hydraulic cylinder 49 is secured to a hub 50 for pivotal movement about a shaft 51 supported between the rearward edges of plates 48 adjacent the top thereof. The free end of the piston 52 of cylinder 49 is secured to a hub 53 mounted for rotation about a shaft 54 carried by the opposite side members of hold-down finger 47 spaced from shaft 46.

Introduction of hydraulic fluid to cylinder 49 causes the hold-down finger 47 to be rotated about shaft 46 through an arc in excess of 90° from the generally horizontal position to the generally vertical position, shown in FIG. 2, as well as any required intermediate position necessary for retaining any particular load. Identical slide and finger structure is provided on opposite sides of the carriage. A flow divider insures uniform distribution of hydraulic fluid to each of the pair of cylinders 49 for uniform operation of fingers 47.

The slide structures carrying the hold-down fingers 47 are vertically movable relative to the carriage frame. A pair of spaced apart parallel plates 55, in the form of rearwardly projecting ears, are fixed to the lower ends

of frame vertical side members 14 and 40, and 15 and 41. One end of a hydraulic cylinder 56 is secured to a hub 57 for rotation about shaft 58 held between the ears 55. Cylinder 56 is vertically extending. The free end of its piston 59 is secured to a hub 60 for rotation about shaft 61 held between the plates 48 at the bottom rearward edges thereof.

Hydraulic fluid to cylinders 56 is pumped through a flow divider for uniform distribution of fluid to both cylinders to insure uniform elevation and lowering of the slides carrying the hold-down fingers. The slide and hold-down fingers may be moved vertically between the full line and dotted line positions shown in FIG. 2. When the slide assemblies are in their uppermost position and the hold-down fingers are fully retracted, crates and other objects of considerable height can be accommodated by the carrier. The operation of the fingers into and out of clamping position, and of the finger slides vertically and movement of the forks together and apart are carried on separately. However, both hold-down fingers are moved simultaneously, both slides are moved simultaneously, and both forks are moved simultaneously.

The versatility of the utility carriage is illustrated in FIGS. 7 through 13. In a typical carriage, according to the present invention, the forks may be moved from a minimum span of 24 inches to a maximum of 74 inches measured from the outside edges of the forks or any intermediate position between those limits.

FIG. 7 illustrates use of the utility carriage for loading and moving utility poles and the like. Poles from 12 inch diameter and greater and up to 75 feet in length can be handled.

FIG. 8 shows the utility carriage in use to handle large diameter pipe. Pipe ranging from 12 to 30 inches in diameter and up to 45 feet long can be handled by the carriage.

FIG. 9 shows the carriage being used to handle banded plastic tubing. The bundles of relatively friable tubes, 48 in all, are approximately 2 feet by 4 feet and up to 36 feet long. Due to the simultaneous movement of both hold-down fingers, the plastic pipe can be held without fracturing.

FIG. 10 shows the utility carriage being used to handle large spools of cable. Spools up to approximately 7 feet diameter and 4 feet wide may be accommodated. It will be noted that the hold-down fingers are in their almost vertical position and the slides in which the fingers are mounted are elevated.

FIG. 11 shows the utility carriage being used to handle a palletized load of coiled plastic tubing. Six coils almost 6 feet in diameter are stacked 8 feet high on a 6 foot square pallet. Again, the fingers are raised and elevated to accommodate this high load.

FIG. 12 shows the carriage with the forks moved together to handle an object, such as a small transformer, carried on a small pallet.

FIG. 13 shows the carriage used to accommodate a large object, such as a large transformer or the like, up to 8 feet high, on a 5½ by 6 foot pallet.

It is apparent that many modifications and variations of this invention as hereinbefore set forth may be made without departing from the spirit and scope thereof. The specific embodiments described are given by way of example only and the invention is limited only by the terms of the appended claims.

The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. A versatile utility carriage for mobile loaders which comprises:
 - A. a transversely and vertically extending frame;
 - B. a pair of lift forks, each having a vertical leg portion and a horizontal leg portion projecting forwardly therefrom;
 - C. means operatively connected and associated with said forks for moving both of the forks laterally toward and away from one another relative to the frame;
 - D. vertically movable slide means at opposite ends of the frame, said slide means including a pair of spaced apart parallel vertical side plates positioned at opposite ends of the frame and a pair of parallel spaced apart rearwardly extending plates projecting from the upper rearward edges of the slide plates and movable therewith;
 - E. a pair of hold-down fingers supported by said slide means, one end of each of said hold-down fingers being pivotally supported between one of said pairs of slide plates;
 - F. means operatively connected and associated with said fingers and supported by said slide means for raising and lowering the fingers relative to the slide means, said means including a hydraulic cylinder pivotally connected to the slide means between the rearwardly extending plates at the upper ends of the slide plates and a piston extending between the slide plates and pivotally connected to the finger; and
 - G. means operatively connected and associated with the slide means for elevating the slide means relative to the frame and relative to the lift forks.
2. A carriage according to claim 1 further characterized in that:
 - A. said frame includes horizontal shaft means;
 - B. said forks are supported from bushings slideable along said shaft means; and
 - C. opposed fluid pressure means are connected between the opposite sides of the frame and the forks to move the forks along the shaft means.
3. A versatile utility carriage for mobile loaders which comprises:
 - A. a transversely and vertically extending frame including horizontal shaft means;
 - B. a pair of lift forks, each having a vertical leg portion and a horizontal leg portion projecting forwardly therefrom, said forks supported from bushings slideable along said shaft means, and the vertical leg portion of one of said forks being longer than the vertical leg portion of the other fork;
 - C. means operatively connected and associated with said forks for moving both of the forks laterally toward and away from one another relative to the frame, said means comprising a pair of opposed horizontally disposed hydraulic cylinders connected between the opposite sides of the frame and the forks to move the forks along the shaft means, one of said cylinders being disposed above said shaft means with its piston connected to the longer of said vertical fork leg portions, and the other of said cylinders being disposed below said shaft means with its piston connected to the other of said vertical fork leg portions;

- D. vertically movable slide means at opposite ends of the frame;
- E. a pair of hold-down fingers supported by said slide means;
- F. means operatively connected and associated with said fingers and supported by said slide means for raising and lowering the fingers relative to the slide means; and
- G. means operatively connected and associated with the slide means for elevating the slide means relative to the frame and relative to the lift forks.
- 4. A carriage according to claim 3 further characterized in that:
 - A. said cylinder whose piston is connected to the longer of said vertical fork leg portions is pivotally connected to the frame at the side adjacent the other of said forks; and
 - B. said cylinder whose piston is connected to the other of said vertical fork leg portions is pivotally connected to the frame at the side adjacent the fork having the longer leg portion.
- 5. A versatile utility carriage for mobile loaders which comprises:
 - A. a transversely and vertically extending frame;
 - B. a pair of lift forks, each having a vertical leg portion and a horizontal leg portion projecting forwardly therefrom;
 - C. means operatively connected and associated with said forks for moving both of the forks laterally toward and away from one another relative to the frame;
 - D. vertically movable slide means at opposite ends of the frame, said slide means including:
 - 1. a pair of spaced apart parallel vertical side plates positioned at opposite ends of the frame,
 - 2. face-to-face slideways on the inside surfaces of said side plates,
 - 3. a pair of slide plates movable vertically in said slideways, and
 - 4. a pair of parallel spaced apart rearwardly extending plates projecting from the upper rearward edges of the slide plates and movable therewith;
 - E. a pair of hold-down fingers supported by said slide means;
 - F. means operatively connected and associated with said fingers and supported by said slide means for raising and lowering the fingers relative to the slide means; and
 - G. means operatively connected and associated with the slide means for elevating the slide means relative to the frame and relative to the lift forks.
- 6. A carriage according to claim 5 further characterized in that:
 - A. one end of each of said fingers is pivotally supported between one of said pairs of slide plates; and
 - B. fluid pressure means for raising and lowering the fingers are supported between the slide plates.
- 7. A carriage according to claim 6 further characterized in that said fluid pressure means includes:
 - A. a hydraulic cylinder pivotally connected to said slide means between said rearwardly extending plates at the upper ends of the slide plates; and
 - B. a piston extending between said slide plates and pivotally connected to said fingers spaced from the

- pivotal connection of the fingers with the slide plates.
- 8. A carriage according to claim 5 further characterized in that:
 - A. a pair of parallel spaced apart ear plates are provided projecting rearwardly from the lower rearward edges of said frame side plates; and
 - B. fluid pressure means are provided connected to said ear plates and said slide plates for elevating the slide means.
- 9. A carriage according to claim 8 further characterized in that said fluid pressure means includes:
 - A. a vertically extending hydraulic cylinder pivotally connected to said side plates between said rearwardly extending ear plates; and
 - B. a piston pivotally connected to said slide plates between the rearwardly extending plates at the upper edges of the slide plates.
- 10. A versatile utility carriage for mobile loaders which comprises:
 - A. a transversely and vertically extending frame including horizontal shaft means;
 - B. a pair of lift forks, each having a vertical leg portion and a horizontal leg portion projecting forwardly therefrom, said forks being supported from bushings slideable along said shaft means, and the vertical leg portion of one of said forks being longer than the vertical leg portion of the other fork;
 - C. means operatively connected and associated with said forks for moving both of the forks laterally toward and away from one another relative to the frame; said means comprising a pair of horizontally disposed hydraulic cylinders, one of said cylinders being disposed above said shaft means pivotally connected to the frame at the side adjacent to the fork with the shorter of said vertical leg portions and having its piston connected to the longer of said vertical leg portions, and the other of said cylinders being disposed below said shaft pivotally connected to the frame adjacent the fork having the longer leg portion and having its piston connected to the shorter of the vertical leg portions;
 - D. vertically movable slide means at opposite ends of the frame, said slide means including a pair of spaced apart parallel vertical side plates positioned at opposite ends of the frame, face-to-face slideways on the inside surfaces of said side plates, a pair of slide plates movable vertically in said slideways and a pair of parallel spaced apart rearwardly extending plates projecting from the upper rearward edges of the slide plates and movable therewith;
 - E. a pair of hold-down fingers supported by said slide means, one end of each of said hold-down fingers being pivotally supported between one of said pairs of slide plates;
 - F. means operatively connected and associated with said fingers and supported by said slide means for raising and lowering the fingers relative to the slide means, said means including a hydraulic cylinder pivotally connected to the slide means between the rearwardly extending plates at the upper ends of the slide plates and a piston extending between the slide plates and pivotally connected to the finger;

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- G. means operatively connected and associated with the slide means for elevating the slide means relative to the frame and relative to the lift forks;
- H. a pair of parallel spaced apart ear plates projecting rearwardly from the lower rearward edges of said frame side plates; and
- I. said means for elevating the slide means relative to

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the frame comprising a vertically extending hydraulic cylinder pivotally connected to the side plates between said rearwardly extending ear plates and a piston pivotally connected to said slide plates between the rearwardly extending plates at the upper edges of the slide plates.

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,817,567 Dated June 18, 1974

Inventor(s) Le Grand H. Lull

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 5, "and" should be --end--.

Column 5, line 9, "associted" should be --associated--.

Column 5, line 18, "pistion" should be --piston--.

Column 6, line 13, "hydrualic" should be --hydraulic--.

Signed and sealed this 8th day of October 1974.

(SEAL)
Attest:

McCOY M. GIBSON JR.
Attesting Officer

C. MARSHALL DANN
Commissioner of Patents