Feb. 28, 1967 G. N. BOWMAN-SHAW 3,306,481

MAST EXTENSION MECHANISM FOR AN INDUSTRIAL TRUCK

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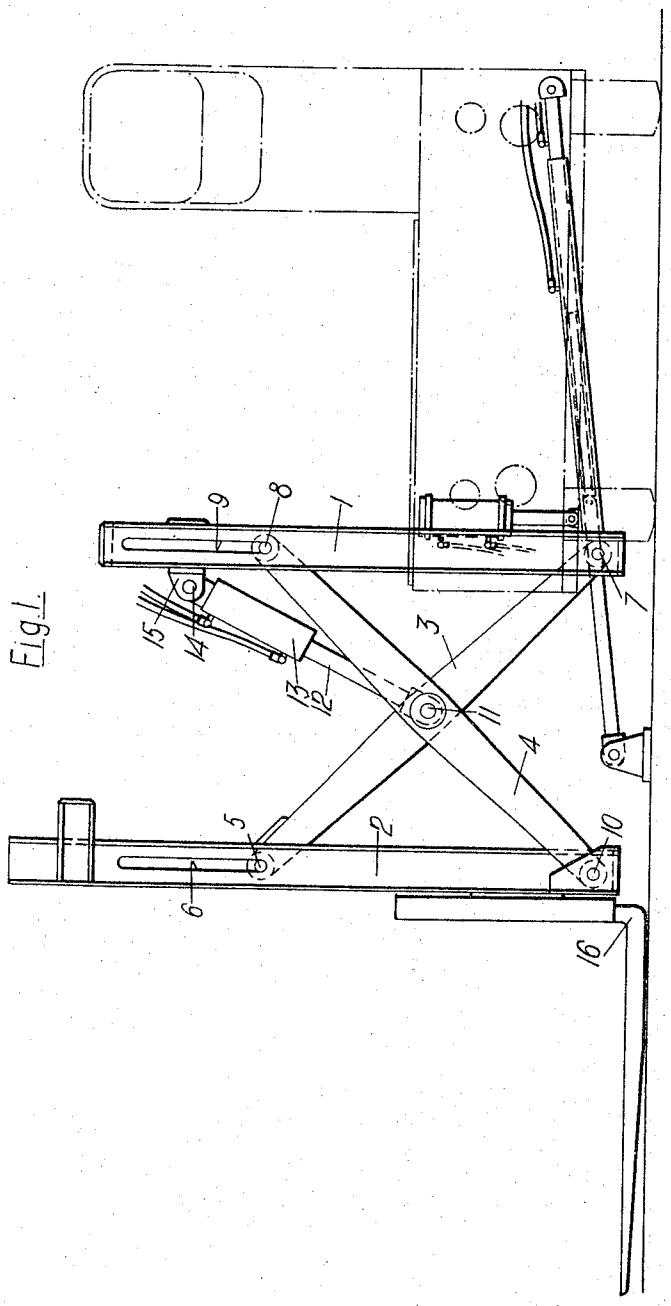

Fig 1.

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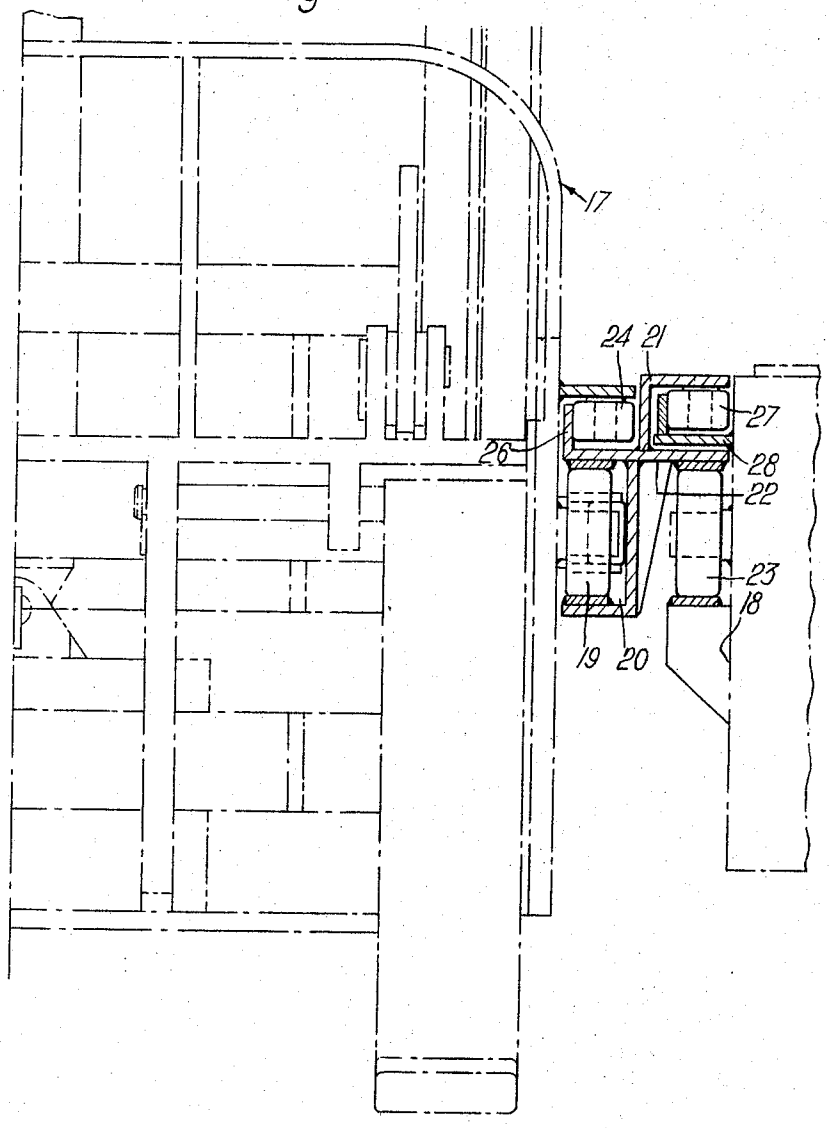
Fig.2.



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MAST EXTENSION MECHANISM FOR AN INDUSTRIAL TRUCK

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6 Claims. (Cl. 214—670)

This invention relates to side loading industrial trucks of the type in which loading means comprising, for example, a pair of forks, is carried on a mast assembly arranged to be traversed transversely of the truck from a position with in a recess, with which the truck is provided, to a position in which the forks extend beyond the side of the truck.

It is the object of this invention to provide means whereby the reach of the loading means may be increased.

According to the present invention, a side loading industrial truck comprises a chassis having a recess extending inwardly thereof from one side of the truck, a mast assembly supported in the recess on guide members, and movable along the guide members transversely of the chassis, a loading device supported from and movable vertically with respect to the mast assembly, and means to extend sideways the part of the mast assembly supporting the loading device to a predetermined distance beyond the side of the chassis. Preferably a first and a second mast assembly is provided, the loading means being carried by the second mast assembly which is suspended from or coupled to the first mast assembly by a linkage system adapted to be extended from a position in which the second mast assembly is adjacent the first mast assembly to a position in which the second mast assembly and hence the loading means carried thereby are spaced outwardly from the first mast assembly.

In accordance with another aspect of the invention the mast assembly of a side loading industrial truck is arranged to traverse, within the recess of the truck, along two guide members positioned one on each side of the recess, the guide members themselves being arranged to be traversed from a position within to a position in which they extend from the recess.

The guide members conveniently incorporate a channel within which rollers mounted on the mast assembly run. The guide members themselves may be arranged to co-operate with further rollers secured to the sides of the recess.

Means may be provided to prevent splaying between the mast assembly and the guide members and between the guide members and the sides of the recess.

In operation the mast assembly will normally first be traversed along the guide members from a position within the recess to a position adjacent its open end, and then the guide members will be extended from within the recess thereby greatly increasing the reach of the loading means carried by the mast assembly.

In order that the invention may be more fully understood embodiments in accordance therewith will now be described by way of example with reference to the accompanying drawings in which:

FIG. 1 is an end elevation of a side loading industrial truck of the type described in accordance with one embodiment of this invention; and,

FIG. 2 is a fragmentary side elevation of the mast assembly and part of the recess of a side loading industrial truck in accordance with another embodiment of the invention.

Referring to FIG. 1, a first mast assembly **1** of a side loading industrial truck is shown in its fully extended

position in the chassis recess. A second mast assembly **2** is coupled to the mast assembly **1** by cross linkage members **3** and **4**. The member **3** is connected to the upper end of the second mast assembly **2**, by a pivot **5** slidably engaged in a slot **6** therein and is pivoted at **7** to the lower end of the mast assembly **1**. Similarly the member **4** is connected to the upper end of the first mast assembly **1** by a pivot **8** slidably engaged in a slot **9** therein and is pivoted at **10** to the lower end of the mast assembly **2**.

At their intersection at their central portions the linkage members **3** and **4** are connected by a pivot **11** to which the piston rod **12** of a double acting hydraulic ram **13** is connected, the cylinder of the ram being pivotally connected at **14** to a bracket **15** fast with the upper end of the mast assembly **1**. Loading means comprising forks **16** are carried by the second mast **2** in a conventional manner, the forks being arranged for movement up and down the mast.

It will readily be appreciated that when the hydraulic ram **13** is extended, the second mast assembly **2** will adopt the position shown in which it is spaced outwardly from the mast assembly **1** thereby greatly increasing the reach of the forks, and when the hydraulic ram **13** is contracted the second mast assembly takes up a position in which it lies adjacent the mast assembly **1**.

It is to be understood that the manner in which the second mast assembly is connected to the mast assembly **1** need not be precisely as shown, but can be replaced by any other extensible linkage or coupling arrangement.

In addition to providing a second mast assembly extensible with respect to the mast assembly **1**, the forks **16** may be coupled to the mast assembly **2**, in a similar manner to that in which the second mast assembly **2** is coupled to the first mast assembly, so that the forks may be extended with respect to the second mast assembly still further to increase their reach. An extensible foot may be mounted on the chassis and ram or otherwise operated to be lowered into contact with the ground beneath the extended mast assembly to counteract the vertical forces on the mast assembly tending to tip the chassis sideways.

Referring now to FIG. 2 part of the mast assembly of a side loading industrial truck is shown at **17**, the mast assembly being arranged within the recess of the truck, one side of which recess is indicated at **18**. The mast assembly is provided with rollers **19** arranged to run within a channel portion **20** of a generally cruciform guide element **21**, so that the mast assembly may be traversed from a position within the recess to a position in which it is adjacent the open end thereof.

Rollers **19** are of course mounted on each side of the mast assembly and a guide element **21** is similarly provided one on each side of the recess.

Each guide element **21** includes a flange **22** arranged to co-operate with rollers **23** secured to the sides of the recess. Thus the guide elements **21** may be extended from a position within the recess to a position in which they extend beyond the open end thereof.

Means, comprising rollers **24** and **27**, are provided to prevent splaying longitudinally of the truck chassis between the mast assembly and the guide elements, and between the guide elements and the sides of the recess. Thus the rollers **24** are mounted on the mast assembly and arranged to co-operate with flanges **26** on the guide elements, and the rollers **27** are mounted on the guide elements to cooperate with flanges **28** fast with the sides of the recess.

In operation, as already mentioned, the mast assembly **17** is normally first traversed along the guide elements **21** to a position adjacent the open end of the recess, and then the guide elements **21** are extended, carrying the

mast assembly with them, so as greatly to increase the reach of the load carrying means mounted on the mast assembly.

When the mast assembly is fully traversed outwardly there is, of course, a tendency for the sides of the recess to be splayed apart. This is combated by the means described above.

The precise means employed to traverse the mast assembly and the guide elements is a matter of choice. Either electrical, mechanical or hydraulic means may be employed.

I claim:

1. A side loading industrial truck comprising a chassis, a recess in said chassis extending inwardly thereof from one side, guide members on the chassis at the sides of said recess, first and second mast assemblies supported on said guide members, means to move both said first and second mast assemblies transversely of the chassis along said guide members to a position near one side of said chassis, a loading device supported from and movable vertically with respect to said second mast assembly, and means to move said second mast assembly with respect to said first mast assembly to a predetermined distance beyond said one side of said chassis.

2. A truck according to claim 1 wherein means are provided to prevent the parts of said chassis bounding opposite sides of said recess spreading apart longitudinally of the chassis.

3. A truck according to claim 1 wherein a stabilising device is provided on said chassis and extendible to engage the ground beyond said one side of the chassis and beneath said first and second mast assemblies in the extended position thereof to counteract the forces acting on the truck tending to tip the truck sideways when said loading device is supporting a load off the ground.

4. A side loading industrial truck comprising a chassis, a recess in said chassis extending inwardly thereof from one side, guide members on said chassis at the sides of said recess, a first mast supported on said guide members, means for moving said first mast along the guide members transversely of said chassis, a second mast, a loading device supported from and vertically movable with respect to said second mast, a linkage system connecting said first and second masts to move as one, and means to actuate said linkage system to move said second mast with said loading device from a position adacent

said first mast to a position spaced sidewardly from said first mast and outwardly of said chassis.

5. A truck according to claim 4 wherein said linkage system comprises at least one pair of cross linkage members each pivoted to the other at the central portions thereof, a pivotal connection between one end of each linkage member to one of said masts, a sliding connection between the other end of each said linkage member to the other of said masts, and power operated means operable to splay said linkage members to extend and support said second mast sidewardly away from said first mast.

6. A side loading industrial truck comprising a chassis, a recess in said chassis extending inwardly thereof from one side, a mast assembly disposed in said recess, a number of first rollers rotatably mounted along each side of said recess and of said mast assembly, a generally cruciform guide element at each side of said mast assembly having flanges rotatably engaged by said rollers, a number of second rollers rotatably mounted about axes at an angle to the axes of said first rollers on at least one of said guide element and said recess and respectively engaging at least one flange on said recess and element, a number of third rollers rotatably mounted about axes at an angle to the axes of said first rollers on at least one of said guide element and said mast assembly and respectively engaging at least one flange on said assembly and said element, the disposition of said rollers, channels and cruciform element being such that in combination they permit travel on said rollers of said guide element in said recess and of said assembly on said guide element to dispose said assembly beyond one side of said chassis, and to prevent sideways spreading of the sides of said recess longitudinally of said chassis, and a loading device supported from and movable in a vertical direction with respect to said mast assembly.

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