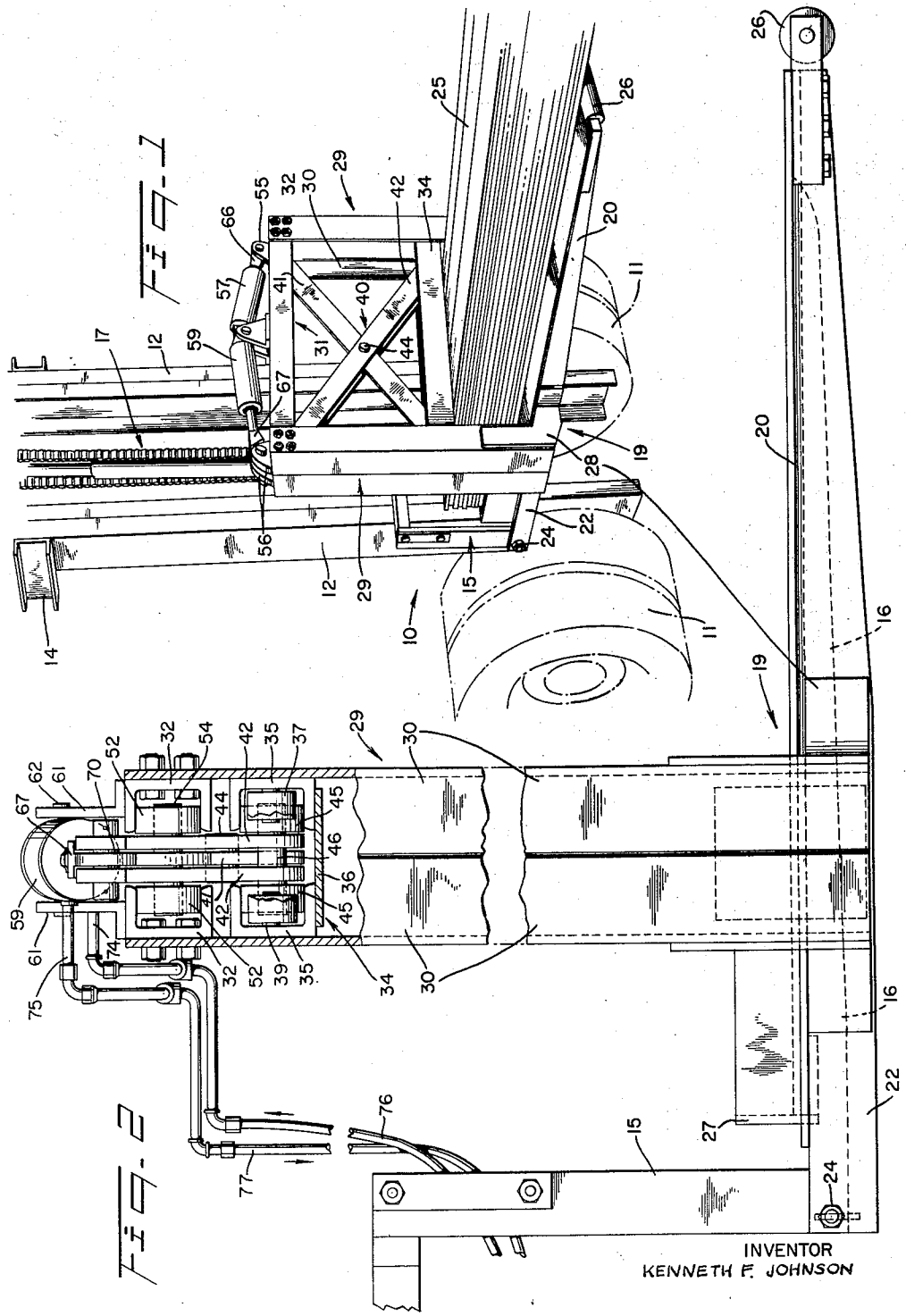
Aug. 30, 1960 K. F. JOHNSON 2,950,830

END LOADER FOR LIFT TRUCK

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END LOADER FOR LIFT TRUCK

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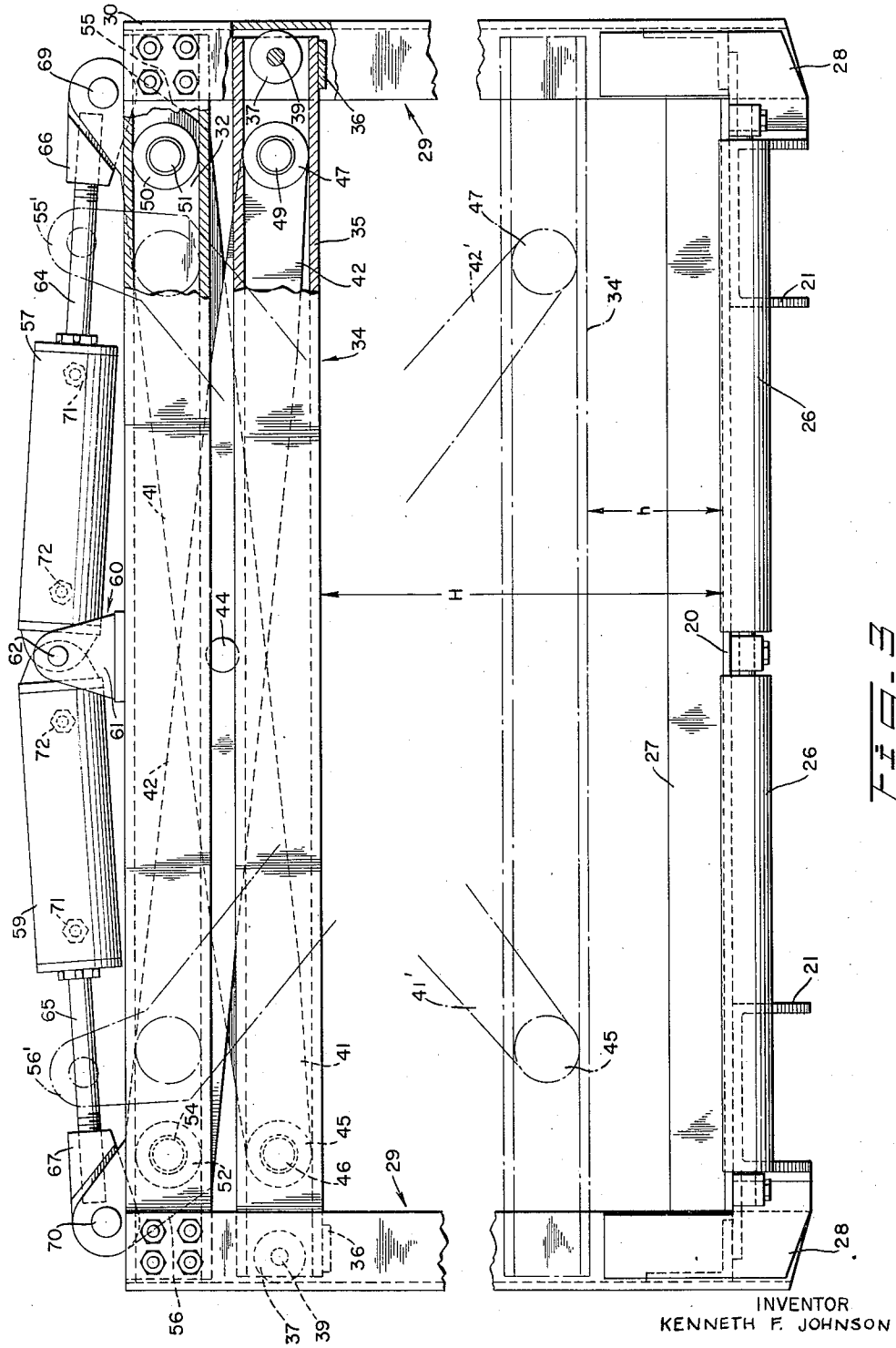


FIG. 3

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END LOADER FOR LIFT TRUCK

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1 Claim. (Cl. 214—654)

This invention relates to an improved loader for trucks of the fork lift type, the loader being of such construction that it can engage elongated articles at their ends and lift and transport such articles by a cantilever action.

The invention has among its objects the provision of an improved end loader of the type indicated having an improved load-engaging and -gripping mechanism.

Another object of the invention resides in the provision of a mechanism for end loading elongated objects and for supporting and transporting them by a cantilever action which is characterized by its economy of height and width, and which is further characterized by the large operative range of movement of the movable load gripping member.

Yet another object of the invention resides in the provision of an end loader of the type indicated which is simple in construction, rugged and durable, and which may be readily controlled.

Still another object of the invention lies in the provision of an end loader mechanism which may be readily made in the form of an attachment for a standard fork lift truck.

The above and further objects of the invention, such as those relating to economies of use and manufacture, will be more readily apparent in the following description of a preferred embodiment of the invention as shown in the accompanying drawings. It is to be expressly understood that such embodiment is illustrative only, and that the invention is not limited thereto.

In the drawings:

Fig. 1 is a fragmentary view in perspective of a fork lift truck provided with an improved end loader device made in accordance with the invention.

Fig. 2 is an enlarged view partially in side elevation and partially in longitudinal vertical section of the end loader shown in Fig. 1.

Fig. 3 is a view generally in end elevation, taken in the direction from right to left in Fig. 2, of the end loader of Figs. 1 and 2, portions of the upper, load gripping member and the guiding and actuating mechanism therefor being shown in vertical section, intermediate parts of the framework and guides being broken away, the upper gripper member and its actuating means being shown in full line in its fully raised position, such upper gripper member and parts of its actuating mechanism being shown in phantom lines with the gripper member in fully lowered position.

The end loader of the invention is shown and described primarily in connection with its use in end loading lumber, particularly lumber in bundle form. It will be understood, however, that the device of the invention is not limited to such use, and that it displays advantages in connection with the gripping, lifting, and transporting of various other objects, particularly elongated objects which are gripped and transported in cantilever fashion.

In some lumber yards it is the practice to bundle

lumber in lots of 500′, 1000′, and occasionally 2000′, as by steel strapping together an assortment of lengths, in proportion to the freight car tally, of one grade and one width of lumber. Such bundles can then be stored and loaded for delivery as a unit, thereby simplifying handling operations.

Preferably the bundles are placed in the loft for storage and removed therefrom and placed in a delivery truck by end loading operations, wherein the bundles are engaged at one end by a lift truck having a gripping device thereon. The bundles are lifted and transported in cantilever fashion by the truck, and are loaded onto and removed from the pile by being moved endwise with respect thereto. Because of the range of sizes of bundles handled and stored in a given yard, it is practically necessary for the bundle-engaging and -gripping device to have a wide range of operative movement of its clamping member in order to accommodate the varying heights of lumber bundles. Typically a 500′ bundle of lumber has the height of 6″, a 1,000′ bundle has a height of 12″, and a 2,000′ bundle has a height of approximately 24″.

Prior end loader devices which have been used for the end handling or loading of bundles of lumber have been seriously limited in the operative range of movement of bundle-gripping members. In such devices the gripping member has been connected directly to the end of each of the piston rods of the one or more vertically disposed expansible fluid motors or cylinders. The range of operative motion of the gripping member has thus been limited to the effective stroke of the motor or motors. Further, such prior end loaders have been bulky and unwieldy, in some the fluid motors adding to the width of the end loader and in others the fluid motor extending markedly above the end loader, thus presenting an awkward, unwieldy and vulnerable vertical extension thereon.

The end loader of the invention is characterized by its simplicity, by its ruggedness of construction, by its versatility, by its compactness in both lateral and vertical direction, and by the simplicity and accuracy of guiding of the movable gripper member to maintain it parallel to the member supporting platform at all times.

The end loader of the invention is shown and described in an embodiment in which it is in the form of an attachment which may be readily attached to and detached from the lifting fork of a standard fork type lift truck. A truck of this type, shown fragmentarily at **10** in Fig. 1, and having front wheels **11**, is shown as being provided with parallel laterally spaced guide members **12** which are connected at the top by a U-shaped channel member **14**. As is usual in such trucks, there is a vertically adjustable slide member **15** to the bottom of which is connected a lifting fork having spaced parallel tines, of which one is shown at **16** in Fig. 2. The slide **15** and the fork connected thereto are lifted or lowered as required, by mechanism **17**, which conventionally is in the form of a vertically disposed expansible motor having the upper end of its piston rod connected by parallel vertical chains to slide **15**. It will be understood that such lift truck also incorporates means not shown, whereby the guide members **12**, and thus the slide **15** and the fork attached thereto, may be selectively tipped or adjusted to change their inclination with respect to the vertical.

The end loader of the invention is shown in the form of an attachment, generally designated **19**, which is supported upon the tines of the lifting fork and is secured at its rear end to the slide **15**. Device **19** includes a broad horizontal platform member **20** having two downwardly open channel members **21** as shown in Fig. 3, members **21** being located adjacent the rear of the platform and on opposite sides thereof so as to receive the

tines of the lifting fork within them. The platform is provided with vertical side members along its opposite edges, the rear end of such vertical members, designated 22, overlapping the sides of slide 15 and being secured thereto as by the movable toggle bolts 24, of which one is shown at 24 in Figs. 1 and 2. Thus the attachment 19 may be quickly and easily attached to or disengaged from the lift truck, as desired.

In the operation of the device, a load or bundle of lumber 25 has one end thereof resting upon the platform 20, the forward end of which is provided with two aligned rollers 26 so positioned in hangers on the platform that their upper surfaces protrude slightly above the general level of the platform. The end of bundle 25 preferably engages a vertical end stop 27 which is in the form of a plate member secured as by welding to the platform 20. When grippingly engaged by attachment 19, the end of the bundle 25 adjacent end stop 27 is held down into substantial contact with platform 20 by the power operated gripper member 34, so that the bundle of lumber which extends far beyond the portion thereof shown in Fig. 1, is supported on the platform in cantilever fashion. When thus supported, the bundle may be raised by raising slide 15, and may be tipped endwise as required by changing the angularity of the guideways 12 with respect to the vertical. The controls for such adjustment of members 15 and 12, as well as those for cylinders 57, 59, which adjust the vertical positioning of gripper member 34, are preferably conveniently located for operation by the driver of the lift truck, so that the load may readily be engaged, lifted, tilted as required, transported, and by similar operations deposited where desired.

The gripper member 34 is vertically guided within two oppositely located vertical side frame members 29 which are attached to the side of platform 20 as by corner braces 28 as shown. Each of members 29 is conveniently formed of two parallel L-shaped bars or members 30 which are secured together to form a channel, as by means of their attachment to the platform 20 by braces 29 and by their being secured as by bolting to an upper horizontal cross member 31. Member 31 is conveniently made up of two spaced parallel L-shaped members 32 suitably connected or tied together as by welded braces, not shown.

As shown in Fig. 2, in the embodiment illustrated the gripper member 34 is constructed of two spaced similar confronting horizontal channel members 35 which are connected as by a bottom tie plate member 36 welded to their bottom edges. Gripper member 34 is guided within guideways provided by side frame members 29 by end rollers 37 on the ends of the gripper member. Each set of end rollers 37 is journalled on a stub-shaft 39 which extends through the vertical webs of the two opposing channel members 35. Rollers 37 substantially accurately engage the bottoms of the guideways in members 29, and thus prevent any substantial endwise motion of the gripper member 34.

Member 34 is moved vertically by power cylinders 57, 59, through the medium of a vertically extending scissors-like element generally designated 40. Element 40, as shown in Fig. 1, is made up of one single lever 41, and by two similar levers 42 positioned parallel to each other and on opposite sides of lever 41. The levers 42, acting as one set, and lever 41 are pivotally generally connected by pivot pin 44. The bottom end of lever 41 extends through the slot formed between the confronting edges of the horizontal webs of members 35 and is connected to the left-hand end of gripper member 34 (Figs. 1 and 3) by rollers 45 on opposite sides of lever 41. Rollers 45 are fairly accurately received between the upper and lower horizontal guide surfaces on channel members 35, and are connected to lever 41 by a stub shaft 46. The lower ends of levers 42 extend through the slot between members 35. Rollers 47, which are similar to rollers 45, are positioned on opposite sides of the lower ends of each of levers 42. Rollers 47 are likewise fairly accurately received within the channels 35, and are connected to the bottom ends of levers 42 (at the right in Figs. 1 and 3) by a stub shaft 49.

The upper ends of lever 41 and of lever set 42, 42, are guided in guideways provided within member 31 so as to move horizontally toward and away from each other. As will be apparent in Figs. 2 and 3, guide rollers 50, on either side of lever 41, and connected thereto by a stub shaft 51, fairly accurately fit between the upper and lower horizontal surfaces of the confronting channel members 32 making up the member 31. Similarly, two guide rollers 52 are positioned on opposite sides of the upper ends of the respective levers 42, and are connected thereto by stub shaft 54. Rollers 52 are fairly accurately received within the guideways presented by channel members 32.

Members 41 and 42, 42 are provided with upper short angular extensions 55 and 56, respectively, which project upwardly through the slot between the spaced horizontal webs of opposite channel members 32. Two similar, oppositely extending double-acting expansible fluid motors in the form of cylinders 57 and 59 are provided to thrust the upper ends of levers 41 and 42, 42 toward and away from each other whereby to lower and raise gripper member 34, respectively. Such cylinders 57 and 59 have the rear ends of their cylinder casings pivotally connected between the vertically extending ears 61 of a bracket member 60 which is centrally secured to the top of cross member 31. The cylinders are connected for limited pivotal movement to the bracket by horizontal pivot pin 62, as shown. The piston rods 64 and 65 of cylinders 57 and 59, respectively, are pivotally attached to the upper angular extensions of the levers 41 and 42, 42 by terminal fittings 66 and 67, respectively. Pivot pins 69 and 70 extend through terminal fitting 55 and lever extension 66, and through terminal fitting 56 and lever extension 67, respectively.

It will be seen that the scissors-like element 40 is, in effect, floatingly connected between the adjustable gripper member 34 and the upper horizontal cross member 31 and that the two lever sets 41 and 42, 42 will move symmetrically and in the same amount assuming that motors 57 and 59 are substantially identical and are subjected to the same fluid pressure. Accordingly, the system insures the maintenance of gripper member 34 horizontal at all times, even though the top of the bundle 25 is not parallel to the upper surface of platform 20. The scissors-like element 40 is free to shift laterally, and since the motors 57, 59, which are connected in parallel as will appear, insures the imposition of the same force on the upper end of each of the levers 41 and 42, 42.

Each of cylinders 57 and 59 is provided with ports 71 and 72 positioned at opposite ends of the respective cylinders of the motors and at opposite sides of the pistons within said cylinders. Ports 71 are inlet ports and ports 72 are outlet ports when the gripper member 34 is lowered, and vice versa when the gripper member is raised. A manifold 74 connects ports 71 of the respective motors in parallel, and a second manifold 75 connects outlet ports 72 in parallel. A flexible conduit 76 connected to manifold 74, and a flexible conduit 77, connected to manifold 75, lead to suitable control mechanism including valves, hydraulic pumps, etc., of the lift truck, not shown. Such mechanism is conventionally provided in such truck for the lifting of slide 15 and for the tipping of guides 12. Motors 57 and 59 may conveniently be under the control of a single added multi-position valve, not shown, by which fluid under pressure may be selectively fed to either port 71 or 72 of the motors so that gripper member 34 may be lowered and raised, respectively.

It will be apparent that the end loader device of the

invention is simple, rugged and positive in construction, and is simple in operation, that it is economical of space both laterally and vertically, and that the movable gripper member 34 thereof is capable of operative gripping movement throughout a wide range between its fully raised position H (Fig. 3) and its fully lowered position *h*. Furthermore, as above noted, the mechanism is such as to insure the maintenance of the gripper member 34 parallel to the platform at all times.

The manner of operation and the advantages resulting from the invention will be apparent from the foregoing. In a typical operation, wherein the lumber is stacked in a loft with the butt ends of alternate bundles in a pile projecting further outwardly than the intermediate bundles, the lift truck operator maneuvers his vehicle so that it is aligned endwise with the bundles. The operator then raises slide 15 so as to bring the rollers 26 on the platform under the outer butt ends of the selected top bundle of lumber, after which he raises the platform slightly and advances his vehicle lengthwise of the bundle so that the butt end thereof slides across platform 20 and into abutment with member 27. Thereupon the operator actuates motors 57, 59, to bring gripper member 34 down into firm engagement with the top of bundle 25. Guides 12 of the lift truck are then tipped somewhat rearwardly to elevate the forward free end of the bundle of lumber, and the bundle is further elevated, following which the lift truck may be backed outwardly away from the stack of lumber to clear it from the pile. The vehicle is then driven to a loading zone, such as a customer's truck, where the bundle 25 is deposited therein by operations substantially the reverse of the above.

Although for purposes of illustration I have shown and described one embodiment of the end loader device of my invention, it will be understood that the invention is not limited thereto since it is capable of numerous variations as to details of construction and as to the type

and character of the articles with which it is employed. The invention is, therefore, to be defined primarily by the claim appended hereto.

What is claimed is:

A mobile end loader for elongated objects comprising mechanism including a generally vertically movable slide, a generally horizontal load supporting platform attached to the slide, two opposed vertical side frame members disposed on opposite sides of and extending above the platform at a location appreciably rearward of the forward end of the latter, an elongated horizontal gripper member having its ends guided by the side frame members for movement toward and away from the upper surface of the platform, the gripper member having an elongated guide channel extending longitudinally thereof, a pair of similar levers pivoted together to form a scissors-like element extending generally in a vertical plane above the gripper member, said levers having projecting members on their lower ends slidable within the guide channel at opposite ends thereof, a transverse upper frame member connecting the upper ends of the side frame members, and opposed similar reciprocable fluid motors extending transversely of the platform and having relatively fixed parts pivoted for vertical movement on the upper frame member symmetrically of the longitudinal center thereof, and the other relatively reciprocable parts of the motors being pivoted to the upper ends of the respective levers selectively to urge such ends of the levers toward and away from each other whereby to lower and raise the gripper, respectively.

References Cited in the file of this patent

UNITED STATES PATENTS

682,083	James	Sept. 3, 1901
1,365,252	Langill	Jan. 11, 1921
2,441,275	Keagle	May 11, 1948
2,724,521	Squires	Nov. 22, 1955
2,734,519	Widdowson	Feb. 14, 1956