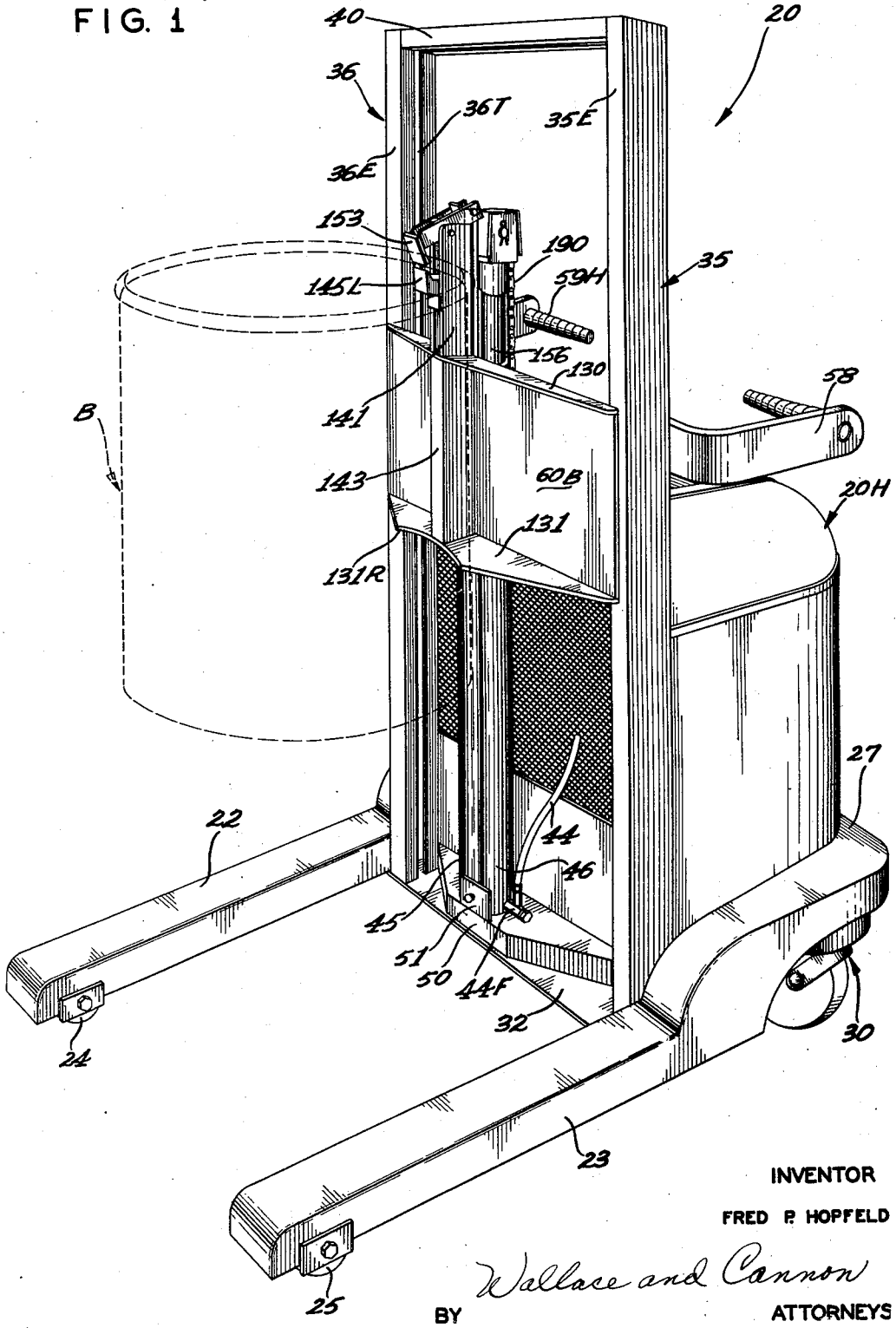
Sept. 22, 1959 F. P. HOPFELD 2,905,347

DRUM HANDLING LIFT TRUCK

Filed Oct. 11, 1956 4 Sheets-Sheet 1

FIG. 1



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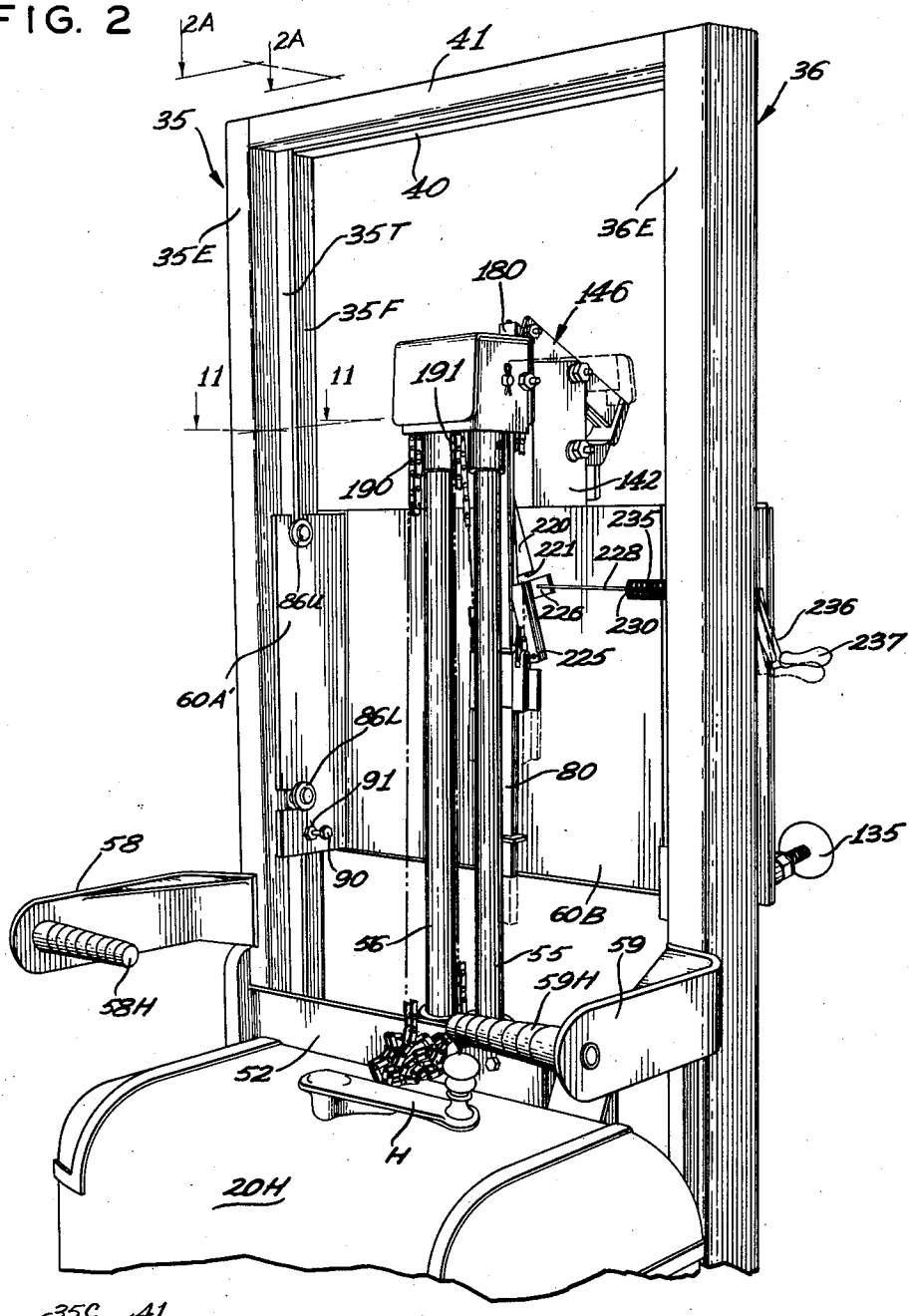
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DRUM HANDLING LIFT TRUCK

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FIG. 2



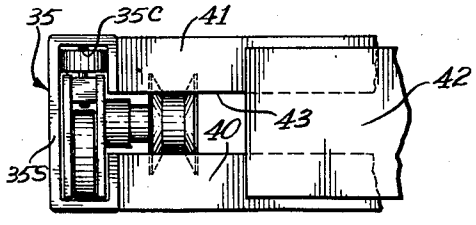


FIG. 2A

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DRUM HANDLING LIFT TRUCK

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FIG. 4

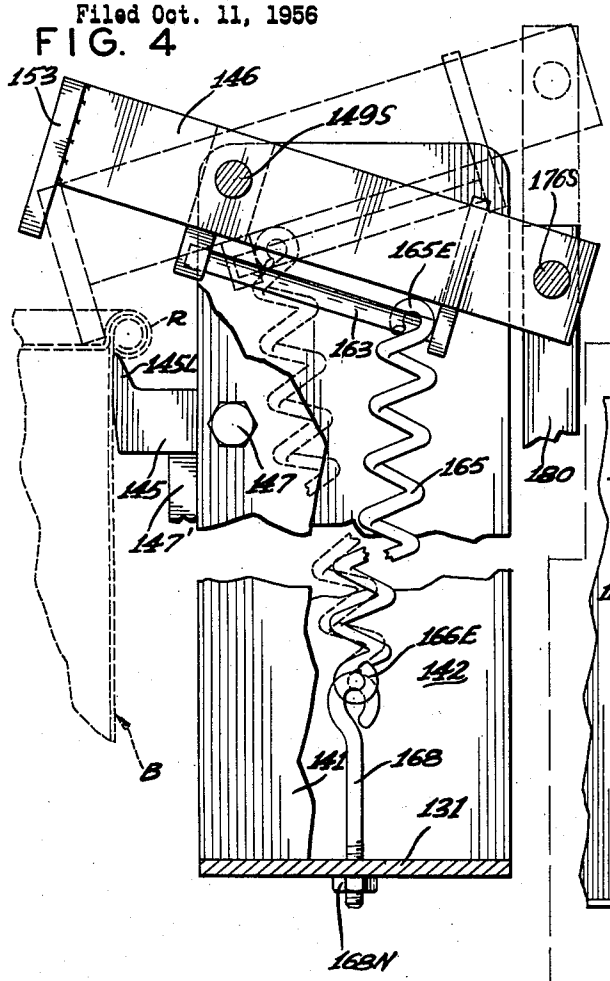


FIG. 3

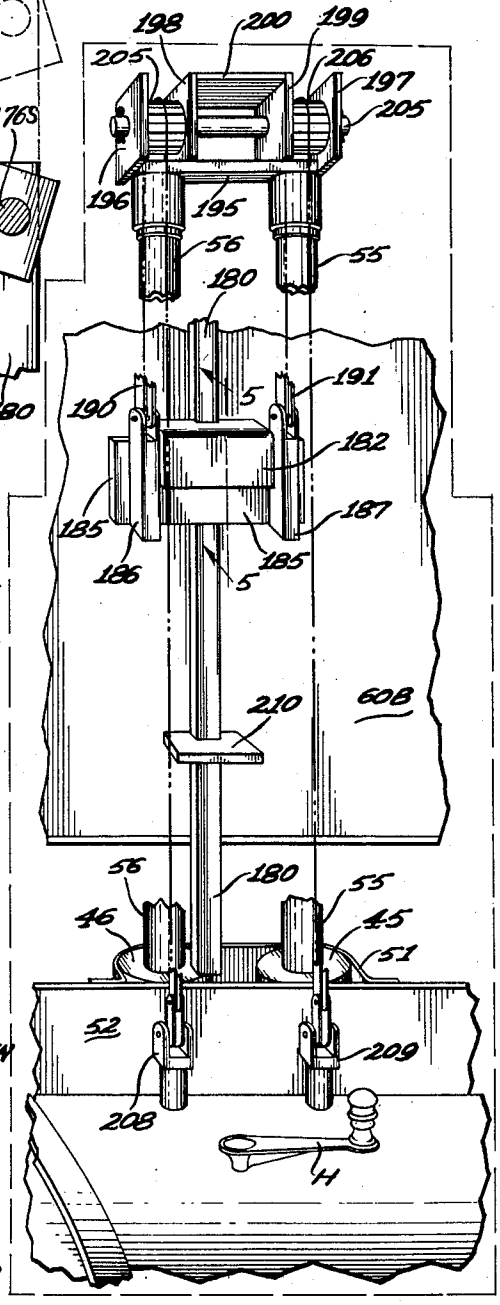


FIG. 5

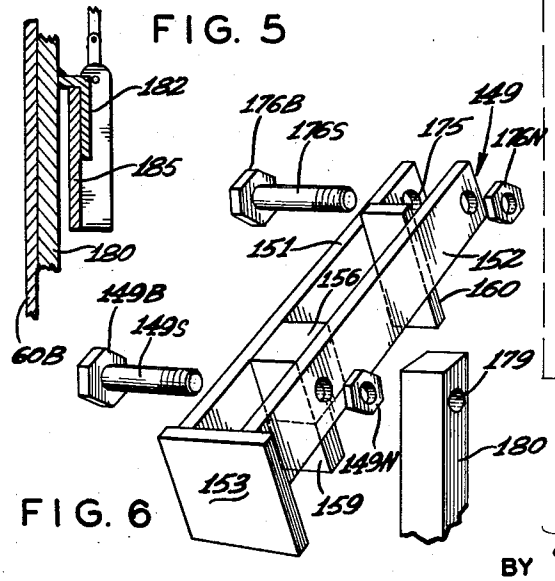


FIG. 6

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DRUM HANDLING LIFT TRUCK

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FIG. 7

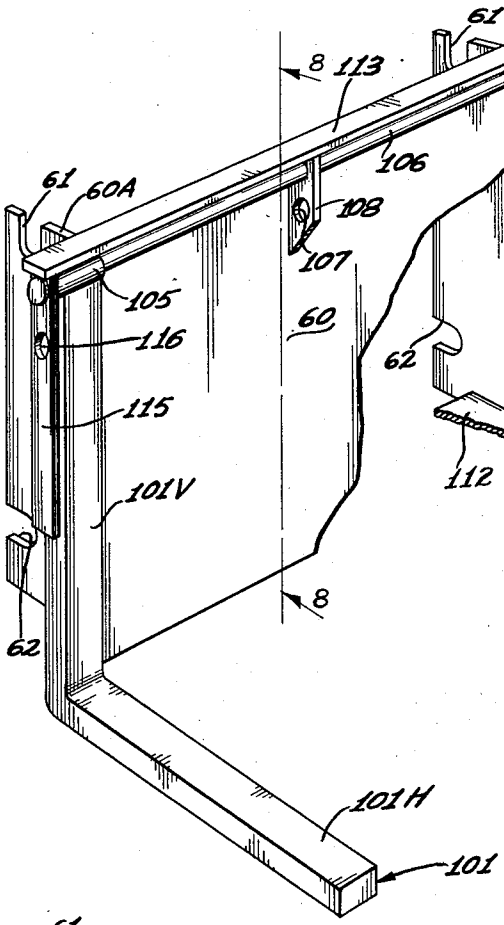


FIG. 10

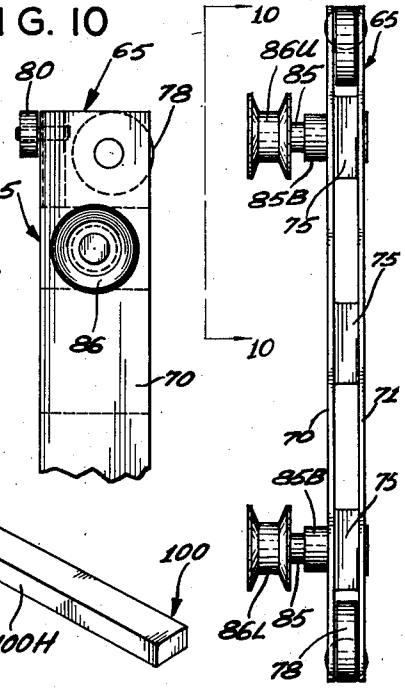


FIG. 9

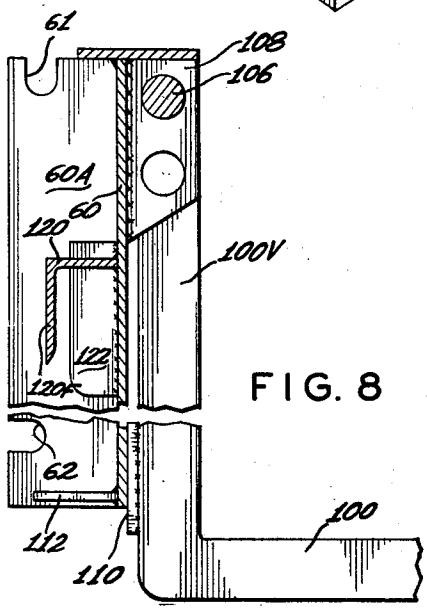


FIG. 8

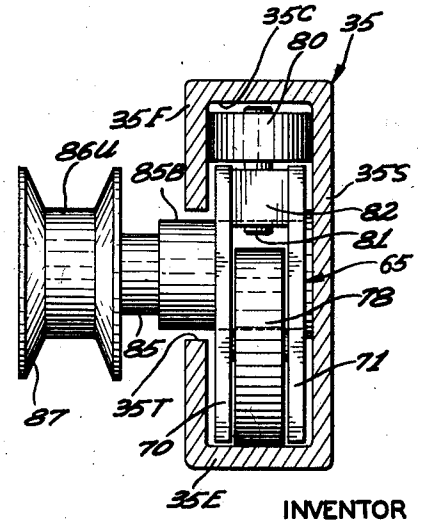


FIG. 11

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United States Patent Office

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2,905,347

DRUM HANDLING LIFT TRUCK

Fred P. Hopfeld, Elmwood Park, Ill., assignor to Grand Specialties Company, Chicago, Ill., a corporation of Illinois

Application October 11, 1956, Serial No. 615,305

11 Claims. (Cl. 214—654)

This invention relates to materials handling equipment in the form of lifts.

Among the more common types of materials handling equipment are so-called shop trucks adapted to transport relatively heavy objects from one location to another. Materials handling equipment of this kind sometimes embody a frame affording a vertical guide track, and a cross plate or head having lift means associated therewith is adapted to be guided on and by such track during raising and lowering movements imparted thereto. One of the objects of the present invention is to materially simplify the way in which a lift plate of this kind is to be guided. Specifically, an object of the present invention in this regard is to afford in materials handling lift equipment members providing guide channels, and stabilizers mounted in said guide channels so as to be easily removed therefrom when desired and adapted to detachably support a lift plate or so-called lift head. Other objects of the invention in this same regard are to equip the aforesaid stabilizers with anti-friction rollers so as to be removable with the stabilizer from the guide means, and to further equip the stabilizers with flanged rollers serving to dismountably associate a lift plate with the stabilizers.

The handling of heavy cylindrical objects such as barrels or the like is particularly difficult especially when these are filled, and another of the important objects of the present invention is to enable barrels or the like having a rim or like projection thereon to be lifted from the rim. A further object of the invention is to enable such lifting to be accomplished by a pair of jaws adapted to clamp or close on a rim or like projection as an incident to engagement of one of the jaw members with a corresponding surface of the aforementioned projection on a barrel or the like.

It is advantageous that a lift truck be capable of interchangeability, that is, be capable of conversion so as to handle materials of different kinds. For instance, it may be desirable to convert a lift truck from a barrel handling embodiment such as described above to an embodiment including pallet engaging forks, and another object of the present invention is to enable such conversions to be readily and easily accomplished.

Other and further objects of the present invention will be apparent from the following description and claims and are illustrated in the accompanying drawings which, by way of illustration, show preferred embodiments of the present invention and the principles thereof and what I now consider to be the best mode in which I have contemplated applying these principles. Other embodiments of the invention embodying the same or equivalent principles may be used and structural changes may be made as desired by those skilled in the art without departing from the present invention and the purview of the appended claims.

In the drawings:

Fig. 1 is a perspective view of the front of a lift truck

embodying features of the present invention for handling barrels or like cylindrical objects;

Fig. 2 is a perspective view, broken away in part, taken at the back of a lift truck embodying a lift plate of slightly different construction than that shown in Fig. 1;

Fig. 2A is a detail view taken substantially on the line 2A—2A of Fig. 2;

Fig. 3 is a diagrammatic view, broken away in part, showing certain details in construction;

Fig. 4 is a side elevational view, on an enlarged scale and broken away in part, of jaw members constructed in accordance with the present invention;

Fig. 5 is a detail sectional view taken substantially on the line 5—5 of Fig. 3;

Fig. 6 is an exploded view showing certain constructional details of the pivoted one of the jaw members;

Fig. 7 is a perspective view of a lift means in the form of pallet forks associated with a lift plate;

Fig. 8 is a sectional view, broken away in part, taken substantially on the line 8—8 of Fig. 7;

Fig. 9 is a front elevation of a stabilizer constructed in accordance with the present invention;

Fig. 10 is a side elevation of one end of the stabilizer shown in Fig. 9, the opposite end of the stabilizer being of like construction; and

Fig. 11 is a sectional view taken substantially on the line 11—11 of Fig. 2.

The present invention is illustrated in Fig. 1 as embodied in a truck 20 of the kind adapted to be propelled manually for materials handling purposes, the truck 20 comprising a relatively stable base structure in the form of a pair of horizontal laterally spaced leg members 22 and 23. The leg members 22 and 23 at the forward ends thereof include wheels 24 and 25. The rear ends of the legs 22 and 23 are connected by a relatively large U-shaped cross brace 27, and this cross brace supports at either side casters 30 of conventional construction enabling direction to be imparted manually to the truck 20.

A cross plate 32, Fig. 1, is extended between the leg members 22 and 23 at the rear thereof, and extending upwardly therefrom in spaced parallel relation are a pair of guide members 35 and 36 affording a vertical frame as will be apparent from Fig. 1. As shown in Figs. 2A and 11, each such a guide member includes an outer side wall as 35S a pair of end walls as 35E and a pair of inwardly directed flanges 35F that are parallel to and spaced from the outer side wall 35S. It will be observed that the flanges 35F terminate in spaced apart edges which define a vertical track as 35T, Figs. 1, 2 and 11 for a purpose to be described below, and it will be further observed that the arrangement is such to afford a vertical channel as 35C, Fig. 11, serving to guide a pair of stabilizers which will be described in more detail below. The upper ends of the guides 35 and 36 are connected by a cross brace, Figs. 1 and 2, afforded by two channel bars 40 and 41 that have a plate 42, Fig. 2A welded to the upper faces thereof. The bars 40 and 41 are spaced to afford a slot 43, Fig. 2A, having ends aligned with the tracks 35T mentioned above, and the arrangement is further such that the tracks 35T extend upwardly to the upper exposed ends of the guides 35 and 36 as shown in Fig. 2A.

A relatively large housing 20H, Figs. 1 and 2, is afforded at the back of the truck 20, and this housing encloses, not shown, a tank for hydraulic fluid, a pump and energizing means for the pump adapted to be controlled by a control handle H, Figs. 2 and 3, so that by rotating the control handle H to its "on" position fluid under pressure is furnished through a hose 44, Fig. 1, to fitting 44F associated with a pair of hydraulic cylinders 45 and 46. The hydraulic cylinders 45 and 46 are supported in an upright position on the upper face of a block 50 which

is supported by the base plate 32. At their lower ends, the cylinders 45 and 46 are anchored by a draw bolt to a flange 57 that projects upwardly from the block 50, and the upper ends of these cylinders are held by a strap 51, Fig. 3, against the front face of a back-up plate 52 that extends between the guide members 35 and 36 as shown in Fig. 2. Operatively related to the cylinders 45 and 46 are corresponding pistons 55 and 56, Figs. 2 and 3, and these pistons are adapted when fluid under pressure is furnished to the hose 44 as described above to elevate the pistons 55 and 56. Secured to the rear walls of the guide members 35 and 36 above the back-up plate 52 as shown in Fig. 2 are a pair of rearwardly extending arms 58 and 59, and the rear ends of these arms are provided with corresponding handles 58H and 59H for manually imparting direction and movement of the truck 20.

A lift plate or head 60 is associated with the vertical frame afforded by the guides 35 and 36 and is of sufficient width to span the distance between the guides 35 and 36. Thus, the outer marginal portions of the lift plate 60 engage corresponding forward faces of the guides 35 and 36 defined by the related end walls thereof, and the lift plate 60 is adapted to be raised and lowered by the pistons 55 and 56 as will be described below.

Under the present invention, the lift plate 60 is related to stabilizers at 65, Figs. 9, 10 and 11, that are slidably mounted in the channels at 35C of the opposed channel members 35 and 36, and to this and the lift plate 60 includes a pair of arms as 60A, Fig. 2, which are disposed at right angles to the plane of the lift plate 60 as shown particularly in Fig. 7. The arrangement is such that the arms 60A overlap the outer walls of the flanges as 35F of the vertical guides 35 and 36. The upper edge of each arm 60A is provided with a U-shaped recess or opening 61, Fig. 7, and recesses 62 of similar shape are formed in the rear edges of the arms 60A, the relation being such that the recesses 61 and 62 open in directions at right angles relative one to the other.

The stabilizers 65 for the lift plate 60 are mounted slidably in the two spaced apart channels as 35C and are in the form of elongated blocks each comprising a pair of spaced apart, flat side plates 70 and 71, Figs. 9, 10 and 11 interconnected by relatively small brace blocks 75 that are welded to the opposed inner faces of the plates 70 and 71.

At their upper and lower ends, the stabilizers 65 are provided with relatively large rollers 78, and the arrangement is such that the axles for these rollers are displaced from the longitudinal center line of the stabilizer as shown in Fig. 10 so that a portion of the periphery of each roller 78 extends beyond a longitudinal edge of the stabilizer.

Likewise, a relatively small roller 80 is provided at the upper and lower end of each stabilizer 65. Axles 81 for these rollers are mounted in blocks 82 disposed between the side plates 70 and 71 of the stabilizer, and the arrangement is such that the outer periphery of each roller 80 extends beyond the outer faces of the side plates 70 and 71 as shown particularly in Figs. 9 and 11.

It will be observed in Fig. 11 that a stabilizer 65 having the rollers 78 and 80 mounted thereon is adapted to neatly fit in the channel at 35C of either guide member 35 or 36, and such mounting of the stabilizers in the guide channels is performed from the upper ends thereof which are exposed at the top of the guide frame of the truck as was mentioned above and as is shown in Fig. 2A.

The related guide parts for the lift head 60 are accurately dimensioned so that the exposed portions of the rollers 78 are adapted to travel on the inner face of an end wall as 35E of each guide member 35 and 36 while the roller 80 has opposite peripheral portions thereof engaged with the outer side wall 35E of the guide member and the corresponding portion of the flange 35 which is opposite thereto. In this way, each stabilizer as 65 is guided and supported within a guide member of the vertical guide frame of the truck 20 so as to freely slide therein along an accurate path.

Projecting in relatively wide spaced relation from the plate 70 of each stabilizer 65 are a pair of bushings 85B, Fig. 9, in which are adapted to fit a pair of relatively short stub axles 85, and freely journaled thereon are a pair of upper and lower rollers or wheels 86U and 86L having opposed, spaced apart flanges 87. The rollers 86U and 86L are adapted to engage the openings 61 and 62 respectively, Fig. 2, provided on the arms 60A that project rearwardly from the lift plate 60. Thus, in associating the lift plate 60 and the stabilizers 65, the stabilizers 65 are first mounted in the guide channel as 65C with the axles 85 disposed in their tracks 35T. The stabilizers are then allowed to drop on to stop means disposed within the guide channels. The axles 85 are then mounted in the bushings 85B, and the rollers 86U and 86L are then mounted on the axles 85. The lift plate 60 is then disposed so that the upward opening recesses 61 therein are disposed below the upper rollers 86U. The lift plate 60 is then manipulated so that the openings 61 thereof engage the hub portions of the upper rollers 86U between the flanges 87, whereupon the lift plate 60 is then pivoted so that the lower outward opening recesses 62 therein engage the hub portions of the lower rollers 86U.

Adjustably mounted in the opposite arms 60A of the lift plate 60 just below an opening as 62 is a positioning bolt 90, Fig. 2. Such bolt is normally turned to a fully opened setting in a corresponding nut 91. After the above assembly of the lift plate 60 on the stabilizers 65 has been completed, the bolt as 90 is then turned to a closed position whereat an end portion opposite the head thereof is disposed adjacent the inner edge of a flange as 35F thereby preventing forward displacement of the lift plate 60 relative to the rollers 86U and 86L. To disassociate or dismount the lift plate 60 relative to the stabilizers, the foregoing operation is reversed, and it will be recognized from this that an important feature of the present invention is the relative ease with which the lift plate 60 and its stabilizers may be associated and disassociated with respect to the guide frame of the truck.

Thus, it is advantageous in materials handling equipment of the kind described herein to enable interchange between different kinds of handling devices to be utilized. Thus, the lift plate 60 in the present instance is adapted to support a pair of pallet engaging arms 100 and 101, Fig. 7, and these arms are formed from relatively heavy bar stock material so shaped as to provide horizontal extensions 100H and 101H and vertical extensions 100V and 101V. The horizontal extensions are of course adapted to support and lift a pallet as is well known in the art. Welded to the upper ends of the extensions 100V and 101V are sleeves 105 having the bores thereof aligned horizontally. A tie rod 106 has the opposite ends thereof fitted into the bores of the sleeves 105, and the medial portion of the tie rod 106 is disposed in the present instance in the upper of two openings 107 formed in a bracket plate 108 having the rear edge thereof welded to the forward face of the lift plate 60. It will be observed in Fig. 8 that the upper portions of the extensions 100V and 101V of the pallet engaging arms are spaced somewhat forwardly of the forward face of the lift plate 60. Adjacent the corners thereof, the arms 100 and 101 are provided with the spacer plates 110 that are welded to the forward faces of the extensions 100V and 101V as shown in Fig. 8 and these spacer plates engage the forward face of the lift plate 60.

A lower cross brace 112 is welded at either end to the inner faces of the arms 60A of the lift plate 60, and an upper cross brace 113 is likewise welded to the lift plate 60. Ends of the cross brace 113 extend outwardly of the pallet engaging arms 100 and 101, and depending from these outer ends of the cross brace 113 are a pair of plates 115 each having a pair of openings as 116

therein aligned with the openings in the bracket plate **108**, and the relation is such that ends of the tie rod **106** extended beyond the sleeves **105** are adapted to engage in the upper ones of the openings **116**. Thus, in mounting the arms **100** and **101** to the lift plate **60**, the tie rod **106** may be disposed either in an upper or lower position to correspondingly locate the forwardly projecting portions of the pallet engaging arms **100** and **101** in an upper or lower plane. It will also be seen that the arms **100** and **101** can be shifted on the tie rod **106** to adjusted positions.

To enable lifting forces to be applied to the lift plate **60**, anchor means are afforded on the rear space thereof and these anchor means are adapted to be engaged by complemental means provided on flexible lift means in the form of chains operated by the above described pistons **55** and **56**. Thus, as shown in Fig. 8, an angle plate **120** extends rearwardly from a medial portion at the rear face of the lift plate **60**, and this angle plate includes a downwardly extending flange **120F** affording a hook. Opposite side edges of the angle plate **120** are welded to the inner faces of a pair of blocks as **122** which in turn have edges welded to the rear face of the plate **60**, and the relation is such that the flange **120F** extends beyond the rear edges of the blocks **122** so as to afford clearance space therein for a lift lug complemental to the clearance space as will be described below in connection with another embodiment of the invention.

A lift plate as **60** may be advantageously used in connection with the handling of barrels or like cylindrical objects with the truck **20**, and a lift plate **60B** adapted for such purposes is illustrated in Figs. 1 and 2. The lift plate **60B** is supported by stabilizers **65** in the guide means **35** and **36** and thus includes arms as **60A'**, Fig. 2, adapted to cooperate with the rollers **86U** and **86L** in the same manner that was described above. As shown in Fig. 1, the lift plate **60B** in this instance is provided at the upper edge with a forwardly extending flange **130**, and spaced below the flange **130** is another forwardly extended flange **131** at the lower edge of the lift plate **60B**. The flange **131** in the medial portion thereof is arcuately recessed at **131R**, and this recess is configured complementary to the diameter of a barrel or cylinder B that is to be transported by the truck **20** having a lift plate **60B** thereon. Alternatively, the lower flange **131** may be substituted by a pair of discs as **135**, Fig. 2, that are adjustably mounted at the opposite lower corners of the lift plate **60B** so as to be adjustable between extended and distended positions as required by barrels as B of different size or diameter, the flange **131** or the discs **135** in either instance serving merely as a backup for the barrel as B which is to be handled.

Extending upwardly from the flange **130** of the lift head **60B** in this instance are a pair of plates **141** and **142**, Figs. 1 and 4, and these plates extend downwardly to and are secured to the flange **131**. The front edges of the plates **141** and **142** that lay between the flanges **130** and **131** are covered by a face plate **143**, Fig. 1. The portions of the plates **141** and **142** upwardly of the flange **130** afford a standard for a pair of jaw members **145** and **146**, Fig. 4, and the lower one of these jaw members is secured to the standard thus afforded by a bolt **147**, this jaw including an upwardly extending lip portion **145L** adapted to engage the lower surface of the rim R, Fig. 4, of the barrel B as will be described in more detail herein below.

The lower jaw member **145** in the present instance is stationary with respect to the lift head, and is braced by a block **147'**, Fig. 4 welded to the plates **141** and **142**. The upper jaw member **146** is hingedly supported on a pin afforded by a shank **149S** of a bolt **149B**, Fig. 6. To this end, the upper jaw **146** comprises a pair of spaced parallel plates **151** and **152**, Fig. 6, welded to aligned ends of the plates **151** and **152** is a lug **153** constituting a lip adapted to engage the surface of the rim R of the barrel B opposite that engaged by the lip **145L** as shown by dotted lines in Fig. 4. Rearwardly of the lip **153** is a block **156** welded to the inner faces of the plates **151** and **152**, and this block, and the corresponding portions of the plates **151** and **152**, is provided with an opening through which the bolt **149** is adapted to be passed, a nut **149N** being afforded to secure the bolt **149** in position to afford a hinge or pivot point for the jaw **146** as mentioned above.

As shown in Fig. 6, the block **146** includes a depending leg **159**. Spaced rearwardly of the block **156** is another block **160** that is welded to the inner faces of the plates **151** and **152**, and it will be observed that the block **160** includes a portion that extends downwardly beyond the lower edges of the plates **151** and **152** so as to be aligned with the depending portion **159** of the block **156**. The depending portion **159** of the block **156** is provided with a bored opening, and this opening is adapted to receive one end of a mounting rod **163** as shown in Fig. 4, the opposite end of this rod being welded to the lower end of the block **160**. A relatively strong coil spring **165**, Fig. 4, is provided at the upper end with an eye **165E** which is hooked on the rod **163**. The spring **165** extends downwardly from the rod **163**, and an eye **166E** at the lower end thereof is hooked to the head of an eye bolt **168** which extends upwardly from the flange **131** in the portion thereof that is between the plates **141** and **142**. The lower end of the eye bolt **168** is threaded as shown in Fig. 4, and a nut **168** is associated therewith to anchor the bolt **168** to the flange **131**. By turning the nut **168N**, the tension on the spring **165** can be adjusted.

The jaws **145** and **146** are illustrated in normal or open position in Figs. 1 and 2. In open position, the upper end of the spring **165** is effective to hold the jaw member **146** in the clockwise limit position shown, but when the lip **145L** of the stationary jaw **145** encounters resistance in a way to be described below during elevation of the life head **60B** the upper jaw **146** snaps to the dotted line position shown in Fig. 4 as an incident to such resistance encountered by the lower jaw member **145**. At the same time, the spring **165** snaps forward over a dead center position on the rod **163** to the dotted line position shown in Fig. 4 to firmly hold the jaws **145** and **146** in closed position.

Thus, in utilizing the truck **20** having a lift head **60B** for handling barrels or the like having a rim R or other similar projection thereon, the truck is manipulated so that the barrel or the like which is to be lifted is centered between the base leg structure **22** and **23** of the truck. At this time the lift head as **60B** is disposed in a downward position, so that the lower jaw member **145** is disposed against the side of the barrel at a point below the rim R thereof. To enable the desired clamping on the rim R between jaws **145** and **146** to be accomplished, the lift head is elevated by furnishing fluid under pressure to the cylinders **45** and **46** to elevate the pistons **55** and **56**. In the present instance, upward movement of the pistons **55** and **56** is imparted to the rear end of the upper jaw **146** to lift the head **60**, and the way in which this is accomplished will now be described.

As shown in Figs. 4 and 6, the rear ends of the plates **151** and **152** are provided with aligned openings **175**, and the shank **176S** of a bolt **176B** is adapted to be passed through these openings and through the opening **179** of a vertical transmitting bar **180**, Fig. 6, having the upper end thereof interposed between the plates **151** and **152** at the rear end thereof. A nut **176N** is mounted on the threaded end of the bolt shank **176S** to couple the rear end of the jaw **146** to the upper end of the force transmitting bar **180**.

The transmitting bar **180** is slidably related to the rear face of the lift head **60B** as will be apparent from

Figs. 3 and 5. Secured by a weld to the back of the transmitting bar **180** is an angle bracket **182**, Figs. 3 and 5, serving as anchor, this bracket being similar to the angle bracket **120** described above. The angle bracket **182** includes a downwardly extending flange as shown in Fig. 5 which is spaced rearwardly of the bar **180**, thereby affording a clearance space for a hook complemental to such clearance space. In the present instance such hook is afforded by a plate **185**, Fig. 3, having lugs **186** and **187** welded to opposite sides thereof. The lugs **186** and **187** are bifurcated at the upper ends and are provided with pins on which the lower ends of a pair of transmitting chains **190** and **191**, Figs. 2 and 3, are secured. It will be recognized that the plates **182** and **185** may be readily associated and disassociated.

The chains **190** and **191** are adapted to be controlled by the pistons **55** and **56**, and to this end, as shown in Fig. 3, the pistons at the upper ends thereof are welded to a relatively heavy cross head **195**. The cross head **195** is provided with vertical end plates **196** and **197**, and spaced inwardly of the plates **196** and **197** are associated plates **198** and **199** connected by a cross plate **200** spaced above the cross head **195**. An axle **205** is mounted in aligned openings in the plates thus afforded at the upper ends of the pistons **55** and **56**, and on this axle are journaled a pair of idlers **205** and **206** between the associated plates.

The chains **191** and **192** are extended upwardly from the lugs **186** and **187**, over the idlers **205** and **206** and then are passed downwardly where the lower ends thereof are secured to anchor pins afforded by a pair of anchor lugs **208** and **209** that are suitably secured to the housing **20H** at the back of the truck.

When fluid under pressure is furnished to the cylinders **45** and **46** to elevate the pistons **55** and **56**, the cross head **195** at the top of the pistons is forced upwardly with the pistons to tension the chains **190** and **191**. As a consequence of this, the transmitting bar **180** is lifted by the plate **185** engaged with the hook **182** at the back of the transmitting bar **180**. Preferably, the transmitting bar **180** is guided at this time in an opening formed in a plate **210**, Fig. 3, welded to the back of the lift head **60B**.

As was mentioned above, the coil spring **65** is relatively strong in nature so that during initial elevation of the transmitting bar **180** at the rear end of the jaw **146** in open position to carry the lift head **60B** upwardly therewith. During such upward movement of the head **60B**, the lower jaw member eventually **145** encounters the lower side of the projection such as the rim R on the object to be lifted, whereupon further upward movement of the pistons **55** and **56** is effective through the transmitting bar **180** to pivot the jaw **156** counterclockwise as viewed in Fig. 4 about the shank **149S** of the bolt **149B** serving as a hinge or pivot pin. When this occurs, the spring **165** over rides the dead center point of the rod **163**, and the spring **165** in the dotted line position shown in Fig. 4 is then effective to firmly hold the jaws **145** **146** in closed position. Further actuation of the pistons **55** and **56** to carry the chain **190** and **191** upwardly causes the upper jaw to tightly clamp and grip the rim R against the lip **145L** of the lower jaw **145** which is rigid. Accordingly, the object as B is lifted to the desired height above floor level, and the truck is maneuvered to transport the clamped object B.

It is advantageous to afford a lock for holding the lift plate as **60B** in elevated position, and such is shown in Fig. 2 of the drawings. Thus, the transmitting bar **80** is provided at an outer side with a narrow latch plate **220** which has a straight lower edge **221**. An arm **225** is pivotally mounted to the rear face of the lift head **60B** so as to pivot toward and away from the latch plate **220**, and the arrangement is such that the upper end of this arm is adapted to be disposed below the edge **221** of the latch plate **220**. The upper end of the arm **225** is formed with an ear **226**, and connected to this ear **226** is a horizontal rod **208**. The rod **228** is provided with a fixed washer **230**, and a relatively strong coil spring **235** is arranged on the rod **228** between the washer **230** and the inner wall of the frame member **36** so as to normally force the arm **225** toward the transmitting bar **80**. The rod **228** is adapted to be controlled by a bell-crank lever **236** having an operating handle **237**. Thus, by pressing the handle **237** inwardly in the direction of the frame member **36** as viewed in Fig. 2, the actuating rod **238** will be pulled to the right against spring **235** to release the arm **225** relative to the latch plate or lug **220**, and when this has been accomplished the pistons **55** and **56** are adapted to be lowered to lower the lift head.

Hence, while I have illustrated and described the preferred embodiments of my invention, it is to be understood that this is capable of variation and modification, and I therefore do not wish to be limited to the precise details set forth, but desire to avail myself of such changes and alterations as fall within the purview of the following claims.

I claim:

1. In a lift of the kind described, lift means guided for vertical raising and lowering movements, upper and lower jaw members movable with said lift means and adapted to clamp opposing upper and lower surfaces on an object to be lifted, the lower of said jaw members being stationary and adapted to travel upwardly with said lift means along a side of said object so as initially to engage such lower surface of the object, the upper of said jaw members being pivotally supported in a normally open position, power means for elevating said lift means, means to transmit the action of said power means to said upper jaw member to enable said upper jaw member to pivot and close on said upper surface of the object to be lifted automatically as an incident to said initial engagement of the lower jaw member so as to clamp down on said upper surface as aforesaid, and means to hold said jaw members closed on said opposing surfaces during continued elevation of said lift means to carry the thus-clamped object upwardly.

2. In materials handling equipment of the kind described including a lift head provided with open ended recesses, means affording a pair of parallel spaced apart guide channels each open at one side, stabilizers slidably mounted in said guide channels, anti-friction means on said stabilizers and confined wholly within said guide channels and engaging the inner sides of the means affording said guide channels, and flanged rollers carried by said stabilizers and projecting beyond the open sides of said channels and dismountably associated with said open ended recesses in said lift head to dismountably connect said lift head to said stabilizer.

3. In materials handling equipment of the kind described, a lift head, arms on said lift head formed with open-end recesses at edges thereof, an elongated stabilizer adapted to be mounted in an open guide channel, rollers on said stabilizer having parallel axes, other rollers on said stabilizers having parallel axes disposed normal to the axes of the first-named rollers, and stub axles projecting outwardly from said stabilizer affording support for one side of a lift head adapted to be so supported by a pair of such stabilizers, and flanged rollers on said stub axles and fitted into said recesses in said lift head.

4. In materials handling equipment of the kind described, an elongated stabilizer adapted to be slidably mounted in a guide channel open at least at one side, rollers on said stabilizer having parallel axes, other guide rollers on said stabilizer having parallel axes disposed normal to the axes of the first-named rollers, stub axles projecting outwardly from said stabilizer so as to project outwardly of the open side of said guide channel, and flanged rollers on said stub axles adapted to engage openings in a lift head adapted to be so supported at either side by a pair of such stabilizers.

5. In materials handling equipment of the kind described, a frame affording vertical parallel spaced apart guides, stabilizers slidably mounted in said guides, a lift head supported by said stabilizers for vertical raising and lowering movements, upper and lower jaw members movable with said lift head and having clamping front ends adapted to clamp opposing upper and lower surfaces on an object to be lifted, the lower of said jaw members being fixed in position and adapted to travel upwardly with said lift head along a side of said object so as initially to engage such lower surface of the object, the upper of said jaw members being pivotally supported in a normally open position, means to transmit lifting movement to said lift head through said upper jaw, said transmitting means acting on said upper jaw member on the side of its pivot opposite said clamping end thereof, and means to hold said upper jaw member in open position as aforesaid until said lower jaw engages the surface allocated thereto on the object to be lifted whereupon the upper jaw member closes on said upper surface of the object to be lifted automatically as an incident to said initial engagement of the lower jaw member as aforesaid.

6. In materials handling equipment of the kind described, a frame affording vertical parallel spaced apart guide channels having open upper ends, stabilizers mounted in said guide channels from the open ends thereof and including anti-friction rollers thereon adapted to engage the walls of said channels, a lift head, flanged rollers supported by said stabilizers and associated with openings in said lift head and removably attaching the lift head to said stabilizers, and means to raise and lower said lift head.

7. In materials handling equipment of the kind described, a frame affording vertical parallel spaced apart guide channels having open ends, stabilizers mounted in said guide channels from the open ends thereof and including anti-friction rollers thereon adapted to engage the walls of said channels, a lift head, flanged rollers supported by said stabilizers and associated with openings in said lift head to attach the left head to said stabilizers, a pair of jaw members movable with said lift head and adapted to clamp opposing upper and lower surfaces on an object to be lifted, the lower of said jaw members being stationary and adapted to travel upwardly with said lift head along a side of said object so as initially to engage such lower surface of the object, the upper of said jaw members being hingedly supported in a normally open position, means to impart lifting movement to said lift head through said upper jaw, and means to hold said upper jaw member in open position as aforesaid until said lower jaw engages the surface allocated thereto on the object to be lifted whereupon the upper jaw member closes on said upper surface of the object to be lifted automatically as an incident to said initial engagement of the lower jaw member as aforesaid.

8. In materials handling equipment of the kind described, a movable lift means, a pair of jaw members mounted on said lift means, one of said jaw members being fixed in position and the other of said jaw members being pivoted on said lift means, power means to impart motion to said lift means to engage the stationary one of said jaw members with a corresponding surface on an object to be lifted, and means to transmit the action of said power means directly to the pivoted jaw member to enable the pivoted one of said jaw members to close on a surface of the object to be lifted opposite the first named surface thereof automatically as an incident to engagement of the stationary jaw member as aforesaid.

9. In materials handling equipment of the kind described, a frame affording vertical parallel spaced apart guides, a lift head supported by said guides for vertical raising and lowering movements, upper and lower jaw members movable with said lift head and adapted at the forward ends thereof to clamp opposing upper and lower surfaces on an object to be lifted, the lower of said jaw members being fixed in position and adapted to travel upwardly with said lift head along a side of said object so as initially to engage such lower surface of the object, the upper of said jaw members being pivotally supported intermediate the ends thereof in a normally open position on said lift head, spring means acting between said upper jaw member and said lift head for holding said upper jaw member normally in open position as aforesaid, means to impart lifting force directly to the rear end of said upper jaw member to impart lifting movement to said lift head at the same time, whereby said spring is overbalanced and said jaw members clamp on opposed surfaces of an object to be lifted when the lower jaw member engages one such opposing surface during lifting movement as aforesaid.

10. In materials handling equipment of the kind described, a head, power means to impart motion to said head for lifting the head, spaced jaw members movable with said head and adapted to engage opposing surfaces on an object to be moved, one of said jaw members being fixed in position and adapted to travel with said head along a side of said object so as initially to engage one of the opposing surfaces of the object, the other of said jaw members being hingedly pivotally supported in a normally open position, means to transmit the action of said power means directly to said other jaw member to thereby lift the head directly by and through said other jaw member and to enable said other jaw member to close on the other of said opposing surfaces of the object automatically as an incident to said initial engagement of the first-named jaw member so as to firmly clamp said object for movement with said head, and spring means engaging said other jaw member for holding said other jaw member in normally open position and for assisting in holding said jaw members closed on said opposing surfaces during continued movement of said lift to carry the thus-clamped object with the head.

11. In materials handling equipment of the kind described, a head, spaced apart jaw members movable with said head and adapted at outer ends thereof to engage opposing surfaces on an object, one of said jaw members being fixed in position on said head and adapted to travel with said head along a side of said object so as initially to engage one of the opposing surfaces of the object, the other of said jaw members being pivotally supported in a normally open position, spring means acting between said other jaw member and said head to hold said other jaw member in open position as aforesaid, force means acting on the end of the other jaw member opposite the outer end thereof to impart motion to the head through the connection between the head and said other jaw member, whereby the force means overbalances said spring means and said jaws are closed operatively on said object when said one jaw member initially engages said object as aforesaid.

References Cited in the file of this patent

UNITED STATES PATENTS

989,550	Broderick	Sept. 15, 1908
2,421,472	Way	June 3, 1947
2,447,300	Williams	Aug. 17, 1948
2,456,320	Repke	Dec. 14, 1948
2,679,437	Pusztay	May 25, 1954
2,698,107	Ericson	Dec. 28, 1954
2,709,015	Sasgen et al.	May 24, 1955
2,759,562	Ulinski	Aug. 21, 1956