Nov. 12, 1968 A. M. VIK 3,410,431

CLAMP MECHANISM FOR MATERIALS HANDLING EQUIPMENT

Filed July 6, 1966 2 Sheets-Sheet 1

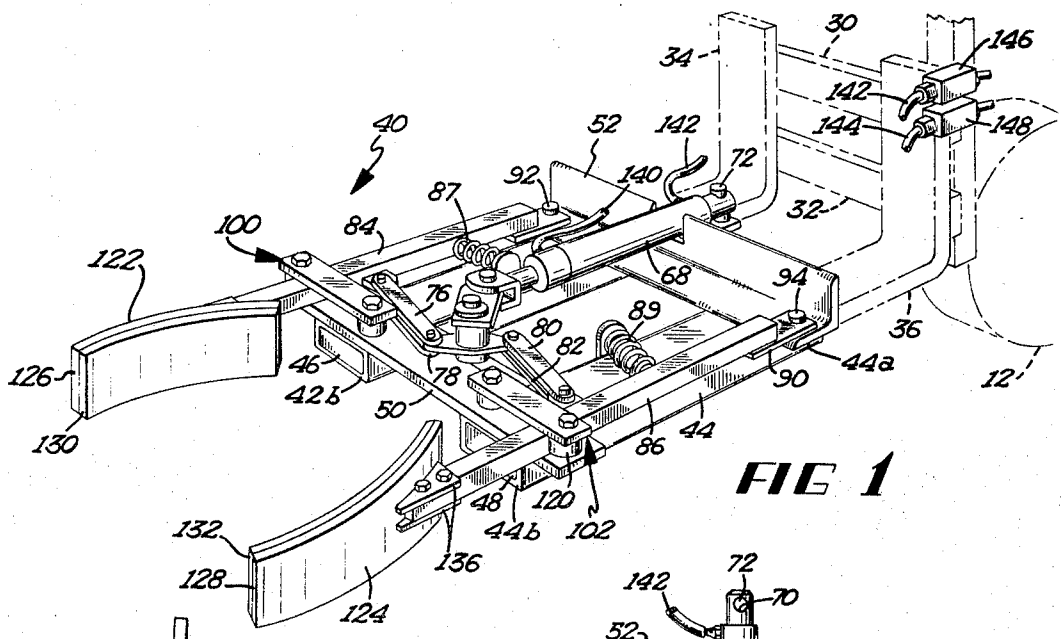

FIG 1

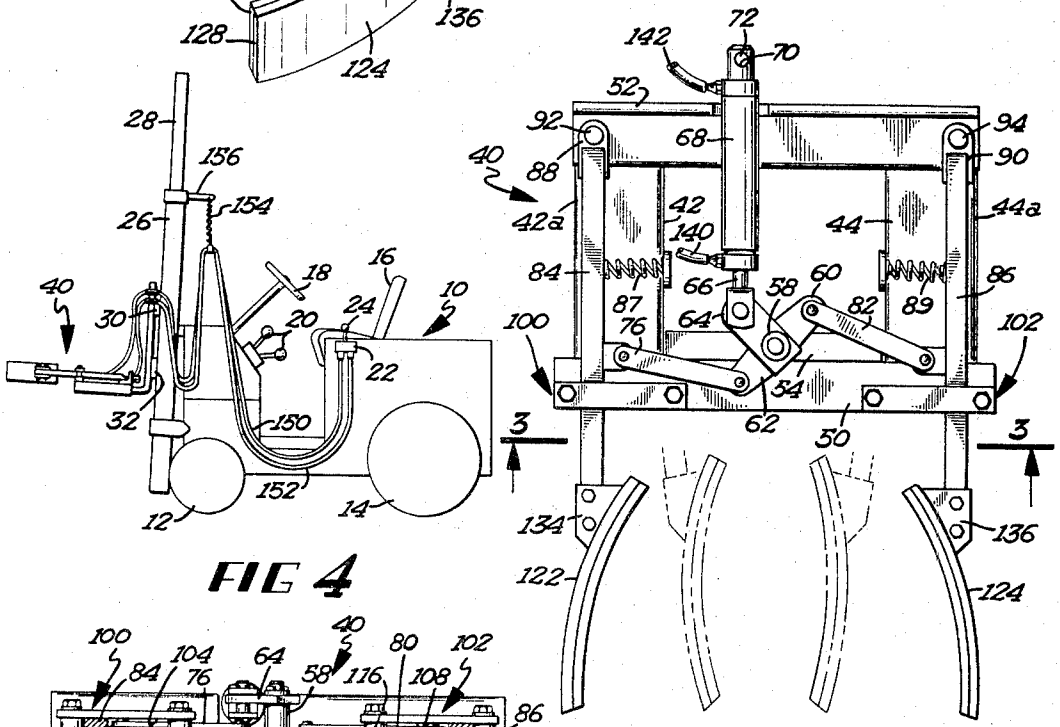

FIG 4

FIG 2

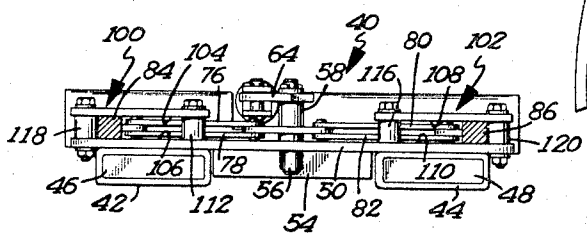

FIG 3

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CLAMP MECHANISM FOR MATERIALS HANDLING EQUIPMENT

Filed July 6, 1966 2 Sheets-Sheet 2

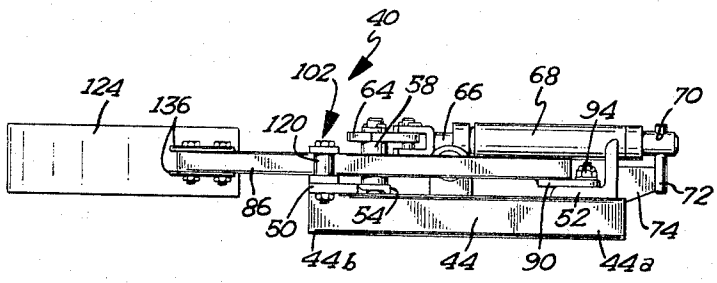

FIG 5

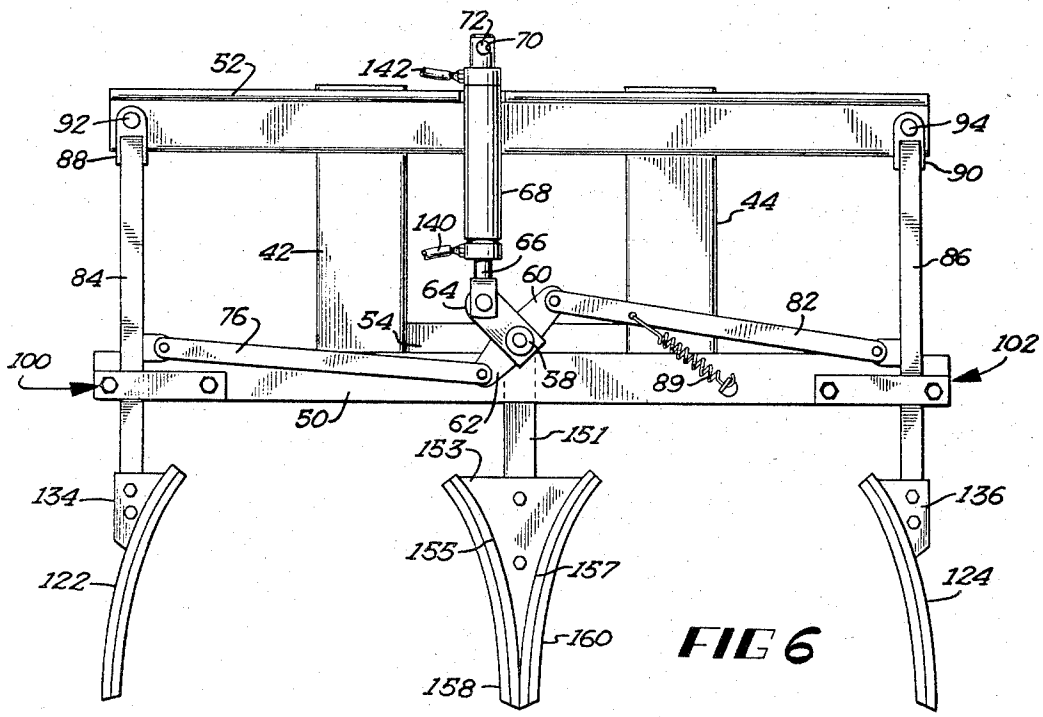

FIG 6

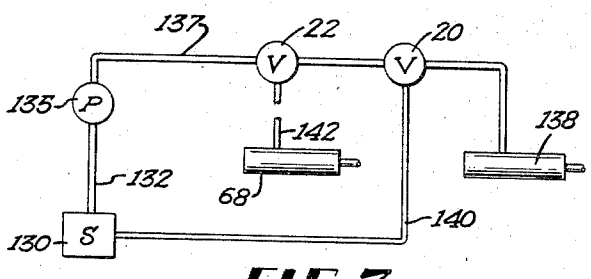

FIG 7

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3,410,431

CLAMP MECHANISM FOR MATERIALS HANDLING EQUIPMENT

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Filed July 6, 1966, Ser. No. 563,135
9 Claims. (Cl. 214—620)

ABSTRACT OF THE DISCLOSURE

A clamp mechanism for fork lift trucks and other materials handling equipment consisting of a supporting framework with parallel tubular members positioned to slide over the horizontal portions of the lift truck forks. Two clamp arms are pivotally secured at their rearward ends to the rearward portion of the framework. The arms extend forwardly from pivots and each is supported at its approximate center by a slide plate affixed at the forward end of the framework. The free ends of the arms are moved toward or away from one another in a horizontal plane by a hydraulic actuator that is connected to a crank mounted for pivotal movement between the arms. A pair of laterally extending link members are connected between the crank and the arms. Suitable jaws are mounted upon the free ends of the arms.

The present invention relates to materials handling devices and more particularly to a power-actuated clamp mechanism of the type to be mounted on a lifting implement such as the fork of a lift truck. The invention is particularly useful in engaging and lifting smooth-surfaced vertical cylindrical objects such as fiber shipping drums and similar objects.

A variety of clamping and lifting devices have been proposed for use on implements such as lift trucks. Most of these devices require that the forks of the lift truck or the lifting mechanism itself be entirely removed and replaced by the clamping mechanism. This operation, of course, requires a substantial amount of time and effort and not only adds to the downtime of the lift truck but necessitates the expense of a mechanic for removing the forks from the truck and mounting the clamp mechanism in its place. Furthermore, these clamps frequently occupy a substantial amount of space in the area immediately ahead of the lift truck mast and consequently either partially or completely block the operator's view which is a serious disadvantage since the efficient positioning and engagement of the clamping members when an object is being loaded as well as the steering of the truck as it moves from one location to the other is dependent upon good visibility. Moreover, once the clamping mechanism is placed in position, the lift truck is unsuited for other work and must be employed exclusively for the purpose of lifting and transporting objects of the type requiring a clamp.

Other devices of the general type described have been proposed as for example described in my prior application, Serial No. 393,889, now Patent Number 3,319,815. While my prior invention is highly satisfactory in a variety of applications, it is unsuited for certain applications, as for example the lifting of drums and other cylindrical objects such as a fiber drum which has a smooth external surface since it is necessary for ribs or other extensions on the surface of the drum to engage the clamping jaws in order for the jaws to be moved to their clamping position. Furthermore, in my prior patent there was no reliable provision for controlling and limiting the pressure applied to the drum. Thus, in the case of delicate objects, excessive pressure can be applied.

In still other devices of the type described, there is no reliable provision made for maintaining the clamped object to be transported in alignment with the central longitudinal axis of the lift truck. Thus, in some prior devices it is possible for the jaws to move independently and the load to shift to either the right or left side of the truck. This occurrence is an annoyance to the operator and can even be hazardous particularly where heavy objects are being transported or where corners must be negotiated at relatively high speeds.

A further disadvantage of many of the prior devices of the general class described is that the jaws of the clamping mechanism are supported entirely from the point at which they pivot when moving from the open to the closed position and the necessarily high loading at these pivots subjects them to substantial stresses which tend to produce excessive wear or even breakage of the pivots and their supporting structures. In addition to these above-mentioned deficiencies, prior drum lifting devices of the general type described have been suited only for lifting a single drum. Accordingly, where large numbers of drums are being handled, the lift truck must make a separate trip for each drum.

In view of these and other deficiencies of the prior art, it is one object of the present invention to provide an improved clamp of the type described which can be quickly and easily mounted upon and demounted from the forks of the lift truck.

A further object of the invention is the provision of an improved lift truck clamp wherein the load produced by the object being transported on the jaws of the clamp is isolated from the members upon which the clamp members pivot when moving between open and closed positions.

A further object of the invention is the provision of an improved removable clamp for a lift truck of the type described wherein the operator's vision will be substantially unobstructed.

A further object of the invention is the provision of an improved removable clamp for a lift truck of the type described which is rugged in construction and reliable in operation and can be made at reduced costs through the elimination of a number of parts previously employed.

Another object of the present invention is the provision of an improved detachable lift truck fork clamp of the type described wherein loads of all sizes will be maintained in alignment with the central longitudinal axis of the lift truck and cannot shift laterally from this position.

A still further object of the invention is the provision of an improved clamp of the type described in which the jaws can be easily and quickly removed from the arms to which they are attached when replacement is required.

Another object of the invention is the provision of an improved lift truck fork clamp which can be used for carrying a pair of vertically disposed cylindrical objects.

A still further object of the present invention is the provision of an improved detachable clamp of the type described in which objects varying in size by a factor of about four can be handled, e.g. from about eight inches in diameter to about thirty inches in diameter.

These and other more detailed and specific objects will be apparent in view of the accompanying specification and figures wherein:

FIGURE 1 is a perspective view of a clamp embodying the invention as it appears when mounted upon the forks of a lift truck.

FIGURE 2 is a plan view of the clamp of FIGURE 1.

FIGURE 3 is a vertical sectional view taken on line 3—3 of FIGURE 2.

FIGURE 4 is a side elevational view of the lift truck

with the clamp in position on the forks and on a reduced scale.

FIGURE 5 is a side elevational view of the clamp of FIGURE 1.

FIGURE 6 is a plan view of another form of clamp in accordance with the invention.

FIGURE 7 is a hydraulic circuit diagram of an apparatus in accordance with one form of the invention.

Briefly, in accordance with the invention there is provided a clamp having two connecting elements which secure the clamp to the fork with arms pivoted at their rearward ends and guides at their forward ends. A crank is pivotally mounted on the clamp and operatively connected to the arms and an actuator such as a hydraulic actuator is coupled to the crank for pivoting the crank.

Refer now to the figures which illustrate one preferred form of the invention. In the figures is shown a lift truck **10** of well-known construction having a pair of front wheels **12** and a pair of rear wheels **14**, an operator's seat **16**, a steering wheel **18**, mast control levers **20** and a clamp control valve assembly **22** having a handle **24**. The lift truck **10** is provided with the usual mast **26** having a central vertically movable portion **28** as seen in FIGURE 4 to which a pair of laterally extending bars **30** and **32** are attached. Upon the bars **30** and **32** forks **34** and **36** of conventional and well-known construction are rigidly secured. During operation of the lift truck, the moving portion **28** of the mast **26** is raised and lowered conventionally carrying with it the cross members **30** and **32** and the forks **34** and **36**. When the lift truck **10** is being operated without the clamp of the invention in use, the horizontal portions of the forks **34** and **36** will be inserted beneath the object that is to be carried. The mast **26** will then be pivoted rearwardly about a horizontal axis at the lower end thereof conventionally. The forks **34** and **36** are then elevated sufficiently to raise the load from the ground as it is being transported from one location to the other.

The clamp mechanism in accordance with the present invention is designated **40** and will now be described. The clamp **40** includes a framework composed of a pair of horizontally disposed parallel connecting members such as square tubes **42** and **44** having rearward ends **42***a* and forward ends **42***b* and **44***b*. The connecting tube members **42** and **44** can be formed from steel tubing having a width of approximately 8 inches and a height of approximately three inches. The outward ends **42***b* and **44***b* are preferably sealed by the provision of end plates **46** and **48** which are welded within the open ends of the tubes. As can be clearly seen in FIGURE 1, the tubes **42** and **44** are properly spaced laterally from each other to slide easily over the free ends of the horizontal portions of the forks **34** and **36**. Thus, when the clamp **40** is to be mounted, the operator merely positions the free ends of the forks the proper distance from the floor and drives the truck forwardly thereby inserting the forks within the tubes. The mast **28**, forks and the clamp assembly **40** are then raised until they are free of the floor.

The connecting members **42** and **44** are suitably affixed to each other by means of horizontally disposed forward and rearward cross members designated **50** and **52** respectively which are formed from bar stock, angle iron or the like and affixed as by means of welding to the connecting members **42** and **44**. In this instance the cross member **50** is formed from bar stock and **52** from angle iron.

Immediately behind the cross member **50** is rigidly secured a supplementary cross member comprising an angle iron **54** which is bored at its center to receive a fixed vertically disposed pivot pin **56** upon which is pivotally mounted a crank **58** composed of a tube to which is welded a pair of horizontal extensions **60** and **62** that normally extend diagonally relative to the longitudinal axis of the connecting members **42** and **44**. The extension **60** projects rearwardly and toward the right as seen in FIGURE 2. Extension **62** extends forwardly and toward the left as seen in FIGURE 2. The extensions **60** and **62** can conveniently be formed from a single bar rigidly welded to the tube **58**. Rigidly attached to the tube **58** is a diagonally extending crank arm **64** the rearward end of which is positioned laterally of the crank **58**. Pivotally secured to the free end of the crank arm **64** is the moving member **66** of a hydraulic actuator **68**. The rearward end of the actuator **68** is pivotally connected at **70** to a vertically disposed pin **72** which is itself rigidly affixed to a bar **74** welded to the rearward surface of the cross member **52**. Thus when the actuator **68** is operated, the forward movement of the member **66** will pivot the crank arm **64**, crank **58** and the extensions **60** and **62** in a counterclockwise direction as seen in FIGURE 2.

Pivotally secured to the free ends of the extensions **60** and **62** are two pairs of laterally extending links **76**, **78**, **80** and **82**. The free ends of these links are pivotally secured to the approximate center of a pair of clamp arms **84** and **86**. The rearward ends of the clamp arms are provided with tongues **88** and **90**, suitably bored and mounted upon vertically disposed pivot pins **92** and **94** which are themselves rigidly secured to the cross members **52** and the rearward ends of the connecting members **42** and **44**. Connected to the inward edge of each of the arms and extending centrally therefrom are springs designated **87** and **89** for yieldably biasing the free ends of the arms **84** and **86** outwardly to the disengaged position shown in solid lines in FIGURE 2. It will be readily understood that when the power is provided for operating the actuator **68** in both directions, the springs will not be required. The springs **87** and **89** are preferred when a single hose is connected to the actuator as will be described in connection with FIGURE 7.

At the forward end of the connecting members **42** and **44** are provided a pair of guides defined by bars **100** and **102**. The guides include upper and lower horizontally and laterally disposed guide surfaces **104** and **106** on the left and **108** and **110** on the right. The bars **100** and **102** are spaced above the cross member **50** and secured thereto by means of bolts over which are mounted sleeves **112** and **116** defining inward stops for the arms **84** and **86** and sleeves **118** and **120** which serve as stops for limiting the outward movement of the arms **84** and **86** respectively. It will be seen that the arms **84** and **86** are formed from square bar stock to provide upper and lower parallel slide surfaces at least in the portions between the guide surfaces **104**, **106**, **108** and **110** and it is by this means that two important objectives are accomplished. First, a load applied to the free ends of the arms is isolated from the pivots **92** and **94**. Secondly, the tortional stress about the longitudinal axis of each arm is resisted by each guide.

It can thus be seen that the portion of the upward surface of the cross member **50** defining each guide acts as a loading plate and can be lubricated to any extent desired for assuring smooth movement of the arms between the outward or disengaged solid line position of FIGURE 2 and the central dotted line position of FIGURE 2 which illustrates the extreme inward position to which the free ends of the arms can be moved. It should be noted that the free ends of the arms will be able to move through a considerable distance thereby enabling the clamp in accordance with the invention to lift and handle both large and small objects. For example, clamp **40** can conveniently be made to handle objects having a diameter variation of from about eight inches to about thirty inches or even more.

As can be clearly seen in FIGURES 1 and 2, jaws **122** and **124** are connected to the free ends of the arms **42** and **44**. In this instance the jaws are composed of arcuate sheet metal plates **126** and **128** with the concave surface facing inwardly. To the inward surface of each is bonded by means of a suitable adhesive, by vulcanization or other bonding process, a resilient surface covering such as heavy rubber sheets **130** and **132**. To the rearward edge of each of the plates **126** and **128** are provided vertically spaced

parallel flanges **134** and **136** between which the free ends of the arms **84** and **86** are secured by means of suitable fasteners such as bolts thereby enabling the jaws **122** and **124** to be quickly and easily removed and replaced in the event that they are damaged.

It will be noted at best in FIGURE 2 that the jaws **122** and **124** are oriented on the free ends of the arms **84** and **86** such that their rearward portions extend diagonally centrally and rearwardly whereas the forward portion of each of the jaws is in approximate alignment with the longitudinal axis of the lift truck and with the arms **84** and **86** when in their lateral disengaged positions. In this manner, the free ends of the jaws will be very readily able to enter between closely stacked objects such as fiber drums even though they are spaced only inches apart. Even when there is no spacing between the drums, the free ends of the jaws **122** and **124** when forced forwardly between the stacked drums will be able to move them apart slightly and thereby enter between them. This will enable the operator of the truck to pick up the drums without moving them apart manually.

As best seen in FIGURES 1, 2 and 4, a pair of hydraulic hoses **140** and **142** are connected to the actuator **68**. These hoses extend rearwardly and upwardly and are detachably secured to hose connectors **146** and **148** which are rigidly secured to the cross member **30**. Male and female couplings should be provided upon the ends of hoses **140** and **142** to prevent improper coupling of the actuator **68**. To the connectors **146** and **148** are secured hoses **150** and **152**, which hang in a depending loop downwardly from the connectors **146** ad **148** thence extend upwardly to the lower end of a resilient support such as a spring **154** the upward end of which is connected to a hanger **156** secured to the top of the mast **26**. The hoses extend from the hanger **156** to the valve **22**.

Refer now to FIGURE 7 which shows the hydraulic circuit employed in accordance with one form of the invention. In this instance only one hydraulic line being connected to the clamp actuator to force the moving portion of the actuator to its extended position with the return of the arms to the actuator and the arms to the disengaged position being accomplished by means of springs **87** and **89**. As can be best seen in FIGURE 7, the lift truck is provided with a conventional hydraulic fluid storage sump **130** from which fluid is pumped through a line **132** by a pump **135**. The fluid flows from pump **135** through a line **137** to the valve **22**. Hydraulic fluid flows from the valve **22** to the actuator **68** through the line **150** and **142**. The valve **22** is also connected by means of a line **137** to a valve **20** used for operating the mast and a mast actuator **138**. From the valve **20** a return line **140** conveys excess hydraulic fluid to the sump **130**.

It will thus be seen that extension and retraction of the member **66** of actuator **68** will move the free ends of the arms and jaws between disengaged and engaged positions and that the crank **58** and the links **82** co-acting with the arms and pivots **92** and **94** will reliably maintain a center point located midway between the free ends of the arms at all times on the central longitudinal axis of the clamp and that it will be impossible for the load to shift from one side of the apparatus to the other when negotiating turns and the like.

Refer now to FIGURE 6 illustrating a modified form of the invention in which the same numbers refer to corresponding parts in FIGURES 1–5. It will be noted that the cross members **50** and **52** extend considerably beyond the ends of the connectig members **42** and **44**. As can also be seen, there is rigidly connected to the cross member **52** a forwardly extending arm **150** to which is connected a jaw **153** having arcuate plates **155** and **157** having rubber pads **158** and **160** secured to their exposed surfaces as described above in connection with the jaws **122** and **124**. In the embodiment of FIGURE 6, the jaw **122** co-acts with the jaw plate **155** to provide a first clamp assembly and the jaw **124** co-acts with the jaw plate **157** to provide a second clamp assembly. It should be noted that as the actuator **68** is operated to move the arms **64** and **68** centrally, two objects can be clamped simultaneously and the spacing between the jaws of the first and second clamp assemblies will be equal at all times. Accordingly, containers of the same size will always be subjected to the same amount of compression.

It is apparent that many modifications and variations of this invention as hereinbefore set forth may be 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.

I claim:

1. An implement clamp comprising in combination:

(a) a framework having forward and rearward ends,

(b) means for attaching the framework to the implement,

(c) a pair of longitudinally extending clamp arms secured to the framework for pivotal movement about laterally spaced vertical pivots disposed rearwardly of the forward end of the framework, said arms extending forwardly beyond the forward end of the framework,

(d) jaws mounted on the forward ends of the arms,

(e) a fastening means securing the jaws to the free ends of the arms,

(f) linkage means pivotally connected between the arms for positioning the arms relative to each other at each location of the arms between extended lateral disengaged position and centrally disposed engaged positions equidistant from a center point disposed between the free ends of the arms,

(g) a hydraulic actuator mounted upon the framework at one end and operatively connected to the linkage means at the other end for moving the arms between the extended and the retracted positions and

(h) a pair of loading plates upon said apparatus in longitudinal spaced relationship from said pivots and located vertically of the arms for isolating the weight of the object that is to be transported from the pivots and said arms being provided with smooth supporting surfaces adjacent to and engaged upon the loading plates whereby the load of the object that is to be supported is transmitted to the arms and from the arms to the loading plates.

2. The apparatus according to claim **1** wherein a fixed arm is rigidly mounted between the free ends of said arms and a pair of laterally spaced jaws are secured to the free end of said fixed arm whereby a plurality of objects can be clamped simultaneously.

3. An implement clamp assembly comprising in combination:

(a) connecting means for detachably securing the clamp to said implement, said connecting means having forward and rearward portions,

(b) a pair of clamp arms,

(c) clamp pivots at the rearward portion of the connecting means to pivotally support the clamp arms for movement between spaced apart disengaged positions and central engaged positions, said arms extending forwardly from each pivot,

(d) a jaw on the forward end of each of the arms,

(e) a crank member mounted rigidly relative to the connecting members for pivotal movement upon an axis parallel to the pivots,

(f) a plurality of extensions mounted on the crank,

(g) a pair of rigid link members, each such link member being connected between the free end of one of the extensions and each of said arms, the links and the extensions on the crank connecting the arms together so that the movement of one arm in one direction will cause a corresponding movement of the other arm the same distance in the opposite direction whereby a center point between the arms will remain fixed relative to the implement,

(h) an actuator assembly operatively secured between the connecting members and the crank for pivoting the crank upon said axis for moving the arms and jaws centrally or laterally to thereby position each jaw on a transverse arc extending therebetween, the weight of the object that is to be transported being isolated from said pivots by the provision of a loading plate positioned between the pivots and the jaws beneath the arms and the arms being provided with a smooth supporting surface engaging the loading plate for transmitting the load of the objects supported on the jaws to the arms, the connecting members and the implement.

4. An implement clamp assembly comprising in combination:

(a) connecting means for detachably securing the clamp to said implement, said connecting means having forward and rearward portions,

(b) a pair of clamp arms,

(c) clamp pivots at the rearward portion of the connecting means to pivotally support the clamp arms for movement between spaced apart disengaged positions and central engaged positions, said arms extending forwardly from each pivot,

(d) a jaw on the forward end of each of the arms,

(e) a crank member mounted rigidly relative to the connecting members for pivotal movement upon an axis parallel to the pivots,

(f) a plurality of extensions mounted on the crank,

(g) a pair of rigid link members, each such link member being connected between the free end of one of the extensions and each of said arms, the links and the extensions on the crank connecting the arms together so that the movement of one arm in one direction will cause a corresponding movement of the other arm the same distance in the opposite direction whereby a center point between the arms will remain fixed relative to the implement,

(h) an actuator assembly operatively secured between the connecting members and the crank for pivoting the crank upon said axis for moving the arms and jaws centrally or laterally to thereby position each jaw on a transverse arc extending therebetween, the arms being provided with a pair of spaced apart parallel slide surfaces and a pair of guides being provided having a pair of spaced apart parallel guiding planes adapted to engage the slide surfaces of the arms whereby the movement of each of the arms and jaws along the transverse axis will move the sliding surfaces relative to the guide planes and said guide will confine the movement of the jaws to a predetermined arc about the axis of each of the pivots for isolating tortional stresses exerted by an object being carried upon the jaws about the axis of each of the arms from said pivots.

5. An implement clamp assembly comprising in combination:

(a) connecting means for detachably securing the clamp to said implement, said connecting means having forward and rearward portions,

(b) a pair of clamp arms,

(c) clamp pivots at the rearward portion of the connecting means to pivotally support the clamp arms for movement between spaced apart disengaged positions and central engaged positions, said arms extending forwardly from each pivot,

(d) a jaw on the forward end of each of the arms,

(e) a crank member mounted rigidly relative to the connecting members for pivotal movement upon an axis parallel to the pivots,

(f) a plurality of extensions mounted on the crank,

(g) a pair of rigid link members, each such link member being connected between the free end of one of the extensions and each of said arms, the links and the extensions on the crank connecting the arms together so that the movement of one arm in one direction will cause a corresponding movement of the other arm the same distance in the opposite direction whereby a center point between the arms will remain fixed relative to the implement,

(h) an actuator assembly operatively secured between the connecting members and the crank for pivoting the crank upon said axis for moving the arms and jaws centrally or laterally to thereby position each jaw on a transverse arc extending therebetween, guides being mounted upon the connecting members in position to receive the arms at a point between the free end thereof and the pivots for guiding the movement of the arms on laterally extending arcs about said pivots and for preventing upward or downward movement of the free ends of each of the arms at any position of the arms between extreme lateral and central positions thereof and a stop at each end of each guide to limit the movement of each of the arms whereby pivotal movement of said crank in either direction will be resisted by one of the stops.

6. An implement clamp assembly comprising in combination:

(a) connecting means for detachably securing the clamp to said implement, said connecting means having forward and rearward portions,

(b) a pair of clamp arms,

(c) clamp pivots at the rearward portion of the connecting means to pivotally support the clamp arms for movement between spaced apart disengaged positions and central engaged positions, said arms extending forwardly from each pivot,

(d) a jaw on the forward end of each of the arms,

(e) a crank member mounted rigidly relative to the connecting members for pivotal movement upon an axis parallel to the pivots,

(f) a plurality of extensions mounted on the crank,

(g) a pair of rigid link members, each such link member being connected between the free end of one of the extensions and each of said arms, the links and the extensions on the crank connecting the arms together so that the movement of one arm in one direction will cause a corresponding movement of the other arm the same distance in the opposite direction whereby a center point between the arms will remain fixed relative to the implement,

(h) an actuator assembly operatively secured between the connecting members and the crank for pivoting the crank upon said axis for moving the arms and jaws centrally or laterally to thereby position each jaw on a transverse arc extending therebetween, first and second cross members being rigidly connected between the forward and rearward ends of the connecting members, an actuator member being pivotally connected at one end thereof to the cross member secured between the rearward ends of the connecting members, said crank member being mounted for pivotal movement about a vertical axis at the center of the cross member connected between the forward ends of the connecting members and the other end of the actuator member being pivotally connected to the free end of the crank arm.

7. An implement clamp assembly comprising in combination:

(a) connecting means for detachably securing the clamp to said implement, said connecting means having forward and rearward portions,

(b) a pair of clamp arms,

(c) clamp pivots at the rearward portion of the connecting means to pivotally support the clamp arms for movement between spaced apart disengaged positions and central engaged positions, said arms extending forwardly from each pivot,

(d) a jaw on the forward end of each of the arms,

(e) a crank member mounted rigidly relative to the connecting members for pivotal movement upon an axis parallel to the pivots,

(f) a plurality of extensions mounted on the crank,

(g) a pair of rigid link members, each such link member being connected between the free end of one of the extensions and each of said arms, the links and the extensions on the crank connecting the arms together so that the movement of one arm in one direction will cause a corresponding movement of the other arm the same distance in the opposite direction whereby a center point between the arms will remain fixed relative to the implement,

(h) an actuator assembly operatively secured between the connecting members and the crank for pivoting the crank upon said axis for moving the arms and jaws centrally or laterally to thereby position each jaw on a transverse arc extending therebetween, guides being mounted upon the connecting members in position to receive the arms at a point between the free end thereof and the pivots for limiting the movement of the arms to predetermined laterally extending arcs about said pivots and for preventing upward and downward movement of the free ends of each of the arms, a stop provided at each end of each guide to limit the lateral and central position of each of the arms, cross members rigidly connected between the forward and rearward ends of the connecting members, an actuator member pivotally connected at one end to the rearward ends of the connecting members, said crank being mounted for pivotal movement about a vertical axis at the center of the clamp assembly and the opposite end of the actuator member being pivotally connected to the crank.

8. An implement clamp assembly comprising in combination:

(a) connecting means for detachably securing the clamp to said implement, said connecting means having forward and rearward portions,

(b) a pair of clamp arms,

(c) clamp pivots at the rearward portion of the connecting means to pivotally support the clamp arms for movement between spaced apart disengaged positions and central engaged positions, said arms extending forwardly from each pivot,

(d) a jaw on the forward end of each of the arms,

(e) a crank member mounted rigidly relative to the connecting members for pivotal movement upon an axis parallel to the pivots,

(f) a plurality of extensions mounted on the crank,

(g) a pair of rigid link members, each such link member being connected between the free end of one of the extensions and each of said arms, the links and the extensions on the crank connecting the arms together so that the movement of one arm in one direction will cause a corresponding movement of the other arm the same distance in the opposite direction whereby a center point between the arms will remain fixed relative to the implement,

(h) an actuator assembly operatively secured between the connecting members and the crank for pivoting the crank upon said axis for moving the arms and jaws centrally or laterally to thereby position each jaw on a transverse arc extending therebetween, the arms being provided with a pair of spaced apart parallel slide surfaces and a guide is provided having a pair of spaced apart parallel guiding planes adapted to engage the slide surfaces of the arms whereby the movement of each of the arms and jaws along the transverse axis will move the sliding surfaces relative to the guide planes and the guides will confine the movement of the jaws to predetermined arcs about the axis of each of the pivots and isolate tortional stresses exerted by an object being carried upon the jaws on the axis of each of the arms and the extensions on the crank are diametrically opposed to each other and are positioned upon a horizontal axis extending diagonally relative to a longitudinal axis, a crank arm is provided on the crank, the free end of the crank arm being positioned laterally from the axis of rotation of the crank and an actuator assembly is pivotally connected between the clamp assembly and the crank arm.

9. An implement clamp assembly comprising in combination:

(a) connecting means for detachably securing the clamp to said implement, said connecting means having forward and rearward portions,

(b) a pair of clamp arms,

(c) clamp pivots at the rearward portion of the connecting means to pivotally support the clamp arms for movement between spaced apart disengaged positions and central engaged positions, said arms extending forwardly from each pivot,

(d) a jaw on the forward end of each of the arms,

(e) a crank member mounted rigidly relative to the connecting members for pivotal movement upon an axis parallel to the pivots,

(f) a plurality of extensions mounted on the crank,

(g) a pair of rigid link members, each such link member being connected between the free end of one of the extensions and each of said arms, the links and the extensions on the crank connecting the arms together so that the movement of one arm in one direction will cause a corresponding movement of the other arm the same distance in the opposite direction whereby a center point between the arms will remain fixed relative to the implement,

(h) an actuator assembly operatively secured between the connecting members and the crank for pivoting the crank upon said axis for moving the arms and jaws centrally or laterally to thereby position each jaw on a transverse arc extending therebetween, guides being mounted upon the connecting members in position to receive the arms between the free end thereof and the pivots for guiding the movement of the arms, a stop at each end of each guide to limit the lateral and central position of each of the arms, first and second cross members are rigidly connected between the forward and rearward ends of the connecting members, the actuator member being pivotally connected at one end to the cross member secured between the rearward ends of the connecting members, and at the opposite end to the crank and yieldable means connected to the actuator and arms for biasing the arms in a predetermined direction about the arm pivots.

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