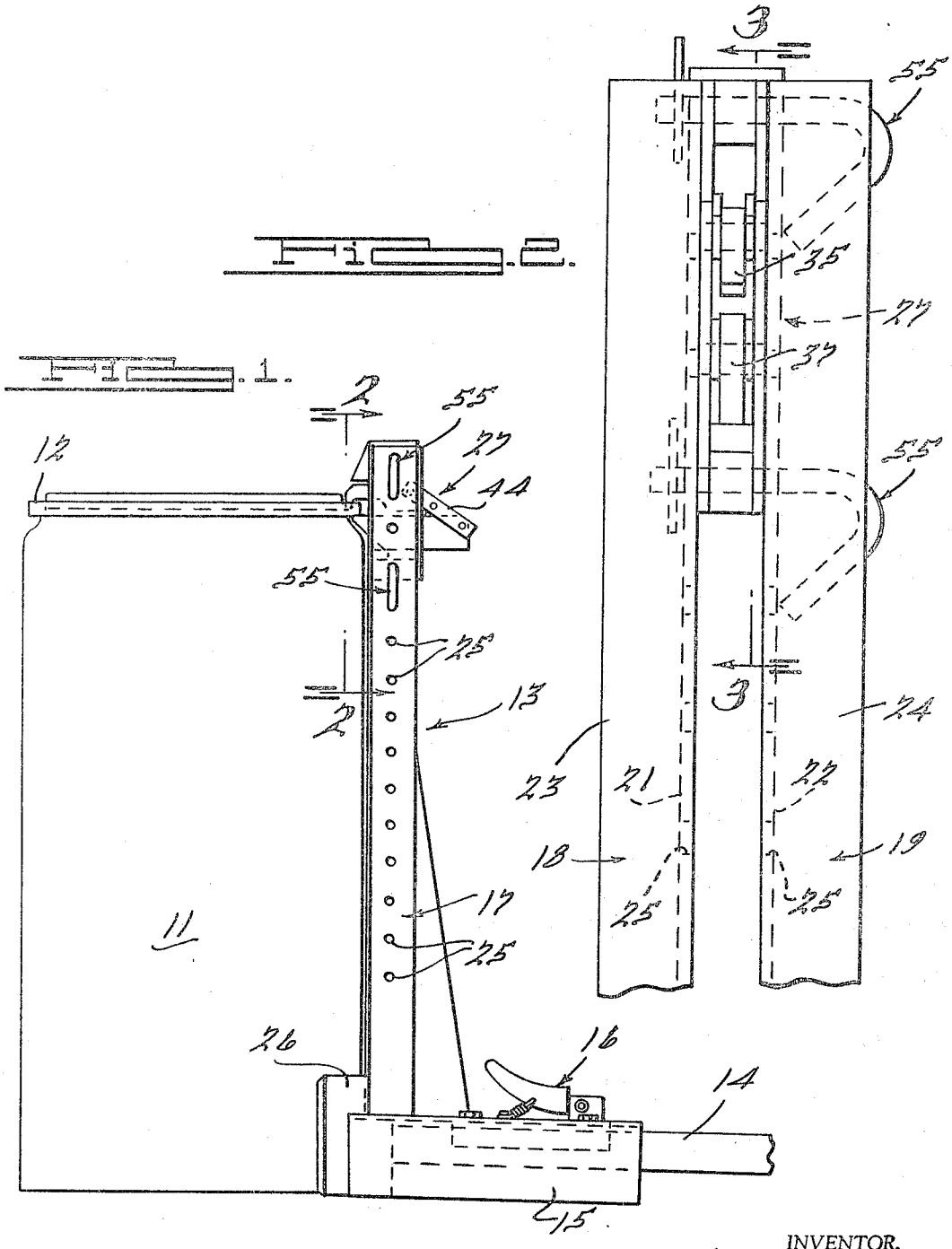
March 21, 1967 D. R. CHENAULT 3,310,336

BARREL LIFT MECHANISM

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Fig. 2.

Fig. 1.



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FIG. 2.

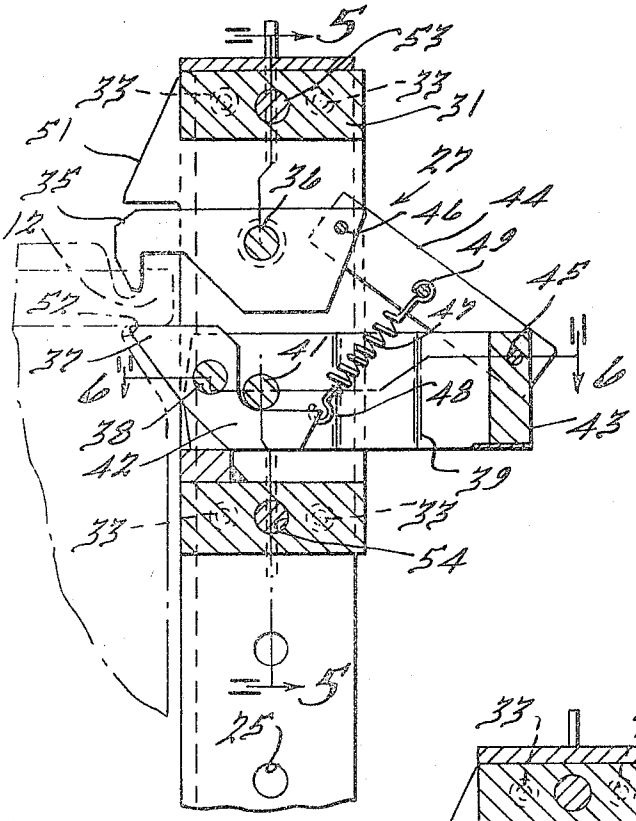
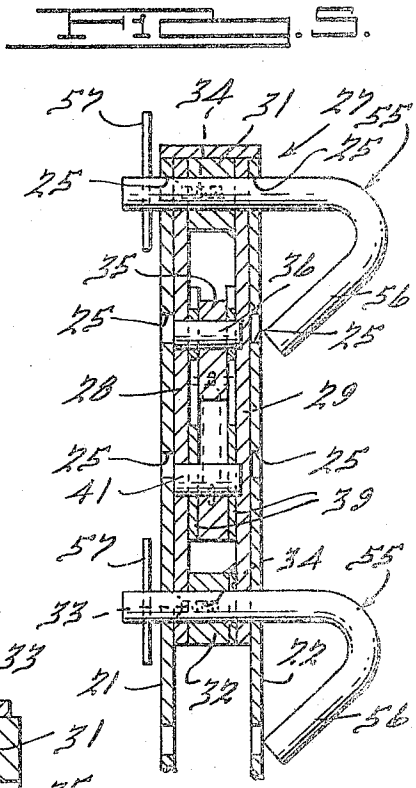


FIG. 3.



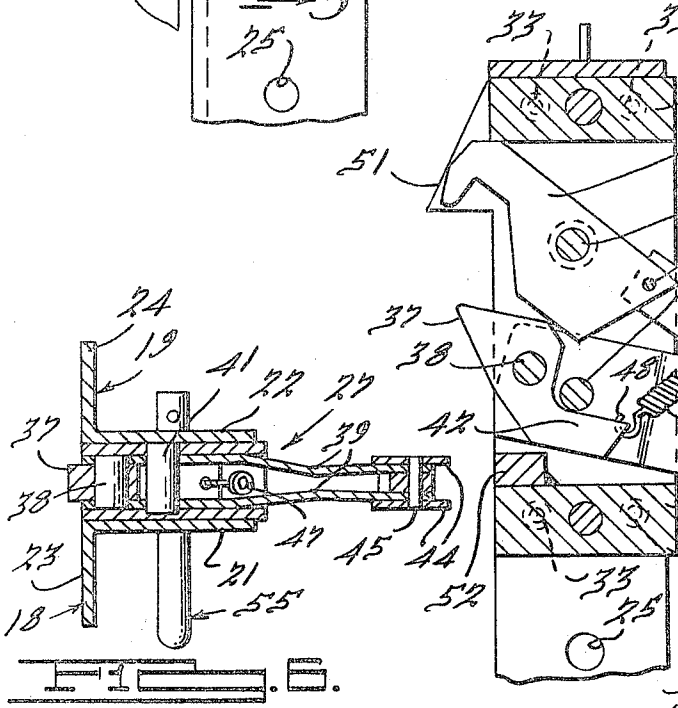


FIG. 4.

FIG. 6.

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United States Patent Office 3,310,336 Patented Mar. 21, 1967

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BARREL LIFT MECHANISM

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Filed Mar. 19, 1965, Ser. No. 441,232
5 Claims. (Cl. 294—90)

This invention relates generally to a device for lifting objects having a flange at one end thereof such as boxes, barrels, or the like and more particularly to a lifting device that is particularly adapted to use in the lifting of objects having relatively weak or flexible side walls reinforced by end flanges.

It is well known to provide a lifting device that grips a barrel, box or other similar container by one of its end flanges so that the container may be transported from place to place. Handling may be facilitated by attaching the lifting device to a fork or lift truck. Such a lifting device is shown in United States Patent Number 3,042,241, entitled, "Barrel Lift Mechanism," issued July 3, 1962, and assigned to the assignee of this invention. The barrel lift mechanism shown in the aforementioned patent is particularly adapted for use in lifting containers having relatively rigid walls. Frequently containers such as fiber drums or the like are provided with relatively unrigid walls or fragile walls that are edged by rigid flanges or chimes. Such containers cannot be subjected to impact forces or lifting forces through their sides without the possibility of rupturing the sides. It is most convenient, however, if the lifting device will automatically engage itself to the container.

It is, therefore, a principal object of this invention to provide a lifting device for containers having relatively fragile walls.

It is a further object of this invention to provide a lifting device for a container that may be carried by a fork truck or the like and which is automatically engageable with the container without necessitating any manual latching operation.

It is a still further object of this invention to provide a lifting device that may accommodate containers of varying heights and sizes.

It is a still further object of this invention to provide a gripping mechanism for engaging a flange of a container that is simple yet automatic in operation.

The foregoing and other objects of the invention are achieved by a lift mechanism having a frame structure including an upstanding member. The upstanding member has a forwardly directed contact surface thereon adapted to contact the side of the object to be lifted contiguous to its lower end. A latch device is provided for gripping a flange at the upper end of the lifted object. Means are provided for adjustably coupling the latch device to the frame for accommodating objects of varying heights.

A latch device embodying this invention comprises a pair of interengaging jaws that are adapted to grip the flange of the lifted object. The jaws are normally biased for movement into an open position. One of the jaws is adapted to engage one side of the flange and is supported for movement from its open position to a gripping position upon engagement with the flange side. Motion transmitting means transmit motion of the one jaw into movement of the other jaw from its open to a gripping position for engaging the flange between the jaws upon contact thereof with the one jaw.

Other objects and advantages of the invention will become apparent from the following description taken in conjunction with the accompanying drawings, wherein:

FIGURE 1 is a side elevational view of a lift mechanism embodying this invention and in engagement with a container;

FIGURE 2 is an enlarged elevational view taken generally in the direction of the arrows 2—2 in FIGURE 1;

FIGURE 3 is a cross-sectional view taken along the line 3—3 of FIGURE 2 and shows the jaws of the latch device in their gripping position;

FIGURE 4 is a cross-sectional view, in part similar to FIGURE 3, showing the jaws in their open position;

FIGURE 5 is a cross-sectional view taken along the line 5—5 of FIGURE 3; and

FIGURE 6 is a cross-sectional view taken along the line 6—6 of FIGURE 5.

Referring now in detail to the drawings and in particular to FIGURE 1, a fiber barrel or drum is indicated generally by the reference numeral **11**. The fiber barrel or drum **11** has side walls that are formed from a relatively unrigid fiber material reinforced at their upper end by a hoop-like flange or chime **12**. A barrel lift device embodying this invention is indicated generally by the reference numeral **13**. The barrel lift device is adapted to be attached to a fork **14** of a lift truck (not shown) or other similar mobile supporting member.

The lifting device **13** includes a frame comprised of a base **15**, which may be of generally channel shaped configuration for receipt upon the fork **14**. A latch mechanism **16** of any known type is provided upon the base **15** for locking the lifting device **13** relative to the fork **14**. An upstanding frame member **17** extends vertically from the base **15** and has a pair of spaced-apart structural angles **18** and **19**. The angles **18** and **19** have facing leg portions **21** and **22**, respectively, that are integrally connected to leg portions **23** and **24** that face the barrel **11** or any other container which may be lifted. A plurality of aligned apertures **25** are formed in each of the legs **21** and **22** for a purpose which will become apparent as this description proceeds.

A contact member **26** is affixed to the lower ends of the legs **23** and **24** of the angles **18** and **19** and to the base **15**. The contact member **26** may be arcuate in shape or have any shape that is complementary to the lower edge of the container to be lifted. The contact member **26** has sufficient height and area to spread the lifting load upon the lower end of the container **11** over a sufficient area to prevent rupture of the side walls of the container.

A latch device, indicated generally by the reference numeral **27**, is provided for gripping the flange or chime **12** to restrain and to lift the upper end of the container **11**. The latch device **27** comprises a housing including side plates **28** and **29**. A top spacer block **31** and a bottom spacer block **32** are welded to the side plate **29**. The side plate **28** is affixed to the spacer blocks **31** and **32** by a plurality of bolts **33** that are threaded into tapped holes **34** formed in the spacer blocks **31** and **32**.

An upper jaw **35** is pivotally supported by the housing by means of a pivot pin **36** that extends between and is supported in the side plates **28** and **29**. A lower jaw **37** is pivoted upon a pivot pin **38** that is, in turn, affixed to the forward end of a pair of lower jaw arms **39**. The lower jaw arms **39** are pivoted upon a pivot pin **41** that extends between and is affixed to the side plates **28** and **29**. The lower jaw **37** has an inwardly extending portion **42** that is adapted to engage the underside of the pivot pin **41** under certain conditions, as will become apparent as this description proceeds. The lower jaw arms **39** embrace the lower jaw **37** and are affixed together at their inner ends, as at **43**.

One end of each of a pair of links **44** is pivotally connected by a pivot pin **45** to the lower jaw arms **39** on each side thereof and adjacent to the connection **43**. The other ends of the links **44** are pivotally connected, by a pivot pin **46**, to the inner end of the upper jaw **35**. A coil tension spring **47** is affixed at its lower end, by means of a

hook 48, to an aperture within the lower jaw portion 42. The opposite end of the spring 47 is affixed to a pin 49 that is affixed to the links 44 between their ends.

The coil tension spring 47 normally creates a tension upon the links 44 that causes them to pivot in a counterclockwise direction about the pin 45 as viewed in FIGURE 4. The counterclockwise rotation of the links 44 exerts a downward force upon the inner end of the upper jaw 35 to rotate it in a clockwise direction until the upper end of the upper jaw 35 contacts the upper spacer block 31. The forces acting upon the lower jaw arms 39 and the lower jaw 37 through the spring 47 are such that these elements will also rotate in a counterclockwise direction until stopped by the contact of the upper jaw 35 with the spacer block 31. It will be noted that the gripping end of the jaw 35 is concealed in this position by a pair of outwardly extending projections 51 formed on the side plates 28 and 29. FIGURE 4 shows the jaws 35 and 37 in their open or disengaged position.

If it is desired to raise a container 11, the fork truck or other device that is supporting the barrel lifting mechanism 13 is advanced toward the container 11. The upper surface of the lower jaw 37 should be positioned below the flange 12 for the proper operation of the latch device 27. If the jaw 37 contacts the side of the flange 12 or a side wall of the container 11, it may pivot in a clockwise direction about the pivot pin 38 so that the portion 42 moves away from the pivot pin 41 and the spring 47 is tensioned. This movement of the lower jaw 37 insures that it will not pierce the side of the container 11. If the lower jaw 37 is above the container and the forks 14 are lowered, the jaw will slide along the container until it registers with a recess 52 (FIGURE 3) in the side of the container 11 below the flange 12. When this occurs, the tension of the spring 47 will cause the lower jaw 37 to pivot to the position shown in FIGURE 4. The force of the weight of the container 11 acting through the flange 12 on the upper surface of the lower jaw 37 as a result of the lifting of the forks 14, causes the lower jaw 37 to tend to pivot in a counterclockwise direction about its pivot pin 38. If the portion 42 is in engagement with the pivot pin 41, this pivotal movement of the jaw 37 with regard to the lower jaw arms 39 is not possible. The force exerted upon the lower jaw 37, therefore, causes the lower jaw 37 and the lower jaw arms 39 to pivot as a unit in a counterclockwise direction about the pivot pin 41. This counterclockwise rotation exerts a force through the links 44 upon the upper jaw 35 to rotate it in a counterclockwise direction about its supporting pivot pin 36. The counterclockwise rotation of the jaws continues until the lower jaw 37 contacts a lower jaw stop block 52 that is affixed to the lower spacer block 32 (FIGURE 3). When this occurs, the jaws 35 and 37 will be in engagement with opposite sides of the flange 12 to grippingly engage it between them and, therefore, cause the container 11 to be lifted.

When lifting containers have relatively unrigid sides, it is necessary that the container be engaged contiguous to both its upper and lower surfaces in the areas of the flanges 12. To accomplish this result and to accommodate containers of varying heights, the latch device 27 is adjustably positioned between the arms 21 and 22 of the angles 18 and 19. As has been noted, aligned apertures 25 are positioned in the arms 21 and 22. A corresponding aperture 53 extends through the side plates 28 and 29 and the upper spacer block 31 of the latch assembly 27. A similar aperture 54 is formed in the lower spacer block 32 and side plates 28 and 29. The spacing between the apertures 53 and 54 corresponds to the spacing between a pair of apertures 25 in the legs 21 and 22 although the apertures in the legs 21 and 22 need not be adjacent apertures.

A pair of lock pins 55 are provided having offset handle portions 56 for locking the latch device 27 with respect to the frame member 17. The ends of the lock pins 55 are extended through the apertures 25 in the arms 21 and 22 and the apertures 53 and 54 in the latch device 27. Cotter keys 57 are provided to prevent disengagement of the lock pins 55 from the respective apertures.

It is to be understood that this invention is not limited to the exact construction shown and described, which is exemplarly of only a preferred embodiment of the intion, but that various changes and modifications may be made without departing from the spirit and scope of the invention as defined by the appended claims.

What is claimed is:

1. A mechanism for lifting objects having a flange at the periphery thereof comprising a housing, a first jaw assembly supported for pivotal movement about a first pivot axis by said housing, a second jaw assembly supported for pivotal movement about a second pivot axis by said housing, means biasing said jaw assemblies for pivotal movement in a first direction about said axes to an open position, said first jaw assembly having a gripping portion adapted to engage one side of the flange and being pivoted in a second direction opposite to said first direction under the influence of lifting forces exerted through the flange from its open position to a gripping position, and linkage means connecting said first jaw assembly to said second jaw assembly for pivoting said second jaw assembly from its open to a gripping position upon pivotal movement of said first jaw assembly in said second direction to grip the flange between said jaw assemblies, said linkage means providing for free movement of said gripping portion of said first jaw assembly in a direction opposite to said second direction without accompanying movement of said second jaw assembly upon contact of said gripping portion of said first jaw assembly with a side of the object to be lifted to prevent perforation of the side by said first jaw assembly.

2. A mechanism for lifting objects having a flange at the periphery thereof comprising a housing, a lever supported for pivotal movement about a first pivot axis by said housing, a first jaw supported for pivotal movement about a second pivot axis upon said lever, a second jaw supported for pivotal movement about a third pivot axis by said housing, a link pivotally connected to said lever and to said second jaw, said first jaw having a portion thereof adapted to engage the portion of said housing defining said first pivot axis for simultaneous pivotal movement of said first jaw and said lever about said first axis in a first direction and for permitting pivotal movement of said first jaw with respect to said lever about said second pivotal axis in a second direction and biasing means for pivoting said jaws into an open position, said jaws being pivotal from said open position to a gripping position upon the engagement of said first jaw with a lower edge of the flange for gripping the flange between said jaws.

3. In a mechanism for lifting objects having a flange at the upper end thereof and adapted for mounting on a mobile supporting member, the combination comprising a frame including an upstanding member having a forwardly directed contact surface thereon adapted to contact a side of an object to be lifted contiguous to a lower edge thereof, a gripping device for gripping the flange of the object to be lifted, said gripping device comprising a housing, a lever supported for pivotal movement about a first pivot axis by said housing, a first jaw supported for pivotal movement about a second pivot axis upon said lever, a second jaw supported for pivotal movement about a third pivot axis by said housing, a link pivotally connected to said lever and to said second jaw, said first jaw having a portion thereof adapted to engage the portion of said housing defining said first pivot axis for simultaneous pivotal movement of said first jaw and said lever about said first axis in a first direction and for permitting pivotal movement of said first jaw with respect to said lever about said second pivotal axis in a second direction

and biasing means for pivoting said jaws into an open position, said jaws being pivotal from said open position to a gripping position upon the engagement of said first jaw with a lower edge of the flange for gripping the flange between said jaws, and means adjustably affixing said gripping device to said upstanding member for accommodating objects of different heights.

4. A mechanism for lifting objects having a flange at the periphery thereof comprising a housing, a pair of jaw assemblies for grippingly engaging the flange, means supporting said jaw assemblies for pivotal movement with respect to said housing, means biasing said jaw assemblies for movement into an open position, means on said housing for shielding one of said jaw assemblies when said jaw assemblies are in the open position, the other of said jaw assemblies having a gripping portion adapted to engage one side of the flange and being pivoted in a first direction upon the exertion of lifting forces therethrough, and motion transmitting means for transmitting pivotal movement of the other of said jaw assemblies in said first direction into movement of said one jaw assembly from its open to a gripping position for engagement of the flange between said jaw assemblies, said motion transmitting means providing for pivotal movement of said gripping portion of said other jaw assembly in a direction opposite to said first direction without resulting movement of said one jaw assembly upon contact of said other jaw assembly with a side wall of the lifted object for precluding perforation of the wall by said other jaw assembly.

5. A mechanism for lifting objects having a flange at the periphery thereof comprising a housing, a first jaw assembly supported for pivotal movement about a first

pivot axis by said housing, a second jaw assembly supported for pivotal movement about a second pivot axis by said housing, said first jaw assembly having a gripping portion for engaging one side of the flange for pivotal movement upon engagement therewith from an open position to a gripping position, linkage means interconnecting said first jaw assembly to said second jaw assembly for pivoting said second jaw assembly from its open position to a gripping position upon pivotal movement of said first jaw assembly from its open position to its gripping position to grip the flange between its jaws, said gripping portion of said first jaw assembly being supported for movement from its open position to a displaced position without accompanying movement of said second jaw assembly upon contact of said first jaw assembly with a side of the object to be lifted to prevent perforation of the side by said first jaw assembly, and single biasing spring means for urging said first and second jaw assemblies to their open position and for retaining said gripping portion of said first jaw assembly in its open position.

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