June 6, 1961 E. E. WALLACE 2,987,204

MATERIAL HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

Filed Aug. 13, 1959 2 Sheets-Sheet 1

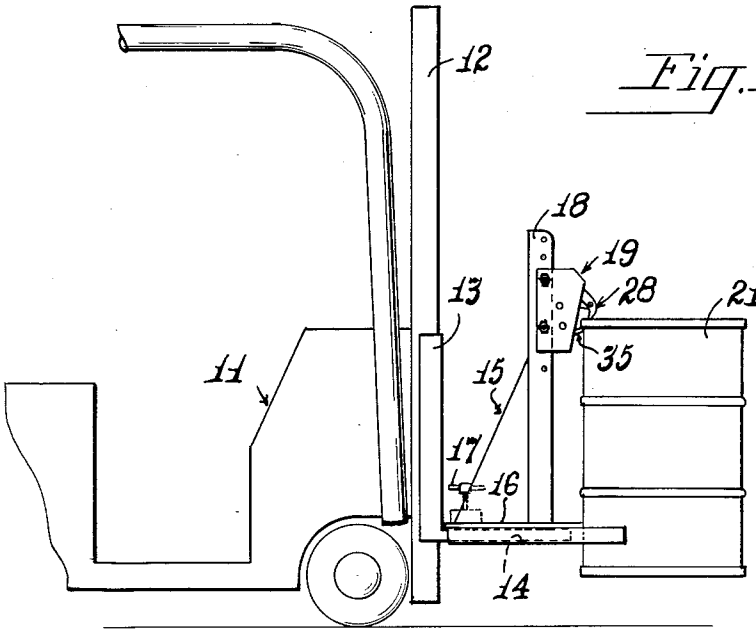


Fig. 1

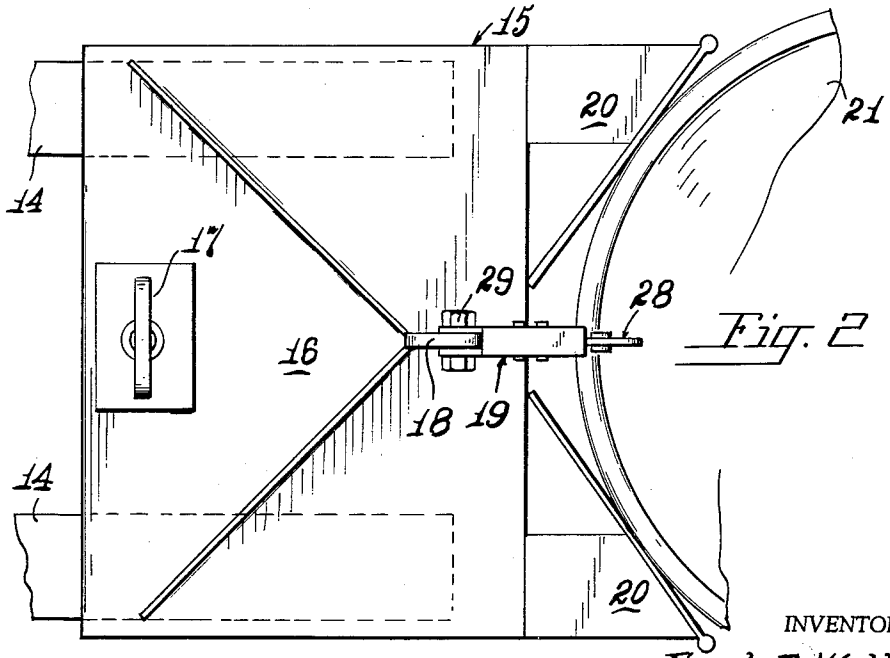


Fig. 2

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Fig. 3.

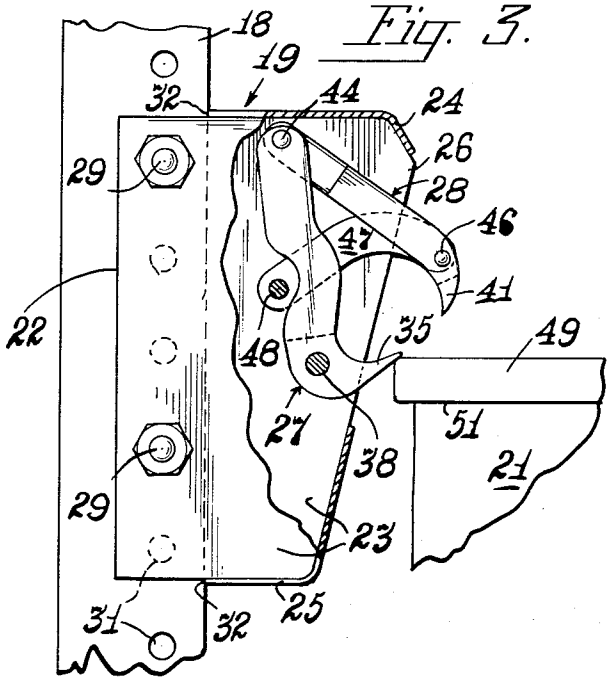


Fig. 6.

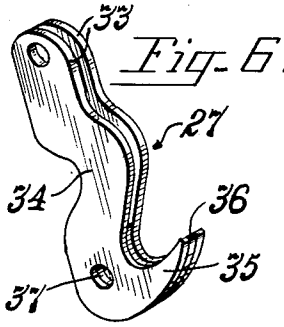
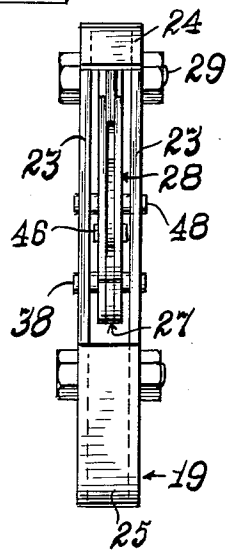


Fig. 5.



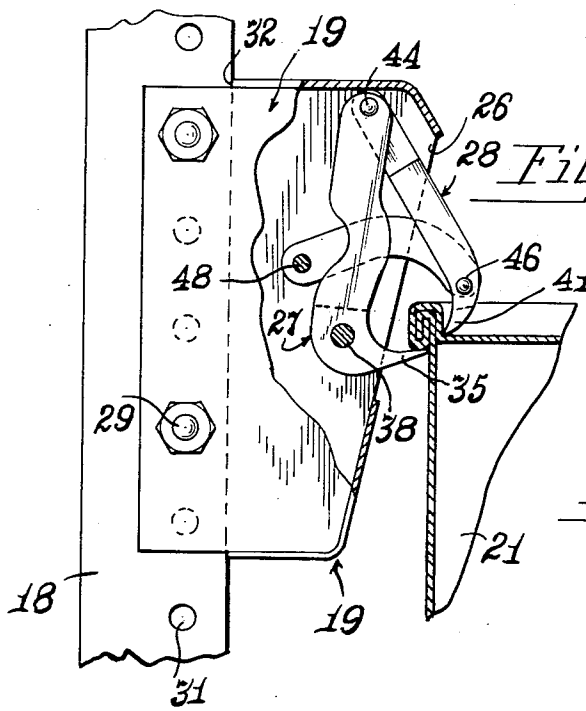
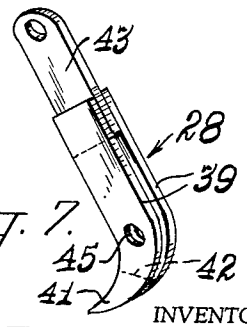


Fig. 4.

Fig. 7.



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MATERIAL HANDLING ATTACHMENT FOR INDUSTRIAL TRUCKS

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10 Claims. (Cl. 214—653)

The invention relates to improvements in material lifting and handling devices, and is more particularly concerned with an assembly, including a novel clamping device, for attachment to an industrial vehicle for lifting, transporting and stacking barrels, drums and like articles.

Industrial vehicles to which the present invention is applicable are equipped with elevating mechanism adapted for lifting a load. In the representative illustration of the lift truck selected for purposes of this disclosure, the elevating mechanism therein is operable to raise and lower a carriage which may be of a type having a fork extending forwardly of the vehicle. The instant assembly includes a novel frame structure that is readily secured to the fork, by being telescoped thereover and secured thereto, or directly to elevatable apron carrying the fork in substitution for the fork. By the use of either mounting, the frame structure is movable with the carriage.

The frame structure includes an upstanding post arranged at its forward end and upon which is secured, for vertical height adjustment, a novel clamping device disposed to engage and automatically interlock with and grip a drum, barrel or a like article to be lifted and transported, and which device is disengaged from said drum or barrel automatically only when such disengagement is required.

More particularly, the clamping device embodying features of the present invention is comprised of a housing that is securely mounted at a selected elevation on the post. The housing contains a novelly constructed gripping jaw assembly consisting of a pair of opposed jaw elements mounted and interconnected in such a manner as to move into jaw open and closed positions in response to relative movement in vertical directions of the clamping device and the drum, or the like, to be engaged or disengaged, and to afford adequate support for carrying the load. Preferably, the clamping device is constructed for the most part from parts stamped from sheet metal stock.

It is an object of the invention to provide a novelly constructed frame structure, including a novel clamping device, which may be easily and quickly attached to or removed from an industrial vehicle.

Another object of the present invention is to provide a novel clamping device.

A further object of the invention is providing novel means for mounting and interconnecting a pair of movable jaw elements for automatic engagement and disengagement with an article.

Still another object is to provide a clamp device of a character including a pair of interconnected jaw elements movable in unison into clamping and releasing positions without the aid of springs.

The structure by means of which the above noted objects and other objects and advantages of the invention are attained will be described in the following specification, taken in conjunction with the accompanying drawings, showing a preferred illustrative embodiment of the invention, in which:

FIGURE 1 is a side elevational view of a representative type of lift truck having the structure of the invention mounted thereon and shown associated with a drum.

FIGURE 2 is a plan view of the frame structure showing the clamping device mounted thereon and engaged with the drum.

FIGURE 3 is an enlarged side elevational view of the clamping device, partly broken away, and showing the jaw elements in an open condition prior to gripping a drum.

FIGURE 4 is a view similar to FIGURE 3, showing the jaw elements closed and in gripping engagement with the bead of the drum.

FIGURE 5 is a front elevational view of the clamp device, showing the jaw elements in closed or gripping condition.

FIGURE 6 is a perspective view of the lower jaw element.

FIGURE 7 is a perspective view of the upper jaw element.

Referring to the accompanying drawings, the industrial lift truck **11** illustrated in FIGURE 1 is of a type commonly used to transport a load and to lift articles for stacking. As shown, the truck includes an upright standard **12** having a vertically slidable carriage **13** thereon, which is adapted to be raised and lowered by any suitable means, preferably hydraulically (not shown). Carriage **13** includes a fork **14** which extends forwardly horizontally therefrom and which normally is used to engage beneath and lift a load. This fork is used in the present instance to mount a novel frame structure, generally indicated at **15**, characterized by having a platform **16** suitably formed to telescope over the fork and be secured thereto firmly as by means of clamp means **17**, for vertical movement in unison therewith. Platform **16** mounts, adjacent its forward end and midway its side edges, an upstanding post or column **18** which provides a mounting support for the novel clamping device **19**. A cradle may be provided on the front end of platform **16**, as by means of opposed triangularly shaped extensions **20**, to engage the wall of a barrel or drum **21** adjacent its lower periphery and hold it in the upright position illustrated when its upper periphery is engaged by clamp device **19**.

The clamping device **19**, best shown in FIGURES 3 through 5, includes a housing **22** that preferably is fabricated from a pair of spaced apart substantially rectangular plates **23** constituting the side walls thereof and which are interconnected along their top, bottom and front edges firmly, as by welding, by connecting edge wall members **24** and **25**. Said wall members are spaced apart to define an opening **26** on the front edge of housing **22** and through which portions of jaw elements **27** and **28** extend. The rear margins of side plates **23** embrace post **18** and have apertures therein to receive bolts **29** that are extended through selected openings **31** in said post for securing the housing to the post rigidly and in any selected position of vertical adjustment. Additional rigidity may be afforded the housing mounting by abutment of the rearwardly disposed edges **32** of edge wall members **24** and **25** with the opposed edge of post **18**.

Lower jaw element **27**, best shown in FIGURE 6, comprises a pair of like strap members each including an elongated body portion **33** offset, as at **34**, midway its ends and terminating at one end in a hook-like bite portion **35**. A spacer plate **36** is arranged between the pair of strap members in the area of the bite portion and the jaw element assembly is welded or otherwise secured together into a unitary structure to provide a solid hook-like load supporting portion **35**. The strap members and the intervening spacer **36** are apertured, as at **37**, to receive a pivot pin **38** for pivotally mounting the lower jaw element firmly between side plates **23** of housing **22**.

The upper jaw element **28**, best shown in FIGURE 7, likewise is fabricated from sheet metal stock and it includes a pair of like strap portions **39** each terminating at one end in a hook-like bite portion **41**. The strap

portions 39 are spaced apart by means of a spacer 42 arranged at its bite portion and at their other ends by one end of a strap 43, both of which are welded to portions 39. Strap 43 extends from between and beyond the ends of portions 39 to provide an extension of single material thickness for nesting between strap or body portions 33 of jaw element 27 when the jaw elements are assembled in the manner best shown in FIGURES 3 and 4. Portions 33 and the free end of strap 43 are apertured to receive a pivot pin 44 for pivotally connecting jaw elements 27 and 28.

The free forward or bite end of upper jaw element 28 is apertured inwardly of spacer 42, as at 45, to receive therethrough a pivot pin 46 for pivotally connecting the forward end of a link 47 thereto and between portions 39. Link 47 extends into the housing through opening 26 and is pivotally secured to the side wall plates 23 thereof by pivot pin 48.

With the herein described clamping device construction, jaw elements 27 and 28 normally lie in a closed position owing to the tendency of the weight of upper jaw element 28 and its mounting link 47 to overbalance the load of lower jaw element 27. When the clamping device is in such closed position and the truck or other vehicle mounting the load lifting assembly may be moved in a direction to abut the forward edge of housing 22, below the jaw elements, against a drum or barrel 21 to be moved or lifted. The lifting mechanism, including the clamping device, then is lowered in the customary manner so as to carry the lower edge of bite portion 35 of lower jaw element 27 into engagement with the top peripheral bead or flange 49 of said drum. Continued lowering of the clamping device causes lower jaw element 27 to rock about its fixed pivot 38 in a counterclockwise direction, thus rocking the upper jaw element 28 counterclockwise about its floating pivot 44 into substantially the jaw-open condition illustrated in FIGURE 3. The movement of the clamping device downwardly is continued until the bite portion 35 of lower jaw element 27 clears the lower edge of bead 49, the said lower edge of bead 49 being shown at 51, whereupon said bite portion will move into the area beneath the bead. The clamping device is now elevated, thus engaging bite portion 35 beneath bead 49 and causing clockwise rotation of the lower jaw element 27 into substantially the position shown in FIGURE 4. Such clockwise movement of lower jaw element 27 imparts like movement to upper jaw element 28, and because of its free floating pivot at 46, its bite portion 41 is carried into tight biting engagement with the inside face of bead or flange 49.

Continued movement of the clamping device upwardly to lift the drum or barrel for transport or stacking results in the entire load of the barrel resting on bite portion 35 of lower jaw element 27, and consequently causes upper jaw element 28 to bite still more tightly against the inside face of the drum bead. The support of the entire load on lower jaw element 27 is transmitted directly to housing 22 through the firm mounting of pivot pin 38. A drum can therefore be lifted, transported and stacked without danger of its being prematurely released by the clamping device. When release of an engaged drum is to be effected, the drum is lowered to a supporting surface, such as the floor, a pallet or on a stack of drums, and when so supported, continued lowering of the clamping device relieves lower jaw element 27 of the clamping load whereupon the vehicle may be backed away from the drum, during which movement the bite portion 41 of upper jaw element 28 rides free over bead 49 and then drops by reason of its own weight into the initial jaw closing position previously mentioned herein.

Although I have described a preferred embodiment of my invention in considerable detail, it will be understood that the description thereof is intended to be illustrative, rather than restrictive, as many details of the structure shown may be modified or changed without departing from the spirit or scope of the invention. Accordingly, I do not desire to be restricted to the exact construction described.

I claim:

1. A clamping device for drums and the like comprising a vertically disposed housing open on one edge, two gripping jaw elements carried in said housing, a first gripping jaw element adapted to engage beneath the bead of a drum and the second gripping jaw element adapted to engage within the bead of a drum, the first jaw element being pivotally mounted firmly in said housing, a link pivotally mounted at one of its ends on a fixed axis in said housing and at its other end to the second jaw element, and means pivotally connecting the first and second jaw elements, said jaw elements being movable into an open condition upon engagement of the first jaw element with the drum and moving of the clamping device downwardly relative to the drum and movable into closed gripping condition when said first jaw element is engaged beneath the bead of the drum and moved upwardly to support the load of said drum.

2. A clamping device for drums and the like comprising a vertically disposed housing open on one edge, two gripping jaw elements carried in said housing, a first jaw element being adapted to engage beneath the bead of a drum and the second jaw element being adapted to engage within the bead of a drum, the first of said jaw elements being pivotally mounted in said housing for movement in a vertical arc, a link pivotally connected at one end to said housing for swinging in a vertical arc and having its other end pivotally connected to the second of said jaw elements, and means pivotally connecting the first jaw element to the second jaw element, said jaw elements being movable in vertical arcs into an open condition upon engagement of the first of said jaw elements with the drum and moving the clamping device downwardly relative to the drum and into closed gripping condition when said first jaw element is engaged beneath the bead of the drum and moved upwardly to support the load of said drum.

3. A clamping device for drums and the like comprising a vertically disposed housing open on one edge, two gripping jaw elements carried in said housing, one of said jaw elements being adapted to engage beneath the bead of a drum and the other of said jaw elements being adapted to engage within the bead of a drum, said one jaw element being pivotally mounted in said housing, a link pivotally connected at one end to said housing and having its other end pivotally connected to said other jaw element, and pivot means connecting said jaw elements, said jaw elements being movable into closed gripping condition when said one jaw element is engaged beneath the bead of a drum and the clamping device is moved upwardly to support the load of said drum.

4. A clamping device for drums and the like comprising a vertically disposed housing open on one edge, two gripping jaw elements carried in said housing, a first of said elements being adapted to engage beneath the bead of a drum and a second of said elements being adapted to engage within the bead of a drum, said first jaw element being pivotally mounted firmly in said housing, a link pivotally mounted at one of its ends on a fixed bearing in said housing and having its other end pivotally connected to said second jaw element, and pivot means connecting said jaw elements, said jaw elements being movable into an open condition upon engagement of the first of said jaw elements with the drum and moving the clamping device downwardly relative to the drum.

5. In a drum handling device, a frame structure adapted for attachment to the elevator mechanism of an industrial vehicle, an upstanding post on said frame structure, a clamping device carried by the post and including a housing having an opening on an edge, a pair of vertically spaced apart gripping jaw elements movably mounted in said housing and projecting through the open-

ing, means securing a first of said jaw elements in the housing for pivotal movement about a fixed axis, a link, pivot means mounting the second of said jaw elements on said link, pivot means connecting said link to the housing, and means pivotally connecting the jaw elements one to the other in a manner to permit movement of said second jaw element into clamping engagement with the bead on a drum to be gripped when the said first jaw element is engaged beneath said bead and the frame structure is elevated.

6. In a drum handling device, a frame structure adapted for attachment to the elevator mechanism of an industrial vehicle, an upstanding post and a cradle on said frame structure, a clamping device carried by the post and including a housing having spaced side walls and an opening on an edge in communication with the space between the said walls, a pair of vertically arranged gripping jaw elements movably arranged in said housing and projecting through the opening, a fixed pivot pin pivotally securing one of said jaw elements adjacent to one of its ends to the housing, a pivot pin pivotally connecting the other end of said one jaw element to an end of the other jaw element, and a link connecting the other jaw element to the housing, said connections being such that when the lower one of said jaw elements is engaged with a bead on a drum to be lifted, the upper one of said jaw elements is carried into tight clamping engagement with the bead.

7. A clamping device for drums and the like comprising a housing having a vertically extending opening, two gripping jaw elements arranged in the housing and extending through the opening, a first of said jaw elements comprising an elongated body having a hook-like bite portion at one end, a fixed pivot pin extending through the housing and through the body adjacent to the hook-like end for pivotally mounting said first jaw element in the housing, a link connected pivotally at one end to said housing and having its other end extend outwardly through said opening, the second jaw element including an elongated body portion having a hook-like bite portion on one end, a pivot pin pivotally connecting said link to said second jaw element closely adjacent to the bite portion thereof, and a pivot pin pivotally connecting the free ends of the body portions of said jaw elements together in a manner to cause the jaw elements to move into open and closed condition in response to directional loads applied to either of said jaw elements.

8. A clamping device for drums and the like comprising a housing having an opening, two gripping jaw elements arranged in the housing and extending through the opening, one of said jaw elements including an elongated body having a hook-like bite portion at one end, a pivot pin extending through the body and mounted firmly in the housing adjacent to the hooklike end for pivotally mounting said jaw element in the housing, a link connected pivotally at one end to said housing and having its other end extend outwardly through said opening, the other jaw element including an elongated body portion having a hook-like bite portion on one end, means pivotally connecting the said other link end to said other jaw element closely adjacent the bite portion thereof, and means pivotally connecting the free ends of the body portions together in a manner to cause the jaw elements to move into open and closed condition in response to directional loads applied to either of said jaw elements.

9. A clamping device for drums and the like comprising a housing, two gripping jaw elements arranged in the housing, a first of said jaw elements comprising an elongated body having a hook-like bite portion at one end, means pivotally mounting said first jaw element in the housing firmly, a link connected pivotally at one end to said housing, the second of said jaw elements including an elongated body portion having a hook-like bite portion on one end, means pivotally connecting the other end of said link to said second jaw element closely adjacent the bite portion thereof, and means pivotally connecting the free ends of the body portions of said jaw elements together in a manner to cause said jaw elements to move into open and closed condition in response to directional loads applied to either of said jaw elements.

10. A clamping device for drums and the like comprising a housing having an opening, two gripping jaw elements arranged in the housing and extending through the opening, a first of said jaw elements comprising an elongated body having a hook-like bite portion at one end, a pivot pin extending through the housing and through the body adjacent the hook-like end for mounting said first jaw element for pivotal movement of the housing about a fixed axis, the second of said jaw elements including an elongated body portion having a hook-like bite portion on one end, a link pivoted at one end in said housing, means pivotally connecting the other end of the link to said second jaw element closely adjacent the bite portion thereof, and means pivotally connecting the free ends of the body portions together in a manner to cause said jaw elements to move into open and closed condition in response to directional loads applied to either of said jaw elements.

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