Aug. 31, 1943. R. J. MOOREHEAD 2,328,224

CLAMP TRUCK

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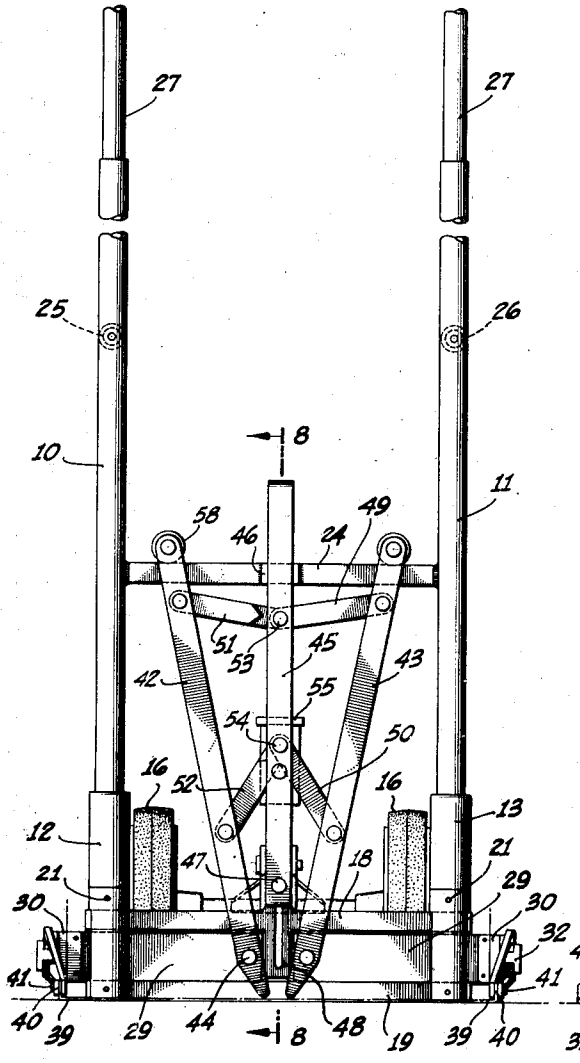


FIG. 1.

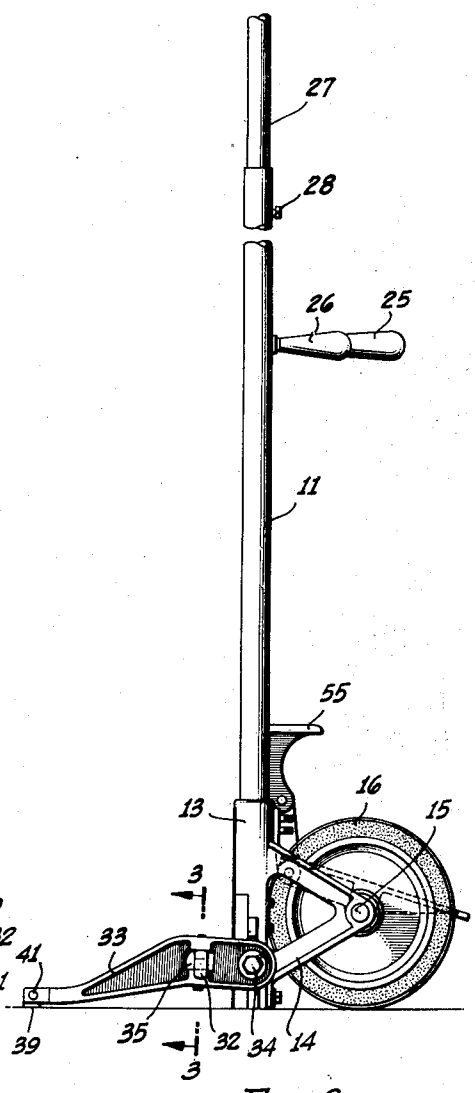


FIG. 2.

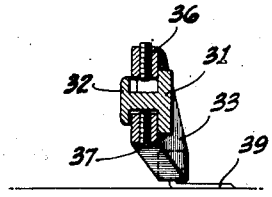


FIG. 3.

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FIG. 4.

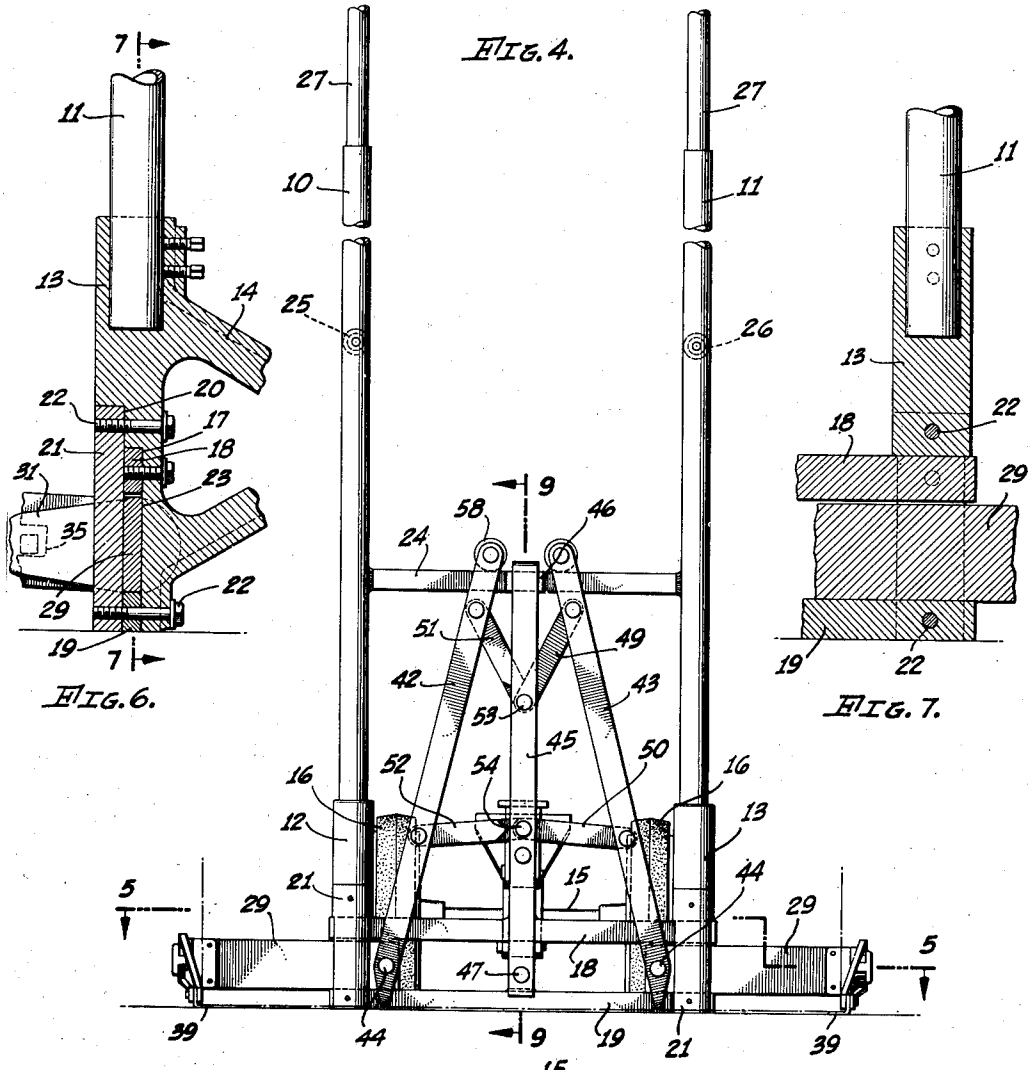


FIG. 6.

FIG. 7.

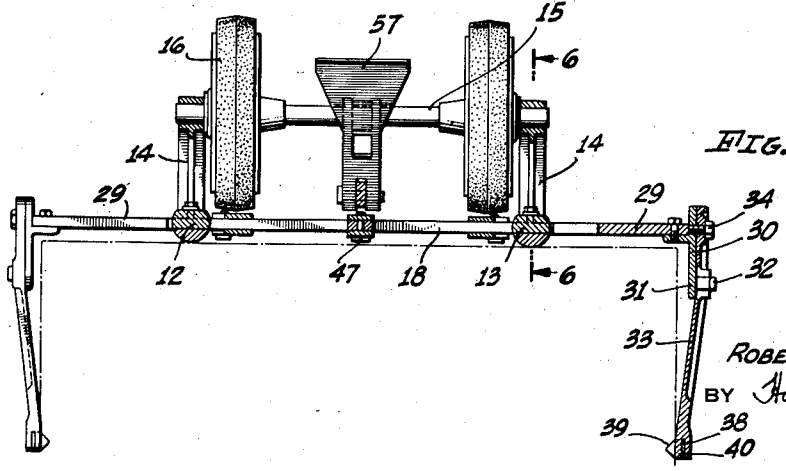


FIG. 5.

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FIG. 8.

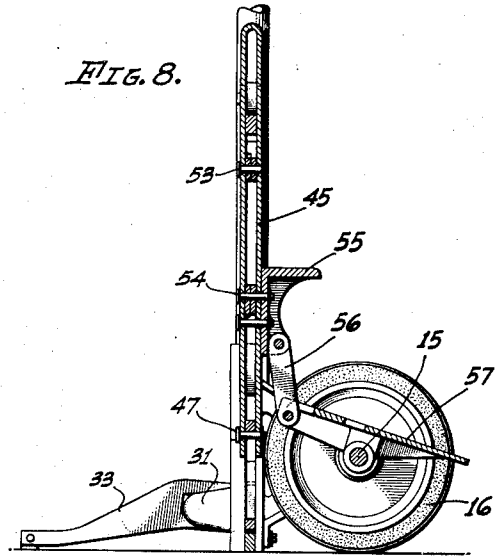


FIG. 9.

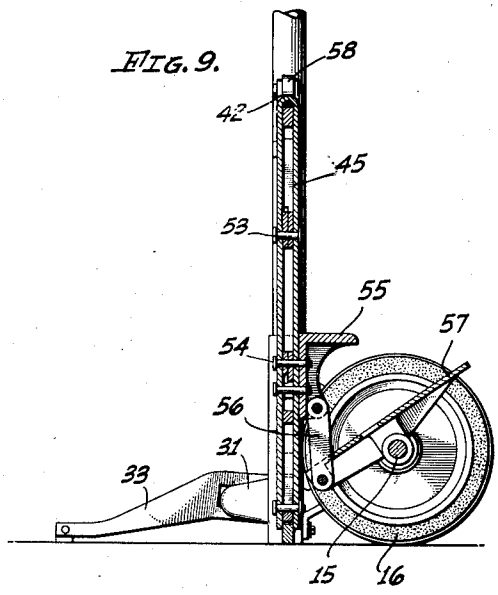


FIG. 10.

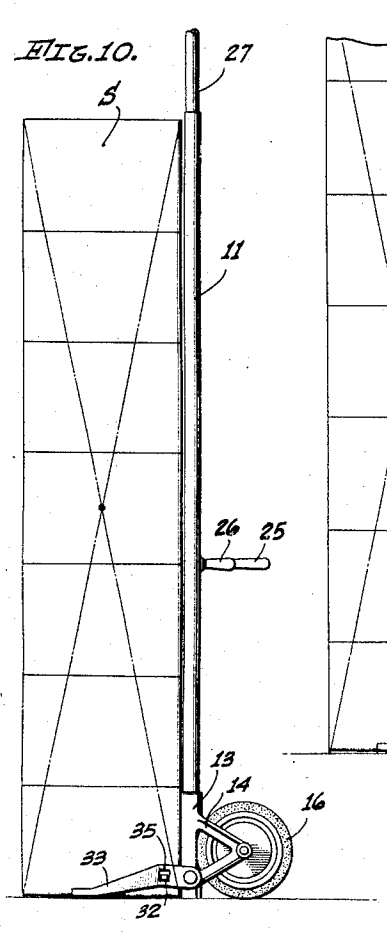


FIG. 11.

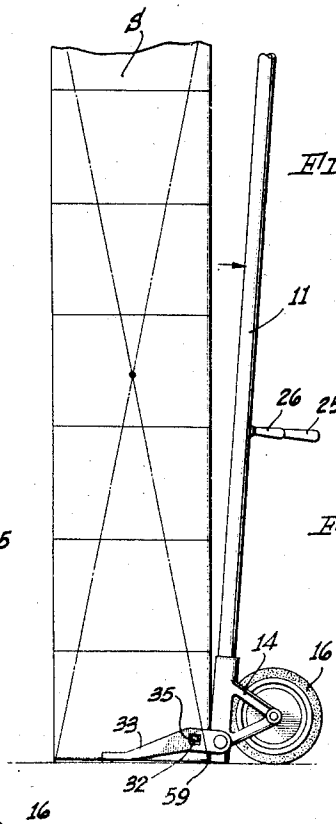
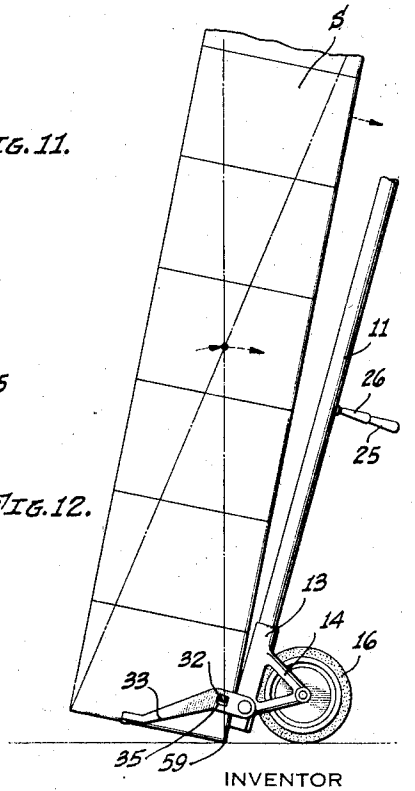


FIG. 12.



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UNITED STATES PATENT OFFICE

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CLAMP TRUCK

Robert James Moorehead, Riverside, Calif.

Application May 11, 1942, Serial No. 442,533

16 Claims. (Cl. 214—65.5)

This invention relates to improvements in clamp trucks and clamping jaws used thereon.

A conventional form of clamp truck now in general use is that which has been modeled after the disclosure in United States Letters Patent No. 990,402, issued April 25, 1911, to Fred Stebler. These clamp trucks so constructed have clamping jaws provided with transversely extending bars and forwardly extending arms. On the forward ends of the arms there are inwardly extending tips that are formed integral with the arm. The inner ends of the bars are connected to operating levers that cause the jaws to move outwardly and inwardly simultaneously. The levers that accomplish the movement of the jaws are pivoted upon the frame of the truck and are connected by pivoted links to a vertically movable operating member and the locking action is accomplished by the movable operating member carrying the links "over center" wherein the pivotal connection between the links and the operating member is below a horizontal line connecting the pivotal connections between the links and their respective levers. Such trucks, while they are susceptible of adjustment at the points of connection between the operating levers and the transversely extending bars of the jaws, when they are once adjusted, are susceptible of handling boxes of only one length. If it is desired to use the clamp truck on boxes of a different length the operating levers must be connected to the transverse bars of the jaws at diffeernt points.

In this form of clamp truck, that has been more or less standardized, the jaws are formed of a single piece of steel. If the tips that engage beneath the bottom of the lowermost box of a stack become badly worn or broken, either a new tip must be welded onto the jaw or a new tip forged from the forwardly extending arms or the entire jaw removed and replaced. It is also impossible to adjust the positions of the tips with respect to the transversely extending bars or the frame of the truck without heating and forging the forwardly extending arms of the jaws to secure the proper adjustment.

An object of the present invention is to provide an improved jaw for clamp trucks having a novel construction of replaceable tip which will be susceptible of being easily attached to the arm of a jaw and effectively support the load imposed thereon. If the tip becomes badly worn or broken the tip can be removed and replaced easily without requiring welding or forging or even the removal of the body of the jaw from the clamp truck.

Another object of the invention is to provide a jaw that may be used as a replacement part on the standardized type of clamp truck which is so constructed that the position of the tip with respect to the clamp truck, when the body of the truck is rolled against a stack of boxes, can be adjusted or varied quite easily. These clamp trucks are used in trucking stacks of boxes of various numbers of boxes per stack, and it consequently is of considerable importance to be able to adjust the position of the forward ends of the jaws so as to properly support the load when trucking stacks of various heights. The improved jaw may be easily and quickly adjusted to accomplish the desired result in order to secure a proper balance of the load.

Another object of the invention is to provide an improved form of universal clamp truck wherein the truck is in constant adjustment for handling stacks of boxes of various lengths. In the improved clamp truck the jaws may be spread to a certain maximum distance apart and contracted to a certain minimum distance apart. If the clamp truck is applied to any stack of boxes having lengths between these maximum and minimum distances the jaws may be clamped thereon regardless of the length and will effectively support the stack without spreading of the jaws which would allow the load to be dropped. By this universal form of construction it is unnecessary to effect a special adjustment of the clamp truck each time that a different stack of boxes having different lengths is to be moved. The universal type of clamp truck is applicable to boxes of all lengths between the maximum distance to which the jaws can be spread and the minimum distance to which the jaws can be contracted.

More specifically, an object of the invention is to provide a universal form of clamp truck wherein the jaws have transversely extending bars slidable in laterally extending guides on the frame of the truck and wherein the binding action of the bars within their respective guides when a load is imposed upon the arms of the jaws is relied upon to prevent spreading or opening of the jaws when the truck is loaded. In this way, regardless of the position of the jaws when they are contracted upon boxes of different lengths the same binding action of the bars within their guides is present to resist opening of the jaws and thus prevent spreading and dropping of the load.

Another object of the invention is to provide a novel linkage and lever construction that facili-

tates the opening and closing of the jaws of a clamp truck to accomplish the wide range of movement necessary to enable the clamp truck to be used on stacks of boxes of different lengths.

Another object of the invention is to provide a clamp truck wherein those parts, that are subject to wear and repair or replacement, are readily detachable to facilitate the worn parts being removed and repaired or replaced.

With the foregoing and other objects in view, which will be made manifest in the following detailed description and specifically pointed out in the appended claims, reference is had to the accompanying drawings for an illustrative embodiment of the invention, wherein:

Figure 1 is a view in front elevation of the improved clamp truck embodying the present invention, the clamp truck being illustrated in that position wherein its jaws are fully contracted;

Fig. 2 is a view in side elevation of the same;

Fig. 3 is a vertical section taken substantially upon the line 3—3 upon Fig. 2 in the direction indicated;

Fig. 4 is a view similar to Fig. 1, but illustrating the jaws of the clamp truck in fully expanded position;

Fig. 5 is a horizontal section taken substantially upon the line 5—5 upon Fig. 4 in the direction indicated;

Fig. 6 is a vertical section taken substantially upon the line 6—6 upon Fig. 5 in the direction indicated;

Fig. 7 is a vertical section taken substantially upon the line 7—7 upon Fig. 6 in the direction indicated;

Fig. 8 is a sectional view taken substantially upon the line 8—8 upon Fig. 1 in the direction indicated;

Fig. 9 is a view similar to Fig. 8 but taken substantially upon the line 9—9 upon Fig. 4 in the direction indicated; and

Figs. 10, 11, and 12 are diagrammatic views illustrating movements of the clamp truck and a stack of boxes, to which the truck has been applied, that are undergone in the operation of loading the truck.

Referring to the accompanying drawings wherein similar reference characters designate similar parts throughout, the clamp truck comprises a suitable frame composed of two upright steel tubes 10 and 11. These uprights have their lower ends fitting into base fittings 12 and 13 which have triangular portions 14 that provide journals for the ends of an axle 15 for supporting wheels 16 that serve to support the frame of the truck and the load that is to be imposed thereon. The forward sides of the base fittings are rebated as indicated at 17, see Fig. 6, to receive spacers or gibs 18 and 19 that extend across the space between the base fittings 12 and 13. They are also rebated as indicated at 20 to receive removable caps 21 which are fastened onto the base fittings as by bolts 22. The removable caps, the forward sides of the base fittings, and the opposed faces of the spacers or gibs 18 and 19 define a transversely or laterally extending guide or guides 23 for the laterally extending bars of the jaws.

The uprights 10 and 11 are also connected together by a horizontal bar 24 which is preferably welded to the uprights and serves to permanently hold the uprights of the frame in associated relationship. On the rear sides of the uprights there may be suitable handles 25 and 26 and in the preferred form of construction the right-hand handle 25, which is mounted on the back of upright 10, is longer than handle 26. Metal tubing sections 27 may be provided which are capable of telescoping within the tubular uprights on being withdrawn therefrom and held in extended position as by a suitable set screw or the equivalent indicated at 28. These sections are adapted to be extended in handling stacks that are quite high.

The jaws each comprise a transversely or laterally extending bar 29 slidable in the guide passage 23. Each bar has at its outer end an angular fitting 30 secured thereto, each fitting having a forwardly extending portion 31 and an outwardly extending lug 32 that is T-shaped in form, see Figs. 1, 2, and 4, with the T head thereof extending vertically.

The arms 33 are attached to the ends of the bars 29 of the jaws as by cap screws 34 and they are capable of having a rocking or pivotal movement about the cap screws 34 as centers. These arms have horizontally extending slots 35, see Fig. 2, formed therein through which the T-shaped lugs 32 extend. The horizontal length of the slots 35 is slightly in excess of the vertical length of the T-shaped heads so that in assembling the arm 33 with the fitting 31, the arm is turned 90° from the position shown in Fig. 2 to enable the slot 35 to pass over the head. The arm is then rotated 90° into the position shown in Fig. 2 and the cap screws 34 applied. Thus, the cap screws provide a pivotal connection between the arms 33 and their respective bars 29 and the T-shaped heads on the lugs bearing against the outer sides of the arms prevent spreading of the arms with relation to the angular fittings 31. Set screws 36 and 37 extend through the top and bottom of the arms and are engageable with the lugs 32 so as to hold the arms 33 in any adjusted position with respect to the bars 29 within the limits of the top and bottom of the slots 35.

In using jaws of this character, as above described on a universal type of clamp truck illustrated in Figs. 1, 2, and 4, it is ordinarily desirable to back off the screws 36 and 37 to allow considerable play of the arms 33 with relation to the bars 29. The set screws may limit the amount of play or if desired they may be backed out entirely so that the play of the arms 33 with relation to the bars 29 is limited only by the lug 32 engaging the top and bottom of the slot 35.

At the forward end of each arm 33 the arm is vertically bifurcated as indicated at 38. Removable tips 39 that have inwardly extending blades are provided and these tips have upwardly extending ribs 40 that fit in the bifurcations 38. Rivets, bolts, or the equivalent 41 extend through the sides of the bifurcation and through the rib 40 to removably hold the tips on their respective arms. As the body portions of the tips fit and bear against the bottoms of the arms rotation of the tips is prevented even though only single bolts or single rivets are used. It is desirable to employ bolts or rivets having heads that are countersunk on the inner faces of the arms 33 so that they will not interfere with the positioning of the blades of the tips beneath the stack of boxes.

The operating means for expanding and contracting the jaws comprises a pair of levers 42 and 43. These are pivotally connected as by rivets 44 at their lower ends to inner ends of the bars 29. An operating member 45 is provided

which, in the preferred form of construction, consists of a suitable length reversely bent upon itself, see Figs. 8 and 9. This operating member is vertically guided between bosses 46 welded or otherwise formed on the bar 24 and by a rivet or bolt 47 that extends through a vertical slot 48 in the spacer or gib 18. A pair of links pivotally connects each lever 42 and 43 with the operating member 45. The links of the pair that connect lever 43 with the operating member are indicated at 49 and 50, and the links of the pair that connect lever 42 to the operating member are indicated at 51 and 52. These links are pivotally connected to the operating member as by rivets or bolts 53 and 54, respectively.

It will be noted, however, that the distance between the points where the links are pivotally connected to the operating lever 45 is less than the distance between the points where the links of each pair are connected to their respective levers.

On the back of the operating member there is fastened a suitable pedal 55 having an upper tread surface and this pedal is pivotally connected as by links 56 to a suitable treadle 57 pivoted on the axle 15.

The operation of this form of construction is as follows. If the operator steps upon the rearwardly extending portion of treadle 57 the links 56 lift the pedal 55 and the operating member 45 in an upward direction or into a position shown in Fig. 1. In this position it will be noted that the upper links 51 and 49 are approaching the horizontal and that the upper ends of the levers 42 and 43 are spread a maximum distance apart. The lower links 50 and 52, however, assume steeply inclined positions or positions approaching the vertical. These links in this position serve as tension links drawing the lower ends of the levers 42 and 43 toward each other and thus contracting the jaws. On the other hand, if the operator steps or presses upon pedal 55 the operating member 45 is forced downwardly or into the position shown in Fig. 4 wherein the lower links 50 and 52 approach the horizontal and function as fulcrums for the levers 42 and 43. The upper links 49 and 51 in this position serve somewhat as tension links drawing the upper ends of the levers 42 and 43 toward each other and causing the lower ends of the levers to spread thus forcing the jaws apart as illustrated in Fig. 4.

I find it relatively important to equip the upper ends of the levers 42 and 43 with rollers 58 which are engageable with the top edge of bar 24. These rollers serve as anti-friction means that keeps the levers from engaging and binding upon the bar 24 particularly in starting to open the truck from the position shown in Fig. 1. By this form of construction it will be appreciated that there is a shiftable form of fulcrum for the levers 42 and 43. In other words, in the open position illustrated in Fig. 4, the links 50 and 52 serve largely as fulcrums for the levers whereas the links 49 and 51 serve as tension means drawing the upper ends of the levers toward each other. In closing the truck from the position shown in Fig. 4 to the position shown in Fig. 1, the fulcrum shifts from the lower pair of links to the upper and in this position the upper links 49 and 51 serve largely as fulcrums with the lower links 50 and 52 serving to pull the lower ends of the levers toward each other. This arrangement permits of a very wide throw wherein the jaws can be moved to a quite wide open position and contracted to a relatively narrow closed position. During all intermediate positions a fair degree of mechanical advantage is present so as to cause the arms of the jaws to firmly embrace the lowermost box of a stack.

In using the improved form of universal truck it is first rolled against the side of a stack of boxes S with the jaws in wide open position as shown in Figs. 4 and 5. When the frame is positioned against the sides of the stack and is in a vertical position as shown in Fig. 10, the operator then steps on the rearward portion of the treadle 57 which forces the operating member 45 upwardly and causes the jaws to contract upon the sides of the lowermost box. The inwardly extending blades of the tips enter between the bottom of the lowermost stack and the floor. The operator can then swing the truck from the position shown in Fig. 10 to the position shown in Fig. 11 wherein the frame of the truck is slightly inclined away from the side of the stack. During this swinging movement it will be noted that the stack remains undisturbed. This slight swinging movement of the truck frame is permitted by the loose play of the lugs 32 and their respective slots 35 in the arms. The operator can then continue rearward swinging of the frame of the truck into the position shown in Fig. 12 and during the first portion of this swinging movement the truck acts as an angular lever turning about axle 15 as a fulcrum. The entire weight of the stack however is not bodily lifted, but instead it is caused to turn or tilt about the rear edge 59 as a center. Thus, in moving the truck from the position shown in Fig. 11 to the position shown in Fig. 12, the truck is first used to merely tilt the stack instead of bodily lift it. As the movement continues the center of gravity of the stack approaches a vertical line over the axle 15 and may pass therethrough so that as the stack leans against the frame of the truck the weight of the stack is effective to force the frame of the truck in a clockwise direction about the axle 15 as a center as viewed in Fig. 12, so that the weight of the stack is thus utilized to lift the stack from the floor and cause the entire burden to be assumed by the supporting wheels 16. Usually the operator holds the frame of the truck by one of its handles and reaches between the uprights 10 and 11 and steadies the stack as he pulls it rearwardly through the tilted position illustrated in Fig. 12. When the stack has thus been lifted from the floor by the truck it may be transported to the desired location.

It will be noted that the transverse bars 29 fit fairly closely in the passages 23 that provide the guides therefor. When the load is imposed upon the forwardly extending arms of the jaws it is effective to attempt to bend the bars 29 about the outer ends of the spacer 19 as a center. It is also effective to attempt to twist or turn the bars 29 within the guides 23. The latter action is probably the most effective to cause the bars of the jaws to bind within their respective guides, and this binding action is sufficient regardless of the presence of the lubricant, to prevent the bars 29 of the jaws sliding outwardly allowing the jaws to spread and drop the load. Thus, regardless of which size of box may be transported and regardless of the extent to which the jaws are contracted the binding action will always be present when the load is applied to prevent opening of the jaws. When the load has been transported to the desired location it may be tilted from the truck into

a vertical position as shown in Fig. 10 and the pedal 55 is then stepped on to effect an expansion of the jaws and a release of the stack.

The binding action of the bars 29 is usually most effective on the lower spacer or gib 19 although it is sometimes effective on the caps 21 and the upper spacer 18. If these parts become badly worn so as to require repair or replacement the caps 21 can be easily and quickly removed and substitution of the worn parts effected.

When the jaw is used on a universal clamp truck as described herein, it is desirable to have a limited amount of play or movement between the arms 33 and the bars 29 in order to enable the frame to move from the position shown in Fig. 10 to the position shown in Fig. 11 prior to starting the tipping or tilting of the stack. If the jaw is used as a replacement part for the standard type of clamp truck, such as that illustrated in the Stebler patent above mentioned, it is usually desirable to tighten down the set screws 36 and 37 so as to engage the lug 32 and thus adjust the position of the tips 39 with relation to the truck so that when the load is applied the truck will be properly balanced. In other words, when the jaw forming a part of the present invention is used as a replacement part on the standard clamp truck the set screws are tightened so that there is no loose play between the arms and the bars. The position of the tip however can be accurately adjusted so that proper balance can be secured. This is accomplished by backing off one of the set screws and tightening the other toward it until the desired position of the tip is secured.

From the above-described construction it will be appreciated that the improved clamp truck is of relatively simple design and is of highly sturdy construction. It is automatically adjustable so as to handle stacks of boxes that are made up of boxes of various lengths. Regardless of the length of the boxes of any given stack the jaws will be automatically clamped thereon, and instead of relying upon the linkage and leverage arrangement to lock the jaws against opening, the binding of the jaws in their guides is relied upon. In this way the same locking action is present regardless of the position of the jaws when they are in box-engaging position. The improved jaw by reason of its limited play of the arms 33 with respect to the bars 29 facilitates a proper loading of the truck with a minimum amount of physical effort, and if used as a replacement part on the standard form of clamp truck it facilitates easy adjustment to secure proper balance. If any parts of the jaws or of the clamp truck become worn or broken, repair and replacement can be quickly and easily accomplished.

Various changes may be made in the details of construction without departing from the spirit or scope of the invention as defined by the appended claims.

I claim:

1. A jaw for clamp trucks comprising a transverse bar, a forwardly extending arm pivotally mounted at the end of the bar for pivotal movement in a plane transverse with respect to the length of the bar, means secured to the end of the bar extending forwardly adjacent the arm, said means serving to limit rocking movement of the arm relative to said bar.

2. A jaw for clamp trucks comprising a lengthwise movable transverse bar, a forwardly extending arm pivotally mounted at the ends of the bar for pivotal movement in a plane transverse to the length of the bar, means secured to the end of the bar extending forwardly adjacent the arm, said means serving to limit rocking movement of the arm relative to said bar and resist spreading of the arm with relation to the bar.

3. A jaw for clamp trucks comprising a lengthwise movable transverse bar, a forwardly extending arm pivotally mounted at the ends of the bar for pivotal movement in a plane transverse to the length of the bar, means secured to the end of the bar extending forwardly adjacent the arm, and means on the arm engageable with said means for limiting movement of the arm with relation to the bar.

4. In a clamp truck, a frame providing transversely extending guides, jaws having transverse bars slidable therein, means for moving the bars outwardly and inwardly within their respective guides, said jaws having forwardly extending arms having limited rocking movement relative to their respective bars in planes transverse to the lengths of the bars.

5. In a clamp truck, a pair of jaws each having a transverse bar and a forwardly extending arm, a frame providing guide means in which the bars are laterally slidable, a lever pivotally connected to each bar, a vertically movable operating member, and pairs of links pivotally connected to the levers and to the operating member.

6. In a clamp truck, a pair of jaws each having a transverse bar and a forwardly extending arm, a frame providing guide means in which the bars are laterally slidable, a lever pivotally connected to each bar, a vertically movable operating member, and pairs of links pivotally connected to the levers and to the operating member, the distance between the points of connection of the links and the operating member being less than the distances between the points of connection of the links of each pair and their respective levers.

7. In a clamp truck, a frame providing laterally extending guides, jaws having bars slidable in the guides and arms extending forwardly therefrom, means for drawing the jaws inwardly toward each other, said jaws being arranged to bind in the guides without appreciable rocking movement therein to resist separation when a load is imposed on the forward ends of the arms, said arms being mounted on the bars in such a manner as to have a limited rocking movement in a vertical plane with respect thereto.

8. In a clamp truck, a frame providing laterally extending guides, jaws having bars slidable in the guides and arms extending forwardly therefrom, means for drawing the jaws inwardly toward each other, said jaws being arranged to bind in the guides to resist separation when a load is imposed on the forward ends of the arms, that portion of the frame that provides the forward sides of the guides being detachable so as to be replaceable.

9. In a clamp truck, a frame providing laterally extending guides, jaws having bars slidable in the guides and arms extending forwardly therefrom, means for drawing the jaws inwardly toward each other, said jaws being arranged to bind in the guides to resist separation when a load is imposed on the forward ends of the arms, that portion of the frame that provides the top and bottom of the guides being detachably mounted upon the frame so as to be replaceable.

10. A clamp truck comprising a frame having upright members, a transverse bar connecting the members, means adjacent the bottom of the frame providing laterally extending guides,

jaws having transverse bars slidable in the guides, levers pivotally connected to their respective jaws, a vertically movable operating member, pairs of links pivotally connecting the levers to the operating member, said levers carrying rollers engageable with said transverse bar.

11. A clamp truck comprising a frame having laterally extending guides, jaws having transverse bars slidable in the guides and arms extending forwardly therefrom, and means for sliding the bars of the jaws inwardly and outwardly within their respective guides, the jaws being arranged to bind in the guides without appreciable rocking movement with respect thereto when a load is imposed thereon so as to resist separating movement of the jaws, said arms being pivotally mounted on the bars for limited pivotal movement in planes transverse with respect to the lengths of the bars, means for limiting the pivotal movement of the arms with respect to the bars.

12. A jaw for clamp trucks comprising a lengthwise movable transverse bar, a forwardly extending arm pivotally mounted on the end of the bar for pivotal movement in a plane transverse with respect to the length of the bar, said arm having an aperture therein, and means on the end of the bar extending through said aperture to limit movement of the arm with respect to the bar.

13. A jaw for clamp trucks and the like comprising a lengthwise movable transverse bar, an arm pivotally mounted upon the end of the bar for movement in a plane transverse to the length of the bar, there being an aperture formed in the arm, means on the bar bearing against one side of the arm and extending through the aperture and engaging the other side of the arm, serving to limit pivotal movements of the arm with respect to the bar.

14. A jaw for clamp trucks comprising a transverse bar, a forwardly extending arm pivotally mounted on the end of the bar for pivotal movement in a plane transverse with respect to the length of the bar, said arm having an aperture therein, means on the end of the bar extending through said aperture to limit movement of the arm with respect to the bar, and means for varying the amount of limited movement of the arm with respect to the bar.

15. In a clamp truck, a pair of jaws each having a transverse bar and a forwardly extending arm, a frame providing guide means in which the bars are laterally slidable, a lever pivotally connected to each bar, a vertically movable operating member, lower links pivotally connected to the operating member and to their respective levers, upper links pivotally connected to the operating member and to their respective levers, the upper and lower links being capable of pivoting relative to each other.

16. In a clamp truck, a frame providing laterally extending guides, jaws having bars slidable in the guides and arms extending forwardly therefrom, means for drawing the jaws inwardly toward each other, said jaws being arranged to bind in the guides to resist separation when a load is imposed on the forward ends of the arms, that portion of the frame that provides the forward sides and the top and bottom of the guides being detachable from the remainder of the frame.

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