United States Patent [19]

Anderson, Jr.

[11] **3,885,692**

[45] **May 27, 1975**

[54] **HANDLING SYSTEM FOR INTERLOCKING COVER BOXES**

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[73] Assignee: **Sonoco Products Company,** Hartsville, S.C.

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[52] **U.S. Cl.** **214/514;** 214/653

[51] **Int. Cl.** **B60p 1/02**

[58] **Field of Search** 214/514, 653, 654, 510, 214/82

[56] **References Cited**

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Primary Examiner—Albert J. Makay

Attorney, Agent, or Firm—C. Gordon McBride

[57] **ABSTRACT**

A load handling attachment for the vertically adjustable support unit of a lift truck. The attachment includes a vertical positioning plate horizontally adjustable forwardly and rearwardly in overlying relation to the platens by a pantograph mechanism or the like. The positioning plate mounts a vertically adjustable carton cap engaging blade for a gripping interlocking with the load and a locking of the load to the positioning plate for a manipulation of the load in conjunction with the positioning plate relative to the lifting platens.

4 Claims, 14 Drawing Figures

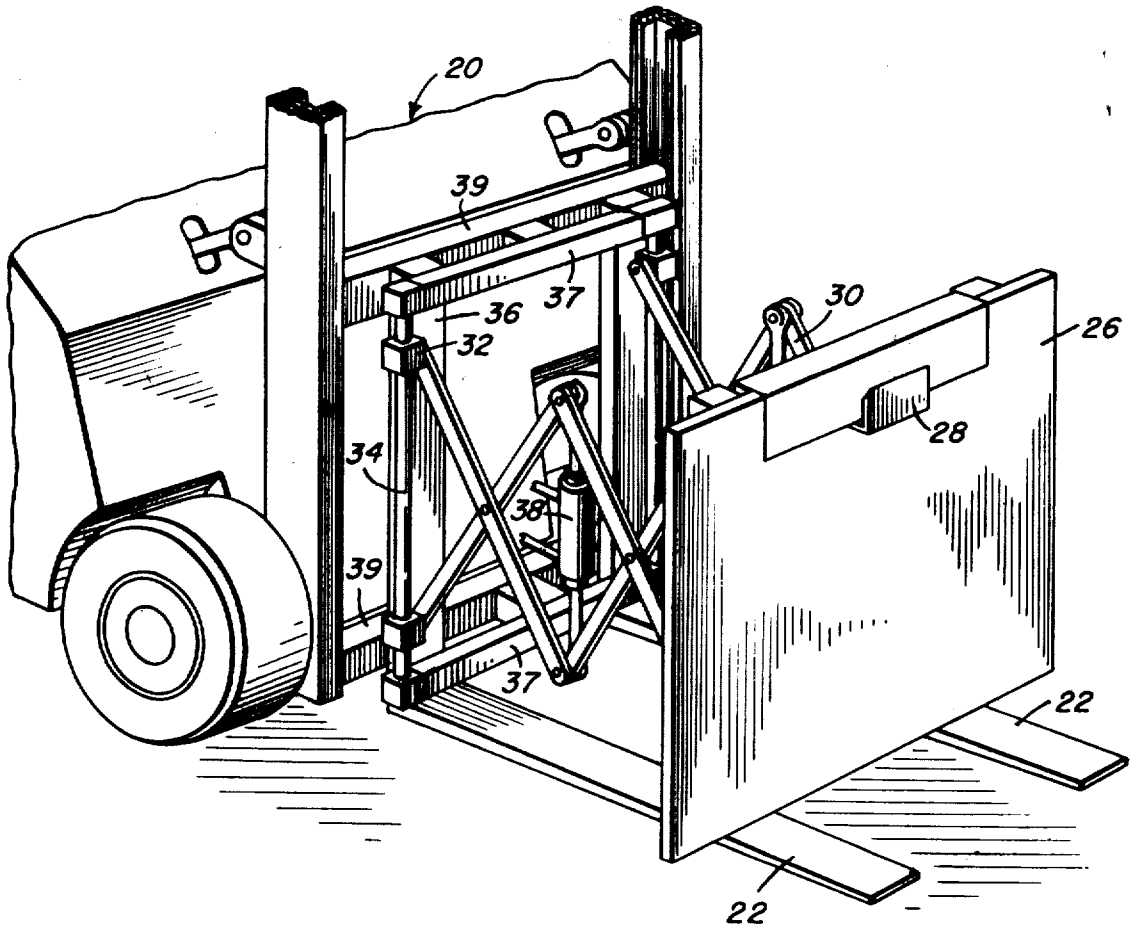


FIG. 1

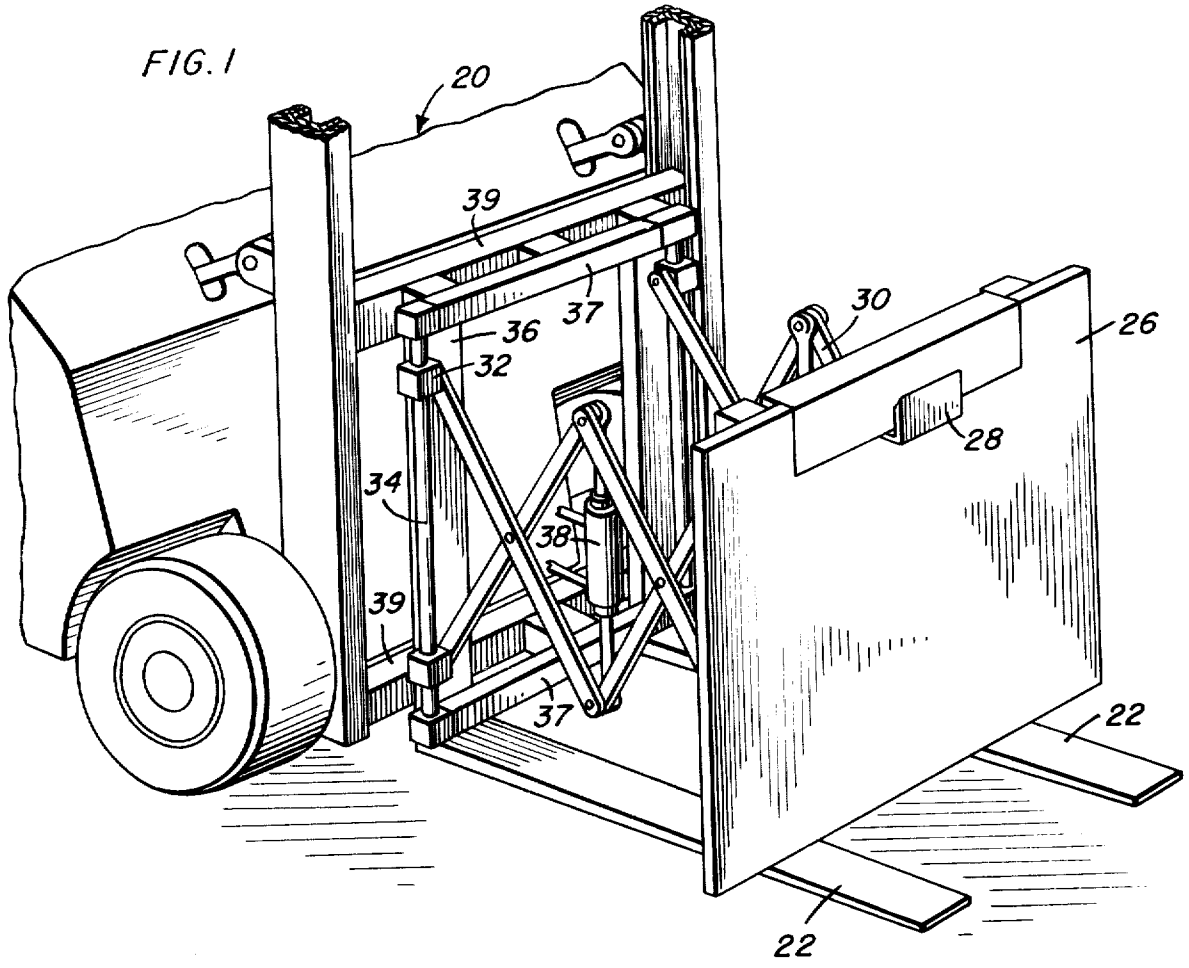


FIG. 2

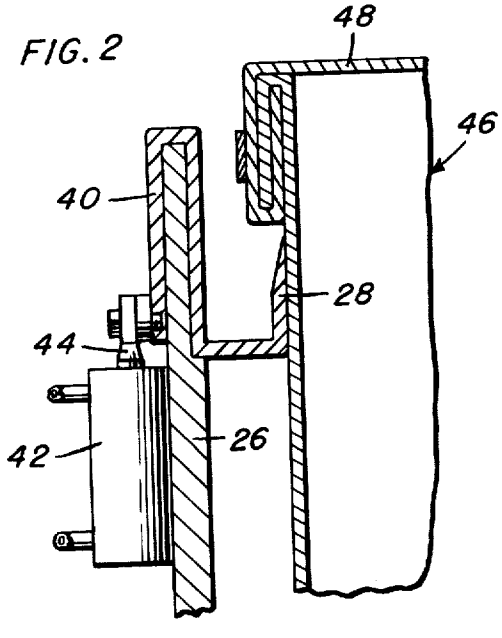


FIG. 3

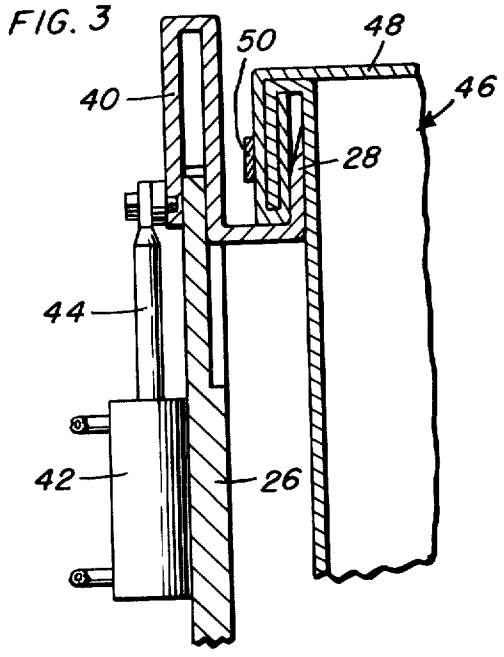


FIG. 4

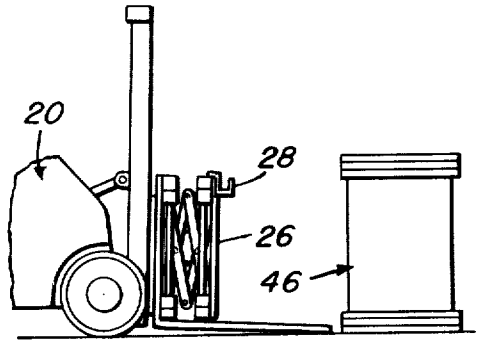


FIG. 5

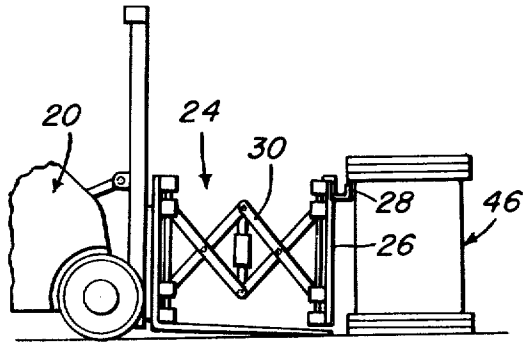


FIG. 6

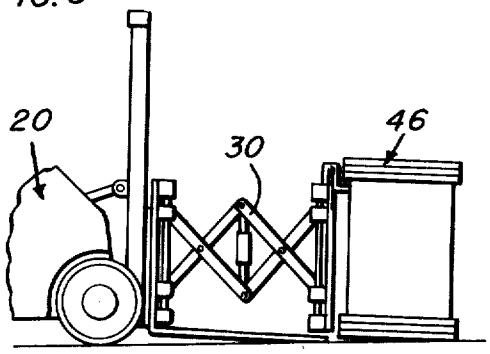


FIG. 7

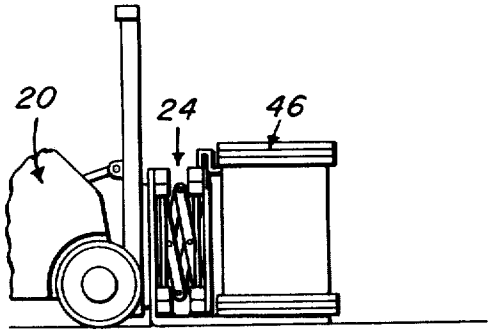


FIG. 8

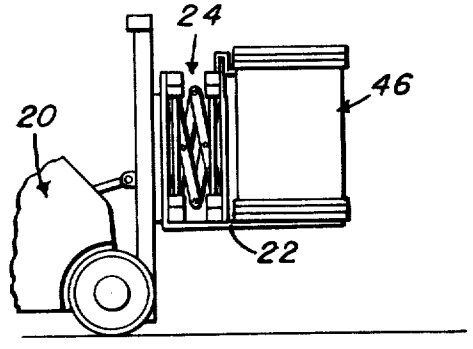


FIG. 9

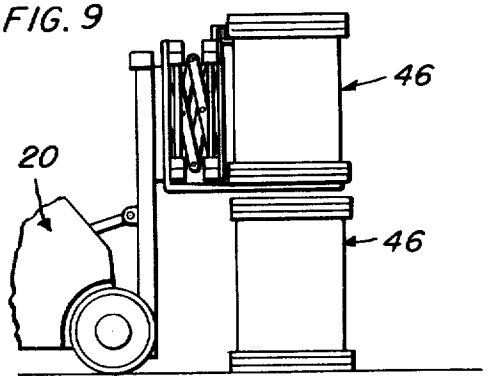


FIG. 10

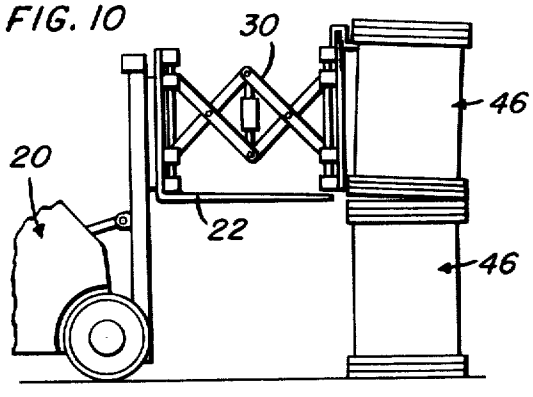


FIG. 11

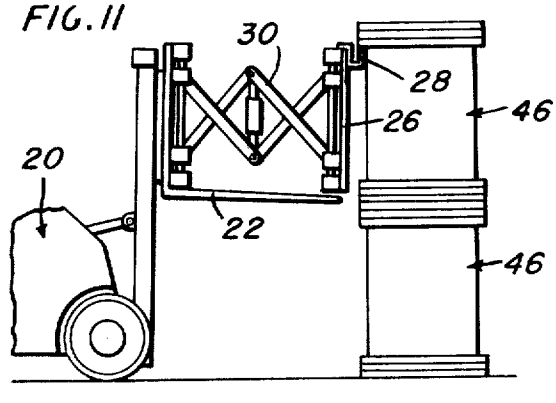


FIG. 12

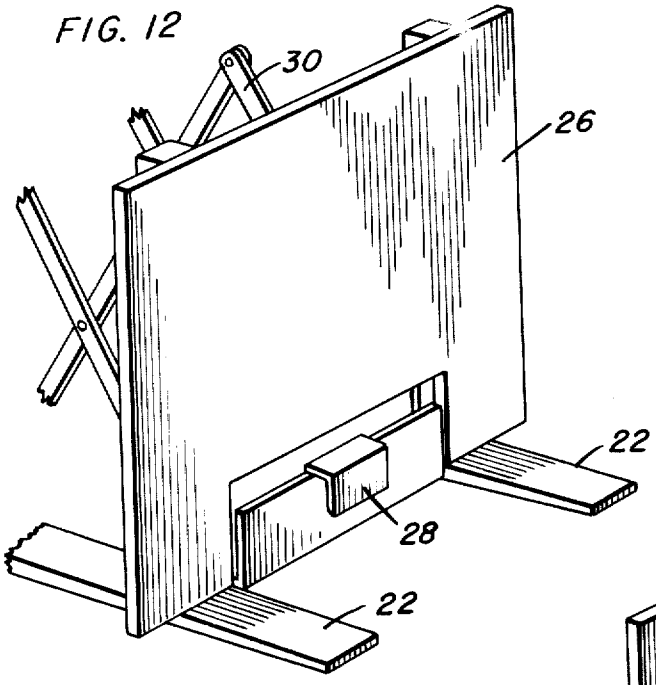


FIG. 13

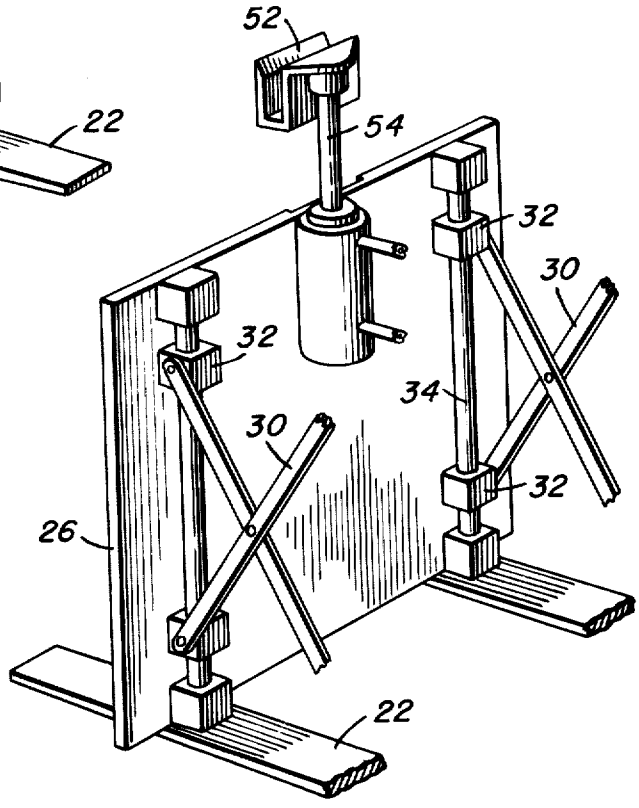
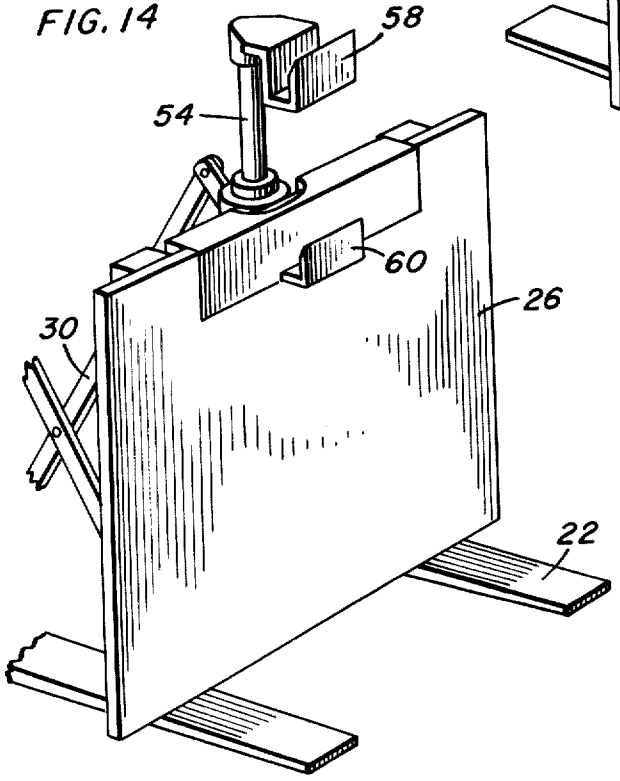


FIG. 14



HANDLING SYSTEM FOR INTERLOCKING COVER BOXES

The present invention generally relates to lift trucks, and is more specifically concerned with the provision of an attachment for the support unit of a lift truck which greatly facilitates the handling of loads, including both the introduction of the load to the support unit and the discharge of the load therefrom.

It is a primary intention of the invention herein to provide a system which constitutes a significant improvement over known systems, particularly those developed in recent years. As examples of the state of the prior art, attention is directed to U.S. Pat. No. 2,993,610 wherein a pantograph controlled push-off plate is provided over the platens or fork members. Another example of prior art activity is U.S. Pat. No. 3,200,978 wherein carton top engaging lift hooks are provided which function so as to constitute the actual lift or support means for the load in conjunction with a back rest support.

Such known systems have, in some instances, been found to be inadequate both from the standpoint of facilitating the loading of cartons and the like, and, in the case of the top supporting hooks, providing adequate support without the introduction of damaging handling stresses to the boxes and/or the contents therein.

In order to overcome the above objections, apparatus has been devised which is particularly adapted to handle interlocking cover or folded cap cartons, or cartons with flaps so folded to provide a lifting lip. Basically, this apparatus includes a horizontally adjustable pusher plate mounted over the platens with the pusher plate including a vertically adjustable load engaging blade mounted thereon. Thus, the pusher plate can be extended outward to the load, the blade adjusted so as to engage beneath the cap, the load, normally a capped carton, tilted slightly upward and slid rearwardly onto the platens after which the blade is slightly retracted downward from its upward lifting position so as to transfer the entire load to the platens for a lifting and transporting of the load, now freely sitting on the platens or forks in an unstressed condition. Upon arrival at the site of discharge, the lifting blade is fully retracted and the positioning plate extended in conjunction with a rearward withdrawal of the platens for a simplified discharge of the carton.

Appropriate variations in the basic concept are also contemplated within the scope of the invention. For example, the gripping blade can be inverted on the positioning plate so as to selectively engage the bottom cap of a carton for a rearward drawing of the carton onto the platens or fork members through a retraction of the positioning plate. By the same token, the gripping blade can be mounted on a vertically extensible mast mounted on the positioning plate so as to accommodate substantial variations in carton heights. Finally, multiple gripping blades can be provided for engaging each of several stacked cartons for a simultaneous movement of the stack as a unit.

The foregoing is considered as illustrative only of the principles of the invention. Further, since numerous modifications and changes will readily occur to those skilled in the art, it is not desired to limit the invention to the exact construction and operation shown and described, and accordingly, all suitable modifications and

equivalents may be resorted to, falling within the scope of the invention.

FIG. **1** is a perspective view of the attachment of the invention mounted on a conventional lift truck;

FIGS. **2** and **3** are extended and retracted sectional details through the gripping blades;

FIGS. **4–11** sequentially illustrate the utilization of the invention;

FIG. **12** illustrates a bottom mounting of the gripping blade;

FIG. **13** illustrates a mast mounted gripping blade; and

FIG. **14** illustrates the use of multiple gripping blades.

Referring now more specifically to the drawings, reference numeral **20** is used to generally designate a conventional lift truck incorporating forwardly extending vertically adjustable support platens or fork members **22.**

The attachment or accessory which comprises the instant invention is generally designated by reference numeral **24** and consists basically of a horizontally adjustable vertically oriented positioning plate **26** overlying the fork members **22** and a vertically adjustable load engaging or gripping blade **28** mounted on the positioning plate **26.**

The positioning panel **26,** which may be solid as illustrated, or of a lighter weight framework construction, is mounted for horizontal adjustment between a forward position overlying the forward edges of the platens **22** and a rear retracted position sufficiently inward so as to appropriately accommodate a load on the platens. This mounting of the positioning plate or panel **26** is, while not limited thereto, preferably effected through the utilization of scissor link lazy tong assemblies or pantograph mechanisms **30.** Two such assemblies will normally be provided with the opposite ends thereof mounted in a manner so as to accommodate the necessary vertical adjustments thereof as the assemblies **30** are extended and retracted. As an example, the end links can be pivotally affixed to collars **32** vertically slidable on support rods **34** affixed to the rear face of the positioning panel **26** and uprights **36** on the front of the lift truck **20.** These uprights **36** can be, as illustrated, mounted on T-brackets **37** extending from the fork carrier **39,** and oriented so as to enable the conventional lateral adjustment of the forks for the accommodation of loads of different width. The pantograph mechanisms **30** are to be actuated for a power extension and retraction by appropriate power means, for example, double acting hydraulic rams **38** supplied and controlled from the conventionally provided hydraulic system on the lift truck itself. It will of course be appreciated that other power means can be utilized to effect a stabilized controlled movement of the positioning panel **26** between the extended and retracted positions thereof.

The load engaging or gripping blade **28** will generally be in the nature of an upwardly directed chisel edged hook positioned just forward of the upper edge of the positioning panel **26** and mounted for vertical adjustment relative thereto in any appropriate manner. As one example, the blade **28** can be provided with a panel edge engaging U-shaped cap **40** which seats over the upper edge of the panel **26** for vertical sliding adjustment thereon through the action of a double acting hydraulic ram **42** affixed to the rear face of the panel **26** with the upwardly projecting rod **44** thereof engaged

with the rear flange of the blade cap **40.** The forward flange of the cap **40** will slide within a recess in the front face of panel **26** so as to provide for a continuous or planar surface. FIGS. **2** and **3** are of particular interest in illustrating the blade **28** in its downward retracted position and in its upward cap engaging extended position. If desired, a greater range of different height cartons can be accommodated by providing a notch in the upper edge of panel **26** to enable a lowering of the blade **28** below that illustrated. Such a notch will be similar to that illustrated in connection with the inverted form of the invention shown in FIG. **12.**

As previously indicated, the load to be handled by the attachment of the instant invention will normally be what is known in the art as an interlocking cover or folded cap carton **46.** In such a carton, the top and bottom caps **48** have the peripheral edges thereof interfolded with the end edges of the box itself with, in most instances, a retaining strap or band **50** locked peripherally thereabout substantially as illustrated in FIGS. **2** and **3.** In this manner, the blade **28** can be slid upwardly between the strap folded cap and edge flange interlock and the body of the box itself. Should the carton be of the type incorporating a flap-formed lifting lip, the blade **28** will similarly engage therebeneath.

It should be appreciated that the function of the load engaging blade **28** is not to elevate and constitute the sole support for the carton **46.** On the contrary, the blade **28,** upon engagement beneath the carton cap **48,** merely upwardly tips the carton sufficiently so as to allow the introduction of the leading or forward ends of the fork members **22** with the blade **28,** through the retracting positioning panel **26,** pulling the carton onto the fork members **22** which in turn will support the load from the bottom thereof in a stable nondamaging manner.

With reference to FIGS. **4** through **11,** the preferred operating sequence of the apparatus of the invention will be noted. Initially, the box or carton **46** is approached and the platen or fork members inclined slightly. The pantograph mechanisms are extended so as to place the positioning panel **26** adjacent the box with the gripping blade **28** immediately below the interlocking cap **48.** The power mechanism associated with the blade **28** is then actuated so as to move the blade upward under the cap into gripping engagement therewith, the lifting movement of the blade continuing until the edge of the box is raised slightly for an accommodation of the leading ends of the fork members **22** without damage to the base or bottom edge of the box. The pantograph mechanisms are then retracted and, through the cap engaged blade, the box or carton is pulled onto the fork members. During the retraction of the pantograph mechanisms, the truck can be maintained stationary or moved forward for a cooperative action with the mechanisms **30.** Once properly positioned on the load supporting fork members, the blade will be slightly lowered or retracted downward so as to shift the entire load to the fork members while still, if so desired, retaining sufficient engagement between the blade and box cap so as to stabilize the load and prevent a shifting of the load on the fork members. The carton can then be elevated on the forks or platens and transported in the conventional manner. When the box is to be unloaded, the positioning panel **26** is extended simultaneously with a backing off of the truck **20.** As the carton moves off the fork members, the leading lower edge thereof rests on the support, for example, a lower previously positioned carton, and the load engaging blade **28** is completely disengaged and the carton smoothly positioned.

In the above described sequence, it will be appreciated that the only lifting effected through the carton cap is a slight raising of one edge of the carton so as to facilitate an introduction of the fork or platen members. The full weight of the elevated carton is supported directly on the fork lift members so as to provide a stable nondamaging support of the carton and its contents.

Several variations are contemplated within the scope of the invention for the accommodation of varying circumstances as might be encountered in the loading of cartons of varying configurations, sizes or the like. With reference to FIG. **12,** the gripping blade **28** can be inverted and mounted on the lower edge of the positioning panel **26** for engagement with the bottom cap of a carton. In this arrangement, it is also contemplated that the blade **28** be sufficiently adjustable so as to engage and disengage with the cap. As illustrated, the lower edge of panel **26** may be notched so as to allow greater upward movement of the blade **28** should this be necessary for the proper engagement and disengagement of the blade **28.** It will be appreciated that, in the inverted position, the gripping blade **28** will provide no lifting function, but merely act as a means so as to engage the carton and rearwardly draw the carton onto the platen or fork members upon a retraction of the pantograph controlled positioning panel **26.**

FIG. **13** illustrates a variation wherein the upwardly directed gripping blade, herein referred to by reference numeral **52,** is mounted on a vertically extensible mast **54** affixed to the positioning panel **26** and controlled for vertical adjustment relative thereto in any appropriate manner, such as through the utilization of a hydraulic unit **56.** The provision of the gripping or load engaging blade **52** on an extensible mast **54** enables the accommodation of cartons of differing heights, the mast merely bringing the gripping blade **52** up to the height required so as to engage beneath the top cap of the carton involved regardless of the height thereof. The apparatus functions in the manner of the basic apparatus insofar as the loading and unloading procedures are concerned.

Finally, FIG. **14** illustrates the concept of utilizing multiple gripping blades **58** and **60** mounted in vertically spaced relation to each other for individual vertical adjustment in any appropriate manner for the accommodation of superimposed loads, for example both upper and lower stacked cartons as illustrated in FIG. **11.** In other words, the upper gripping blade **58** will engage the top cap of the upper carton while the lower gripping blade **60** will engage the top cap of the lower carton. In this manner, both cartons can be simultaneously stabilized and moved onto and off of the fork members as a single unit. While only two vertically aligned gripping blades **58** and **60** have been illustrated in FIG. **14,** it will be appreciated that this basic concept can be extended so as to provide for any reasonable number of vertically spaced blades for the accommodation of an equal number of superimposed cartons or the like.

From the foregoing, it should be appreciated that a unique system has been devised for use in the loading and unloading of capped cartons or cartons having

flap-formed lips, onto and off of lift truck fork members in a manner which specifically avoids damage to either the carton or its contents with the carton, when loaded, being bottom supported in a stable manner directly on the load supporting fork members or platens.

I claim:

1. Load handling apparatus for a vertically adjustable lift truck support unit including a rear truck engaging portion and horizontal support means projecting forwardly therefrom and terminating in a forward edge selectively introducible beneath a load to be supported; said apparatus comprising a positioning panel overlying said horizontal support means and projecting vertically thereabove; means mounting said positioning panel for horizontal movement over said support means between a first forward position adjacent the forward edge and a second position sufficiently rearward of the forward edge to accomodate a load on the horizontal support means between the positioning panel and the forward edge; power means for effecting movement of the positioning panel between the first and second positions thereof; load engaging means on said positioning panel selectively engageable with a load for a controlled movement of a load with the positioning panel relative to the horizontal support means; means for effecting a vertical adjustment of the load engaging means relative to the positioning panel; and said load engaging means having an upwardly directed blade engageable beneath a top cap upon vertical adjustment of said blade whereby the carton can be both gripped and upwardly tipped and the load can be selectively drawn onto and pushed from the support means.

2. The apparatus of claim 1 including a vertically extensible mast mounted on said positioning panel, said blade being mounted on said mast for vertical adjustment therewith for the accommodation of cartons of varying heights.

3. The apparatus of claim 1 including a second upwardly directed blade mounted on said positioning panel in vertically spaced relation to said first mentioned blade for the accommodation of a second carton in stacked relation to a first carton engageable by the first mentioned blade.

4. Load handling apparatus for a vertically adjustable lift truck support unit including a rear truck engaging portion and horizontal support means projecting forwardly therefrom and terminating in a forward edge selectively introducible beneath a load to be supported; said apparatus comprising a positioning panel overlying said horizontal support means and projecting vertically thereabove; means mounting said positioning panel for horizontal movement over said support means between a first forward position adjacent the forward edge and a second position sufficiently rearward of the forward edge to accommodate a load on the horizontal support means between the positioning panel and the forward edge; power means for effecting movement of the positioning panel between the first and second positions thereof; load engaging means on said positioning panel selectively engageable with a load for a controlled movement of a load with the positioning panel relative to the horizontal support means; means for effecting a vertical adjustment of the load engaging means relative to the postioning panel; and said load engaging means having a downwardly directed blade engageable with a bottom cap to permit a carton to be gripped and laterally moved in conjunction with the movement of the positioning panel, whereby the load can be selectively drawn onto and pushed from the support means.

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