Oct. 5, 1965 W. B. CRANE 3,209,705

SPACING AND REINFORCING UNIT FOR USE IN LOADING CRUSHABLE CONTAINERS IN CARGO CARRIERS

Original Filed March 28, 1960 2 Sheets-Sheet 1

Fig. 1

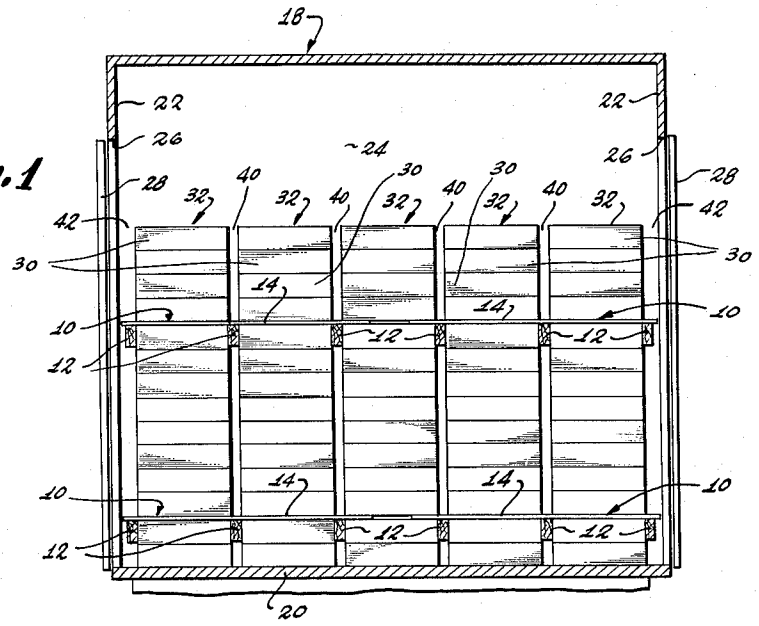
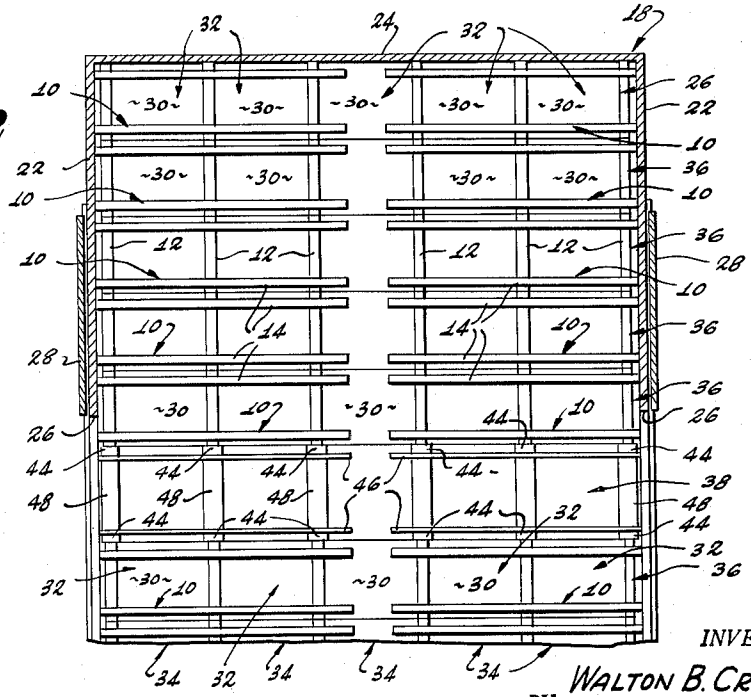


Fig. 2



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Fig. 3

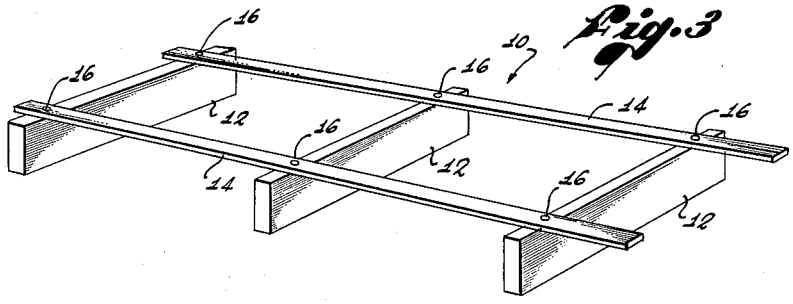


Fig. 4

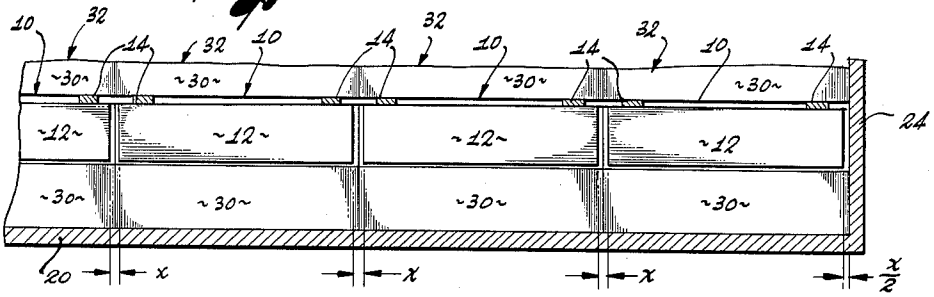


Fig. 5

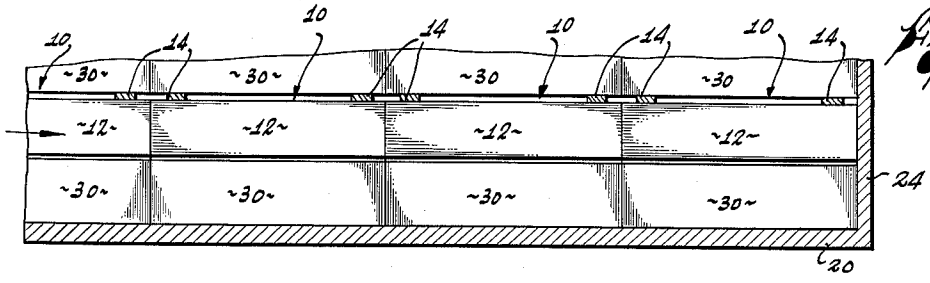
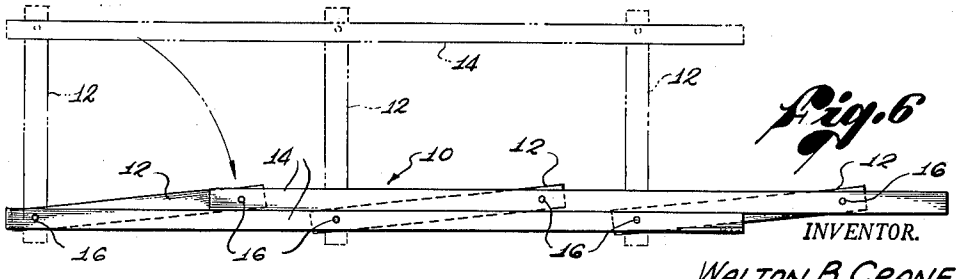


Fig. 6



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SPACING AND REINFORCING UNIT FOR USE IN LOADING CRUSHABLE CONTAINERS IN CARGO CARRIERS

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Continuation of application Ser. No. 18,122, Mar. 28, 1960. This application Aug. 6, 1962, Ser. No. 215,199
1 Claim. (Cl. 105—369)

This application is a continuation of my copending application Serial No. 18,122 filed March 28, 1960, now abandoned, and entitled Box Spacing Unit.

This invention deals generally with the loading of crushable containers for shipment in cargo carriers, such as railroad cars and the like, and particularly with a spacing and reinforcing unit for spacing and reinforcing such containers against crushing and collapse by the compacting forces exerted thereon at the time of loading as well as in transit.

The invention is primarily concerned with the loading of one particular type of crushable container, namely, cardboard containers of the kind which are commonly used to ship grapes and other articles of produce. Briefly, these produce containers consist of flat, rectangular box structures which are handled in stacked pairs. The two containers of each pair are interconnected by wire couplers which prevent relative shifting of the pairs of containers. For purposes of shipment in a cargo carrier, several of these stacked pairs of produce containers are placed one on top of the other in a plurality of vertical columns on the floor of the cargo carrier. The final container stack consists of several of these container columns arranged in rows extending in the fore and aft direction and crosswise direction of the carrier.

When loading produce containers of this kind for shipment in a railroad freight car, for example, the containers are stacked from the two ends of the car toward the center in such a way as to leave a space at the center of the car. After loading is completed, load compacting means, such as a hydraulic expander, is placed in this center space and expanded to force the containers toward the end walls of the car. The compacting force thus exerted on the containers closes any gaps existing between adjacent container columns which would permit the columns, as well as the individual containers therein, to shift about in transit. The load compacting means is either left in place or removed and replaced by suitable braces which retain the compacting force on the containers in transit.

The forces which must be applied to the containers to initially compact them and subsequently maintain them in their tightly compacted condition in transit must be substantial to resist the numerous impacts which occur during transit as a result of "humping" of the railroad car, for example. In the past, it was often impossible to properly compact crushable containers and maintain them in a tightly compacted condition during shipment because the force required for this purpose frequently caused crushing of some of the containers. This crushing of the containers, of course, damaged the container contents. More important, however, was the fact that improper initial compacting and/or crushing of the containers created gaps in the container stack which permitted the containers to shift about, and thereby encounter additional damage, in transit. Thus, during the impacts which normally occur in transit, the entire mass of a group of containers frequently shifted against and crushed other containers.

A general object of the present invention is to provide a container spacing and reinforcing unit for use in loading crushable containers for shipment in cargo carriers which obviates the above problems.

A more specific object of the invention is to provide a spacing unit which reinforces crushable containers stacked in a cargo carrier in such a way as to permit compacting forces of sufficient magnitude to be applied to the containers to maintain the latter in tightly compacted condition during transit and resist the impacts encountered in transit.

Another object of the invention is to provide a spacing unit of the character described which provides rigid force transmitting members that carry the compacting forces directly to the end walls of the cargo carrier so that compacting forces of appreciable magnitude may be applied without crushing the containers.

A further object of the invention is to provide a spacing unit of the character described which spaces the containers for ventilation purposes.

Yet a further object of the invention is to provide a spacing unit of the character described which is simple in construction, inexpensive to manufacture, collapsible for convenient storage, easy to use, and otherwise ideally suited to its intended purposes.

Other objects, advantages, and features of the invention will become readily apparent as the description proceeds.

Briefly, the objects of the invention are attained by providing a spacing unit equipped with at least two parallel, longitudinally rigid spacer bars joined by thin connecting means, such as connecting strips. When loading crushable containers into a cargo carrier, the spacing units are placed on the containers in such a way that the spacer bars of the units straddle the containers in the transverse direction of the carrier and extend lengthwise of the carrier between adjacent columns of containers, whereby to space said adjacent columns for ventilation purposes. These spacer bars have a length which is slightly less than the dimension of a container in the endwise direction of the carrier.

The spacing units are placed at one or more levels in the container stack in such a way that when the stack is compacted by forcing it against an end wall of the carrier, the spacer bars of the spacing units at each level are forced into end-to-end abutment, thereby forming rigid force transmitting members which carry the compacting force directly to the end wall of the cargo carrier. During this compacting of the container stack, each container is compressed slightly by an amount equal to the difference between the length of the spacer bars and the corresponding dimension of the containers. In this way, a very large compacting force can be applied to the container stack to prevent shifting of the containers about in transit while the individual containers are compressed by a controlled amount just sufficient to maintain them in a tightly compacted condition without crushing.

A better understanding of the invention may be had from the following detailed description thereof taken in connection with the annexed drawings, wherein:

FIG. 1 is a vertical section through a cargo carrier which is loaded with a cargo of cardboard produce containers which are reinforced against crushing by means of the spacing unit of this invention;

FIG. 2 is a horizontal section through the cargo carrier of FIG. 1;

FIG. 3 is an enlarged perspective view of a presently preferred form of the present spacing unit;

FIG. 4 is an enlarged section through a portion of the cargo carrier of FIGS. 1 and 2 prior to compacting of the cargo;

FIG. 5 is a view similar to FIG. 4 but after compacting of the cargo; and

FIG. 6 illustrates the manner in which the present spacing unit is collapsible for convenient storage.

Reference is made first to FIG. 3 illustrating one of the present spacing units. The spacing unit, designated in its entirety by the numeral **10**, will be seen to be composed of a series of two or more parallel spacer bars **12**. These spacer bars may comprise wooden blocks, for example, such as short pieces of two-by-four lumber.

Spacer bars **12** are interconnected by connecting means shown as comprising two thin strips **14** of wood or other suitable material. The strips are preferably attached to the bars **12** by single fasteners **16**, such as screws or nails. This permits the spacing unit to be folded or collapsed when not in use, as indicated in FIG. 4, for convenience of storage. The left-hand ends of strips **14**, as the spacing unit is viewed in FIG. 3, extend a distance beyond the left-hand bar **12**. The right-hand ends of the strips extend beyond the right-hand bar **12** a distance which is slightly less than one-half the spacing between adjacent bars **12**.

The spacing unit described above is used as follows: In FIGS. 1 and 2, the numeral **18** denotes a cargo carrier, such as a railroad freight car. This cargo carrier is equipped in the usual way with a floor **20**, side walls **22** and end walls **24**. The side walls have access openings **26** to permit loading and unloading of the carrier. Doors **28** are provided to close the openings **26** in transit.

The numerals **30** denote the crushable containers to be shipped which are shown to be cardboard produce containers. These containers are stacked in a series of vertical columns **32** on the floor **20** of the cargo carrier. The columns **32**, in turn, are arranged in longitudinal rows **34** which extend in the fore and aft direction of the cargo carrier and transverse rows **36** which extend in the crosswise direction of the carrier. When loading a center access carrier, such as a railroad freight car, a space **38** is usually left at the center of the car between the two inner transverse rows **36** of container columns. In the finally loaded cargo carrier, then, there are, in effect, two separate container stacks, one at each end of the car.

During loading of the cargo carrier, the present spacing units **10** are placed across the tops of containers **30** in each of the transverse rows **36** of columns at one or more levels in the container stack. In the drawings, for example, spacing units **10** are shown as being placed at two different levels in the stack. The spacing units are, therefore, located at the same levels in the several transverse rows **36** so that the spacer bars **12** on the spacing units at each level in each longitudinal row **34** are longitudinally aligned. The reason for this will be explained shortly.

The spacing between adjacent spacer bars **12** of each spacing unit is just slightly greater than the dimension of each container **30** measured lengthwise of the transverse rows **36** so that the containers will have a snug fit between the bars. The length of the spacer bars **12** on the spacing units is slightly less than the dimension of each container **30** measured in the lengthwise direction of the longitudinal rows **34**.

It will be observed that when the spacing units **10** are properly positioned in the stack of containers **30**, the spacer bars **12** of the units engage between adjacent columns **32** in each transverse row **36** to space the adjacent columns. Ventilation spaces **40** are thereby provided between the columns. The connecting strips **14** of the spacing units extend across and rest on the tops of the containers **30** directly below the units, as shown. The spacing units in each of the transverse rows **36** are placed in reverse fashion so that the longer projecting ends of the strips **14**, that is to say, the right-hand ends of the strips as the spacing unit is viewed in FIG. 3, extend part way across a common container **30** in the center column **32** of their respective transverse row **36**. These inner ends of the strips on each pair of spacing units are slightly spaced, as shown. The outer ends of the strips **14** on each pair of spacing units engage the side walls **22** of the carrier to space the adjacent container columns **32** from the side walls. Ventilation spaces **42** are thereby also provided between the outer columns **32** and the side walls **22** of the cargo carrier.

After loading of the cargo carrier has been completed, the container stack at each end of the cargo carrier is compacted. This may be accomplished in various ways. In most cases, however, the container stacks are compacted as follows: Braces **44**, interconnected by strips **46**, are placed against and preferably secured to the inner ends of the spacer bars **12** on the spacing units **10** in the two inner transverse rows **36** of container columns **32**. The width of these braces is somewhat greater than the width of the spacer bars **12** so that the braces overlap the containers **30**, as shown.

Some type of load compacting means (not shown), such as a hydraulic expander, is then placed in the space **38**. This expander engages the braces **44** and is expanded to force the containers at the two ends of the cargo carrier toward the end walls **24** of the carrier so as to longitudinally compress or compact the longitudinal rows **34** of containers. Any gaps or spaces that exist in these longitudinal rows are thereby closed to prevent shifting of the containers **30** in transit.

During this compacting of the load, the longitudinally aligned spacer bars **12** on the spacing units **10** are eventually forced into endwise abutment with one another and with the end walls of the cargo carrier, as illustrated in FIG. 5. When the load is fully compacted, therefore, the longitudinally aligned spacer bars **12** abut to form, in effect, a plurality of rigid force transmitting members which engage the end walls of the car at one end and the center braces or expander at the other end. These members, therefore, carry the compacting force exerted initially by the load compacting means and later in transit by cross braces **48**, as explained shortly, directly to the carrier end walls. As a result, a large compacting force, sufficient, for example, to initially properly compact the containers and then retain the containers in tightly compacted condition in transit, may be applied to the containers **30** without crushing them. In this latter connection, attention is directed to FIG. 4 in which a spacing X will be seen to exist between adjacent spacer bars **12** of the spacing units **10** prior to compacting of the containers **30**. This spacing exists, of course, by virtue of the fact that the length of the spacer bars is slightly less than the corresponding dimension of the containers.

When the containers are compacted, therefore, each container is compressed or squeezed by an amount equal to the dimension X before the spacer bars **12** abut. This controlled compression of the containers urges the latter together with just sufficient force to retain them in tightly compacted condition in transit. After the spacer bars **12** of the spacing units **10** abut one another, further compression of the containers is prevented. As a result, crushing of the containers is prevented even though the final compacting force which is exerted by the hydraulic expander or other load compacting means is large.

After the load has been compacted in this way, the expander may be left in place or removed from the space **38** and replaced by the cross braces **48** which are wedged between the braces **44** to retain the large compacting force on the containers in transit.

It is obvious, therefore, that the spacing unit disclosed herein is fully capable of attaining the several objects and advantages preliminarily set forth.

What is claimed is:

In combination:

a cargo carrier having a floor, side walls, and end walls,

a cargo supported on said floor including a multiplicity of substantially identical compressible containers stacked one on top of the other in a number of vertical columns,

said columns being arranged in transverse rows extending crosswise of said carrier and in longitudinal rows extending lengthwise of said carrier,

the adjacent containers at each level in each of said longitudinal rows being disposed in end-to-end contact,

each of said longitudinal rows being a given number of said containers in length,

spacing units disposed at a given level in said cargo including a plurality of longitudinally rigid spacer bars extending lengthwise of said longitudinal rows and located between adjacent longitudinal rows to space said adjacent longitudinal rows and equal in number to said given number,

the spacer bars between each pair of adjacent longitudinal rows being longitudinally aligned lengthwise of said longitudinal rows in direct end-to-end abutment with each other and constituting a group of aligned spacer bars, each being adjacent one of said containers, means holding said spacer bars in said aligned condition,

one of said tranverse rows of containers being exposed and one end of one spacer bar in each said spacer bar group being exposed at said one transverse row, and means applying a compacting force to the containers in said one transverse row and to said exposed spacer bar ends for urging said containers and said spacer bars lengthwise of said longitudinal rows and toward one end wall of said carrier, thereby to hold said containers compressed, and

the length of each spacer bar in each of said spacer bar groups being less, by a predetermined amount, than the uncompressed length of its corresponding container, measured lengthwise of said longitudinal rows, whereby said groups of aligned spacer bars limit the compression of said containers to said predetermined amount.

References Cited by the Examiner

UNITED STATES PATENTS

1,833,016	11/31	Chandler	105—369
2,341,088	2/44	Ellis	105—367
2,424,768	7/47	Nalbandian	105—369
2,894,461	7/59	Nagler	105—367

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