Jan. 15, 1963 R. L. DAVIS ETAL 3,073,431

MULTIPLE UNITIZER

Filed Nov. 7, 1960

4 Sheets-Sheet 1

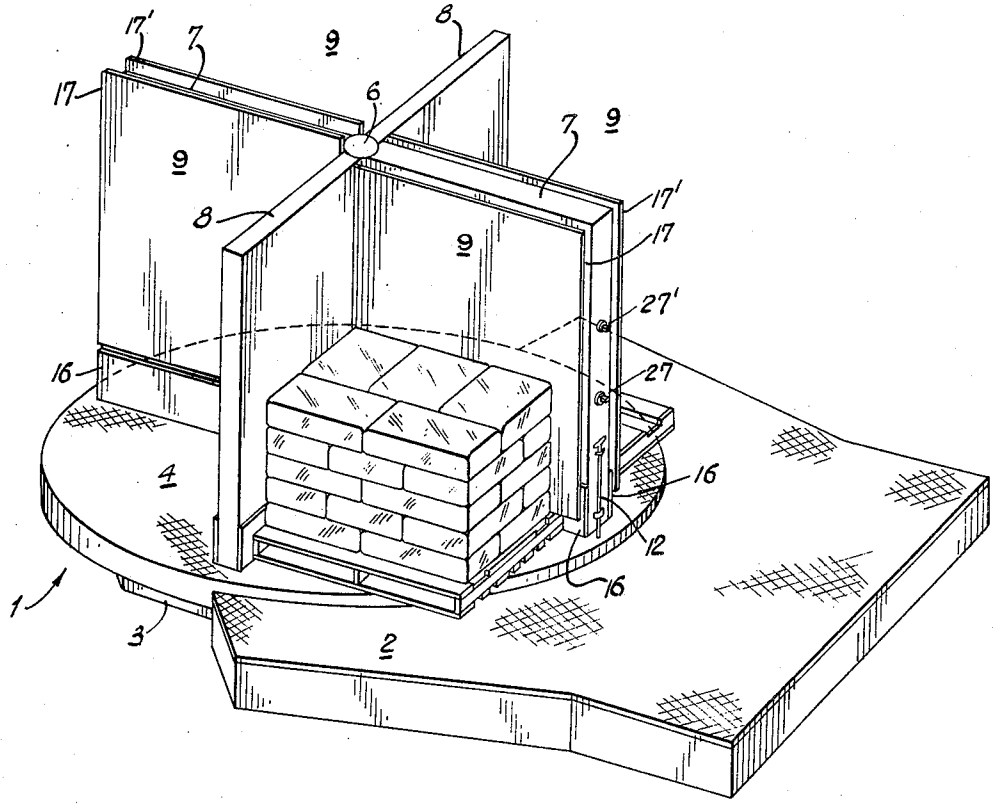

Fig. 1.

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4 Sheets-Sheet 2

Fig. 2.

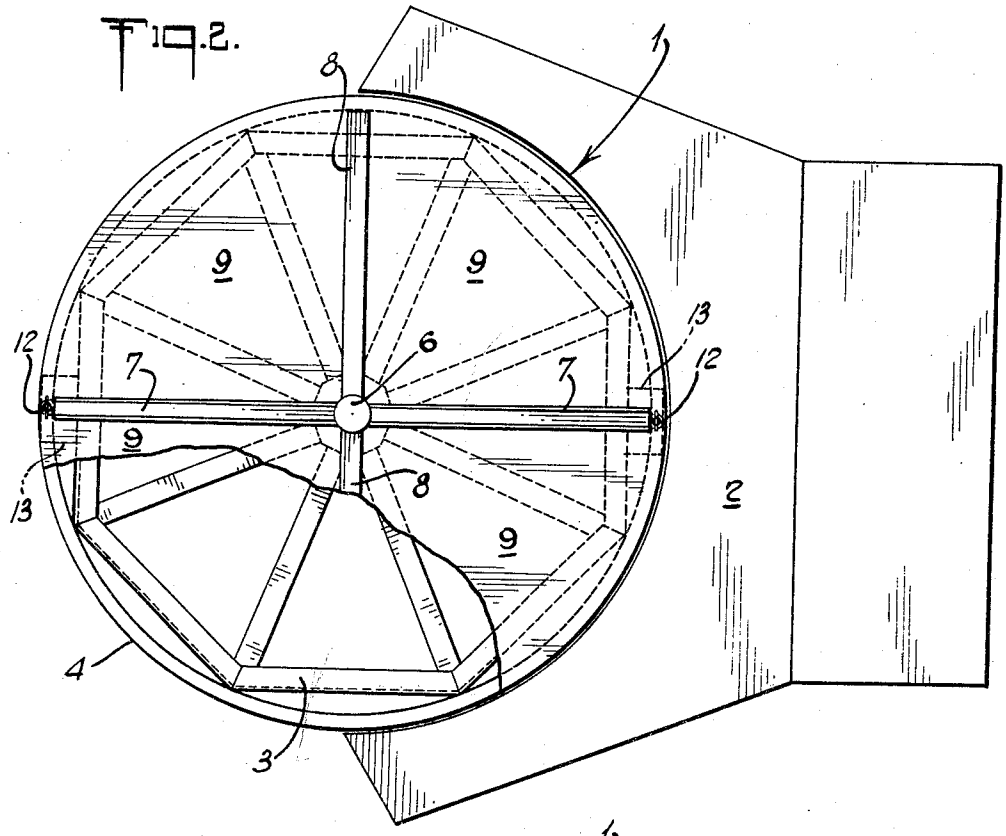
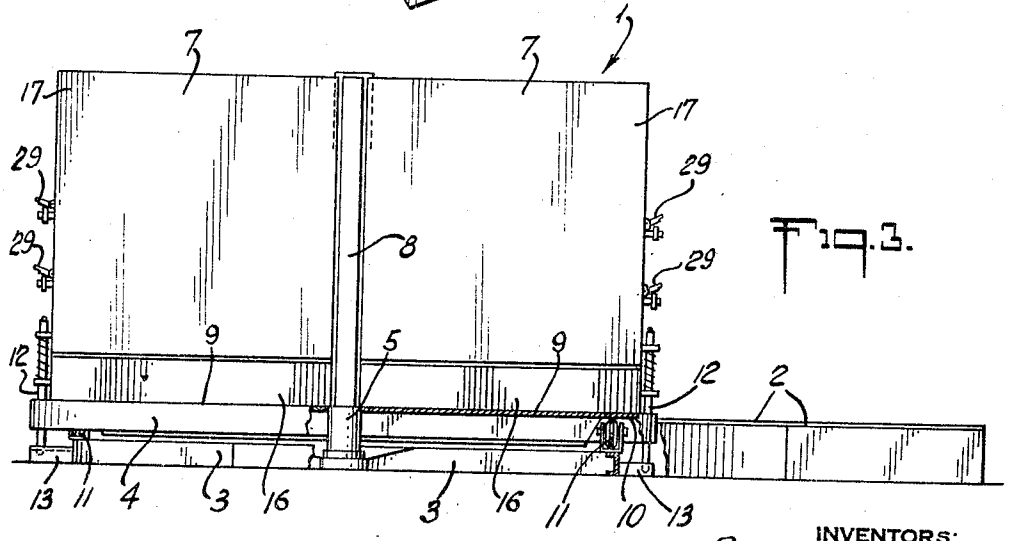


Fig. 3.



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Filed Nov. 7, 1960 4 Sheets-Sheet 3

FIG. 4.

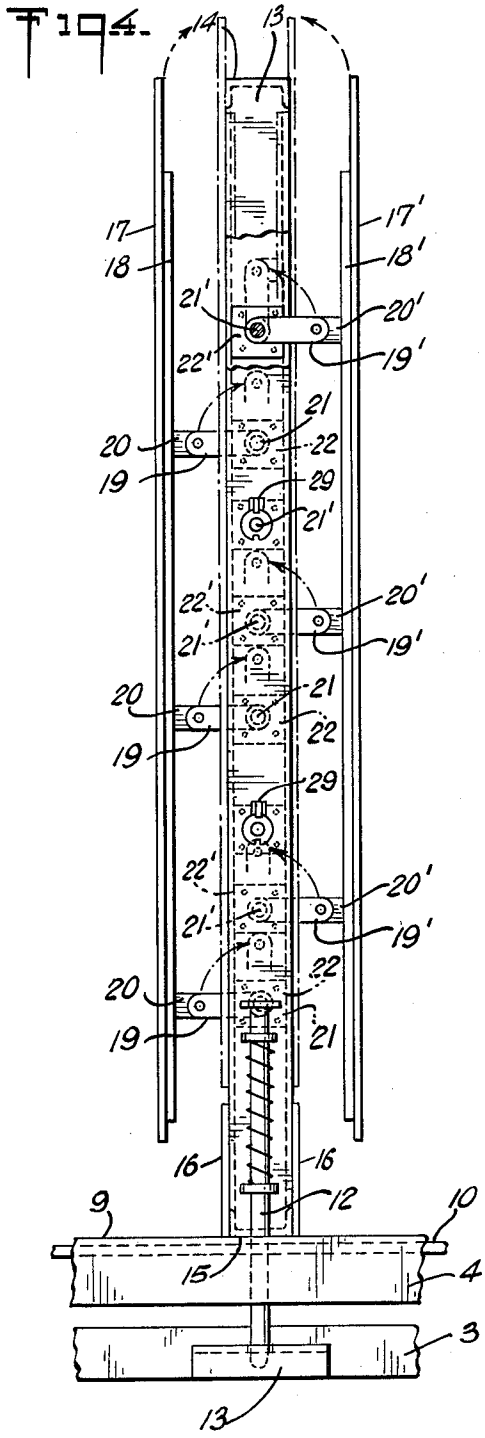


FIG. 6.

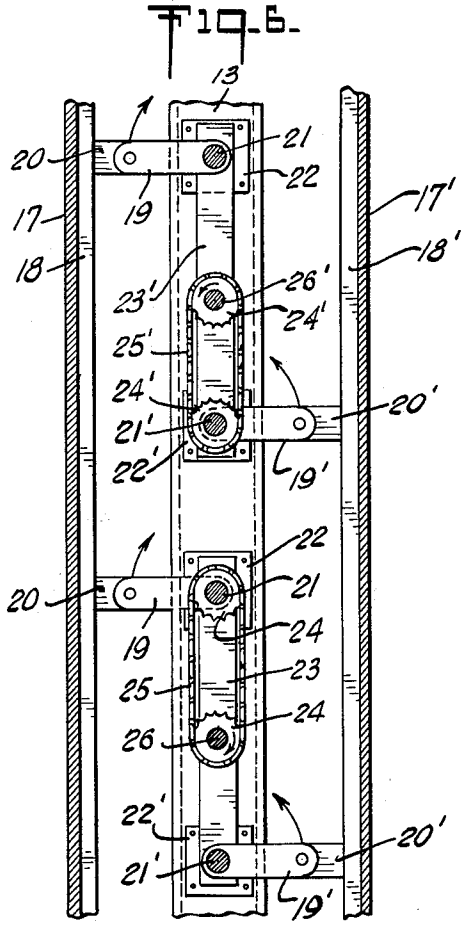
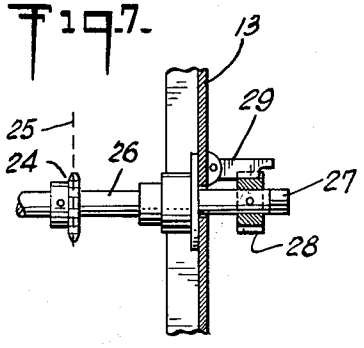


FIG. 7.



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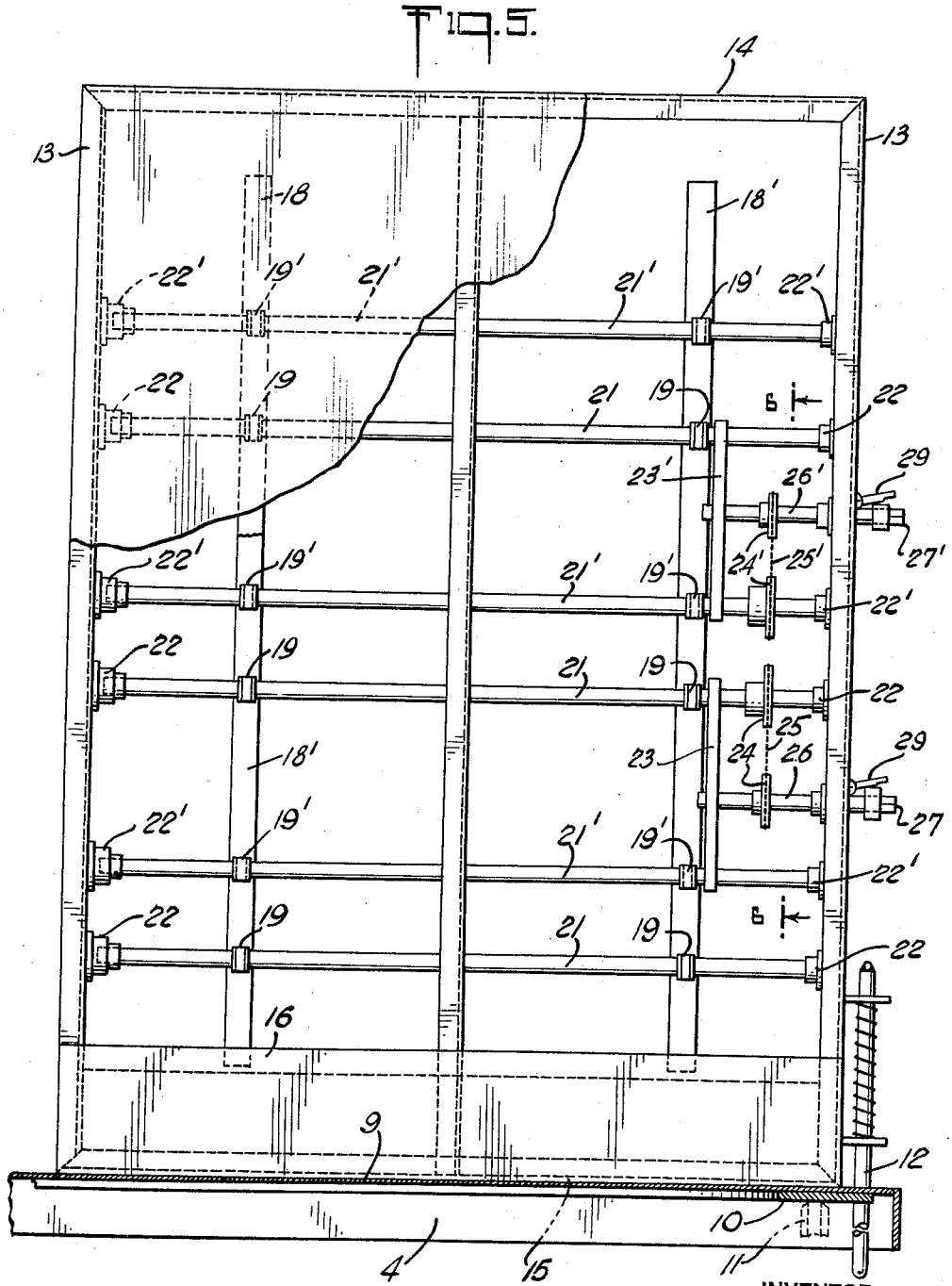
4 Sheets-Sheet 4

FIG. 5.



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3,073,431
MULTIPLE UNITIZER

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3 Claims. (Cl. 198—209)

This invention relates to the formation of bag goods into units for storage and/or shipment. More particularly, it relates to a multiple unitizing device which permits the formation of several units simultaneously while, at the same time, permitting previously finished units to be removed from the device.

In many industries involving finely divided materials such as carbon black, sugar, salt, cement, flour, grain, chemicals including fertilizers, and the like, the product is often bagged for storage and/or shipment. To facilitate movement of the bags from one point to another, it is common practice to form them into units comprising a plurality of bags which may be readily conveyed from place to place by means such as a fork lift truck. Such units are formed upon a wooden base or pallet by erecting a plurality of layers of bags, certain of the bags in each layer being arranged at right angles to the remaining bags, the arrangement in each higher layer being reversed from the arrangement in the layer beneath it. Heretofor, a usual method of forming such units has been to place a wooden pallet between two stationary walls, upon which is constructed the bag unit. The unit, upon completion, is rolled away from the walls while on its pallet to be picked up by a fork lift truck. This permits the unit forming walls to be used to prepare another unit. The disadvantages to the use of such an arrangement in an otherwise highly mechanized installation are obvious.

There has remained, therefore, a need for an improved device for the unitizing of bagged materials. It is a principal object of this invention to provide such a device. It is a further object of this invention to provide a device that is not subject to the disadvantages of prior means of unitizing. It is a still further object of this invention to provide a device which permits multiple unitizing. An additional object is to provide a device that is simple in construction, efficient and economical in operation, and which requires little if any supervision of its operators.

In accordance with this invention, these objects have been met in a simple yet surprisingly effective manner. In general, the multiple unitizing device of this invention comprises a platform suitably mounted upon a fixed base to permit rotation about a centrally located axis. The surface of the platform is subdivided by radially extending partitions whereby a plurality of compartments are formed each provided with two walls forming a 90° angle. In operation of the device, several bag units are formed simultaneously at a unitizing station, one in each of several compartments. At the same time, previously completed units, one in each of the several remaining compartments, are unloaded at an unloading station as by a fork lift truck. On completion of these two operations, the platform is rotated to bring the empty compartments to the unitizing station and the loaded compartments to the unloading station at which points the same operations previously performed are repeated.

The unitizer of this invention may be further understood by reference to the attached drawing in which:

FIGURE 1 shows a perspective view of the multiple unitizer;

FIGURE 2 is a plan view of the multiple unitizer;

FIGURE 3 is a side view of the multiple unitizer;

FIGURE 4 is an end view of one of the adjustable partitions;

FIGURE 5 is a side view of one of the adjustable partitions;

FIGURE 6 is a section taken on line 6—6 of FIGURE 5; and

FIGURE 7 is a detailed view of the unitizer locking means.

Referring to FIGURE 1, the multiple unitizer is shown in perspective clearly illustrating the base, platform and dividing partitions as well as the manner in which bag goods are loaded upon wooden pallets in each compartment to form multi-bag units. As shown therein and more particularly in FIGURES 2 and 3, reference numeral 1 indicates the unitizer in general partially surrounded by a unitizing platform 2 in association with a bag conveying system not shown. The unitizer comprises a base 3 which may be of any suitable material and structural design capable of supporting the platform 4 when fully loaded with bagged goods. The shapes of base 3 and platform 4 may vary but are preferably of generally circular shape, although it is conceivable to employ other configurations. Carried by base 3 is a bearing 5 of a design suitable to carry and permit rotation of vertical shaft 6 to which is secured platform 4 by welding or other means. Also appropriately secured to shaft 6 are vertical partitions 7 and 8, the former having adjustable side panels, subsequently described, which divide platform 4 into four unitizing compartments 9.

Provided above the base on the under side of platform 4 near its periphery is a circular track 10 adapted to engage a plurality of rollers 11 appropriately spaced about and carried on base 3. To minimize binding of the rollers when platform 4 carries several bag units, the platform is carried sufficiently high on shaft 6 so that when it is unloaded, track 10 does not quite engage rollers 11. Thus, when loaded, the weight of the load will be sufficient to engage track 10 with rollers 11, but not so as to impede rotation of platform 4. Rotation of platform 4 may be carried out by any means, not illustrated, such as any suitable electrical drive means. Carried by the ends of partitions 7 are spring actuated locking pins 12, more fully shown in FIGURES 4 and 5, which engage locking slots 13 to lock platform 4 to base 3 when loading and unloading compartments 9. Although shown only on partitions 7, pins 12 may also be provided on the ends of partitions 8, if desired.

From the above description, it is believed that the operation of the unitizer is apparent. Locking slots 13 are so positioned that when platform 4 is locked in place, one of the partitions 7 is centrally located with respect to loading platform 2. Bags conveyed to the platform from the bag feeding and conveying system are then loaded into the adjacent compartments 9 and units built up on wooden pallets by squaring successive layers of bags within the two right angles formed by the junction of partitions 7 with partition 8. Upon completion of the units, the pins 12 are released to unlock the platform 4 and the platform rotated 180° to bring the remaining empty compartments 9 into position at the loading platform. Platform 4 is relocked and new bag units formed on pallets in the two empty compartments adjacent the loading platform 2 while the units previously formed are unloaded from the other compartments as by fork lift for conveyance to storage or shipment.

The multiple unitizer of this invention may be employed with pallets and bag units of various dimensions, a typical pallet and bag unit being illustrated in FIGURE 1. As shown therein, the pallet is substantially square while the bag unit built thereon is rectangular, its longer dimension

approximating the linear dimension of the pallet while its other dimension is shorter than the pallet dimension. The particular pallet illustrated, moreover, serves a dual function in that it is so constructed as to permit its being carried with the unit or left behind depending upon how the unit is built thereon. While FIGURE 1 illustrates a unit prepared for fork pickup by its shorter side leaving the pallet, fork pickup by the shorter side taking the pallet is readily accomplished merely by turning the pallet 90° prior to building the unit thereon. Preparation of units for pickup by its long side with or without the pallet is accomplished in a similar manner.

The multiple unitizer of this invention is adapted for building units for pickup, with or without the pallet, by the long side for box car loading or by the short side for van loading. Preparing a unit on a pallet in the unitizer for pickup by its long side presents no problem since its longer dimension approximates the linear dimension of the pallet and thus a balanced load for fork pickup naturally results when the pallet and unit and squared against the right angled walls. Fork pickup by the short side using the same pallet, however, presents a problem, since a balanced load will not result when the pallet and unit are squared against the right angled walls because the short dimension of the unit is shorter than the linear dimension of the pallet. According to the present invention, this problem has been overcome while permitting the use of the same pallet for preparation of units for pickup by either side by providing partitions **7** of the multiple unitizer with extendable side units.

Partitions **7** are shown in more detail in FIGURES 4–7, the side panels of the partitions being illustrated in their extended position in FIGURES 4 and 6. As depicted in FIGURES 4–7, each partition **7** comprises a supporting framework formed by end plates **13** and top and bottom plates **14** and **15**, the framework being securely connected at one end to shaft **6** and by its bottom to platform **4**. Extending along the bottom of the framework between end plates **13** are abbreviated fixed side plates **16**. Reference numerals **17** and **17'** indicate left and right adjustable side panels, respectively, each of which is provided with a series of vertical bars **18** and **18'** by which it is operatively connected to the framework. Referring specifically to left panel **17**, a plurality of linkages **19** are pivotally connected at one end to projections **20** of bars **18** in a manner to permit movement about the pivot through 90 degrees. The opposite ends of linkages **19** are connected to shafts **21** seated in bearings **22** in end plates **13**. One shaft **21**, referred to herein as the operative shaft, is operatively connected through stub shaft bearing **23**, sprockets **24** and roller chain **25** to drive shaft **26** provided with suitable driving means, not shown, and a locking means **27**, shown in more detail in FIGURE 7 to comprise a locking collar **28** and a locking arm **29**. Side panel **17'** is similarly operatively connected through linkages **19'**, projections **20'**, shafts **21'**, stub shaft bearing **23'**, sprockets **24'** and roller chain **25'** to drive shaft **26'**.

The operation and use of the panels is believed apparent. In their extended position as illustrated in FIGURES 1 and 4, the wooden pallet in each of two compartments **9** extends beneath side panels **17** and **17'** against abbreviated side panels **16**. When bags are loaded upon the pallet, however, they will abut and be squared off in the right angles formed by **17**, **17'** and partitions **8**. Extension of panels **17** and **17'**, therefore, results in the proper location of the unit for pickup by its shorter side. Thus, when the fork tines are inserted in the openings provided in the pallet, an evenly balanced load is obtained. As shown in FIGURE 1, the unit is picked up free of the pallet. To pick up the pallet with the unit, it is merely necessary to turn the pallet 90 degrees prior to preparing the unit. In this case, however, the side panel must be retracted to permit raising of the pallet and the unit by the fork lift. To provide a unit for pickup by its longer side, panels **17** and **17'** are retracted by rotating shafts **26** and **26'**, the motion being transmitted to the panels through sprockets **24** and **24'**, roller chains **25** and **25'** and the operative shafts **21** and **21'**. The remaining shafts **21** and **21'** are free and act as follower guides. Panels **17** and **17'** in their retracted positions are aligned with panels **16** so that the pallets and the bags packed thereon will be flush with panels **17** and **17'**. The units thus formed will also be properly positioned on the pallet, permitting insertion of the fork tines in the openings provided to give balanced loads when picked up by their longer sides. As previously described, whether the pallet is picked up or left will depend upon its position in the unitizer when the unit is built.

We claim:

1. A unitizing device for simultaneously erecting upon pallets several units each of which comprises several superimposed layers each of which, in turn, comprises a plurality of sub units, which comprises: a base; a shaft associated with said base having its longitudinal axis at right angles to the horizontal plane thereof, said shaft being free to rotate about its longitudinal axis; a plurality of roller bearings associated with said base and situated in a horizontal plane about said shaft at a fixed radius therefrom; a rotatable horizontal platform carried at its center by said shaft and positioned above said base, said platform being provided on its under side with a bearing track to engage said roller bearings; means for locking said platform in a pre-selected position; a plurality of partitions of substantially identical length and height extending outwardly from said shaft toward the edge of said platform and upwardly from said platform dividing said platform into a plurality of compartments each of which comprises two partitions having an included right angle, every other of said partitions being provided with extendable side panels; and means associated with each of said last mentioned partitions for extending and retracting said side panels in such a manner that each of said compartments always contains a right angle.

2. A device according to claim 1 in which every other of said partitions comprises bottom, end and top plates forming a partition framework, said framework being secured by one end plate to said shaft and by its bottom plate to said platform; fixed side plates of abbreviated height extending between said end plates; said extendable side panels being situated above said fixed side plates and extending between said end plates.

3. A device according to claim 2 in which said means for extending and retracting each of said side panels comprises a plurality of linkages pivoted at one end to said side panel, the other ends of which are connected to a rotatable shaft.

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