

[54] **UNITIZED PALLETLESS LOAD**  
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[52] U.S. Cl. .... **206/65 S, 53/30, 206/45.33, 214/10.5 R, 229/DIG. 12**  
 [51] Int. Cl. ... **B65d 65/20, B65d 71/00, B65d 85/62**  
 [58] Field of Search .. **206/65 S, 65 B, 45.33; 53/30, 53/184; 229/DIG. 12, 87 R; 214/10.5 R**

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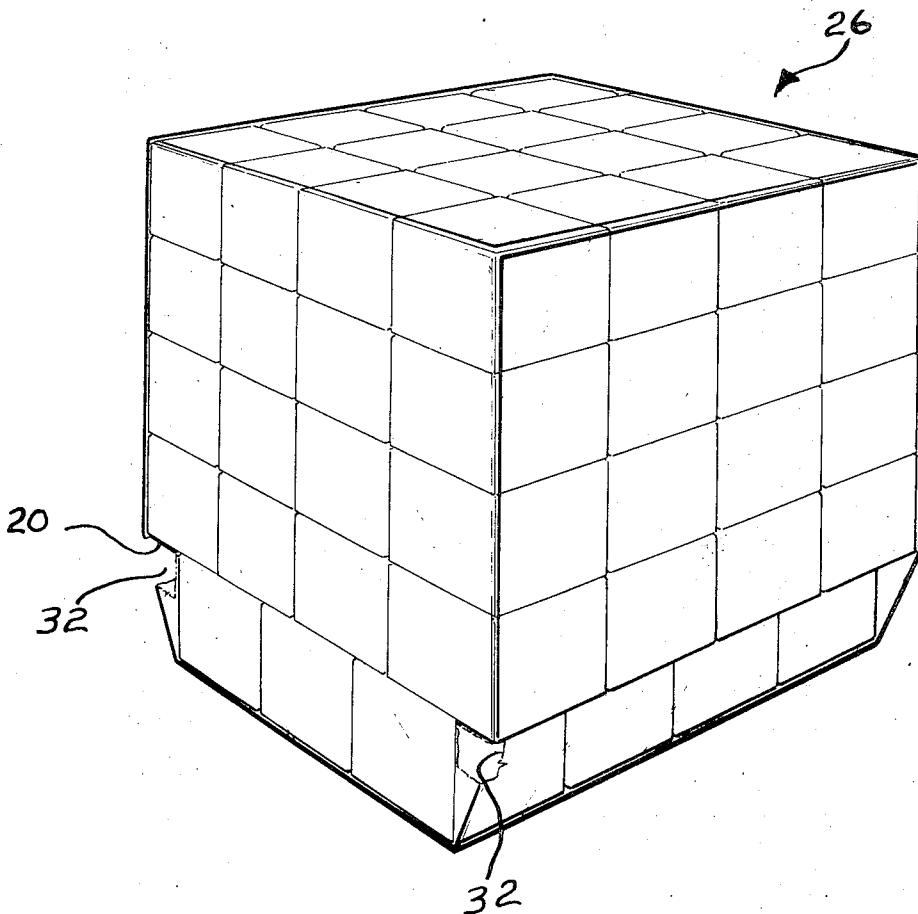
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[57] **ABSTRACT**  
 A unitized, palletless plurality of articles grouped and arranged in transportable or storable units. A first layer of articles is built atop a strip of heat-shrinkable thermoplastic material. Subsequent layers, all of an equal circumference and of greater circumference than the first layer, are built atop the first layer. At least two free ends of the bottommost strip are tucked beneath one of the subsequent layers. When the layers have reached the desired height, a heat-shrinkable thermoplastic material, preferably in the form of a bag, is placed around the entire load. The load, so enclosed, is exposed to heat to cause the material to shrink, also causing the bottom strip to fuse into the overall wrapping. The result is a tightly confined unitized and stabilized load suitable for storage or shipment. The load may be lifted and transported by a fork lift at the ledge defined by the overhang of all of the upper layers over the first layer.

**12 Claims, 6 Drawing Figures**



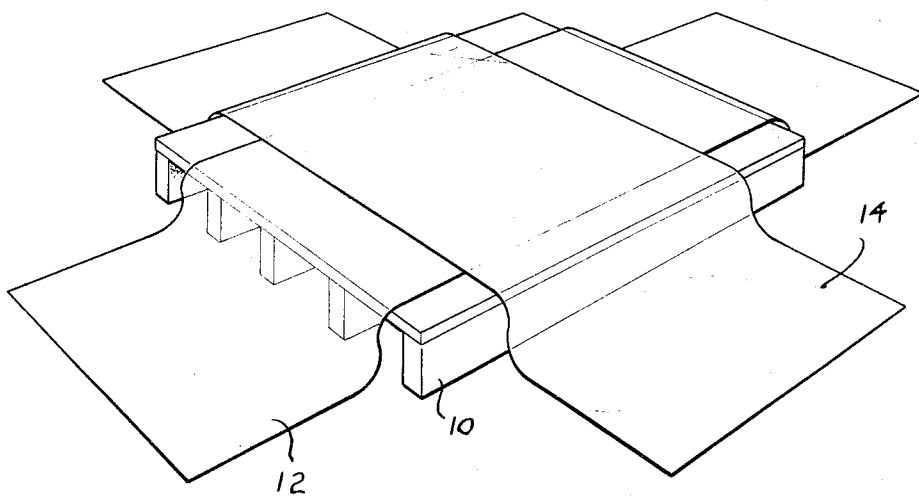


FIG. 1

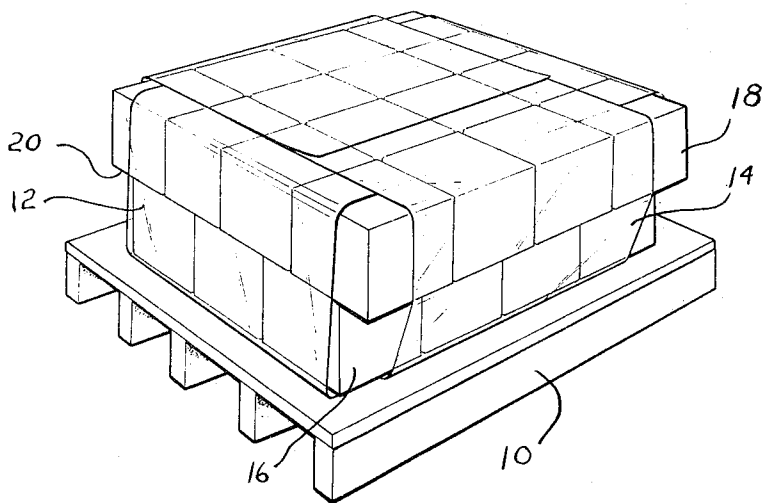


FIG. 2

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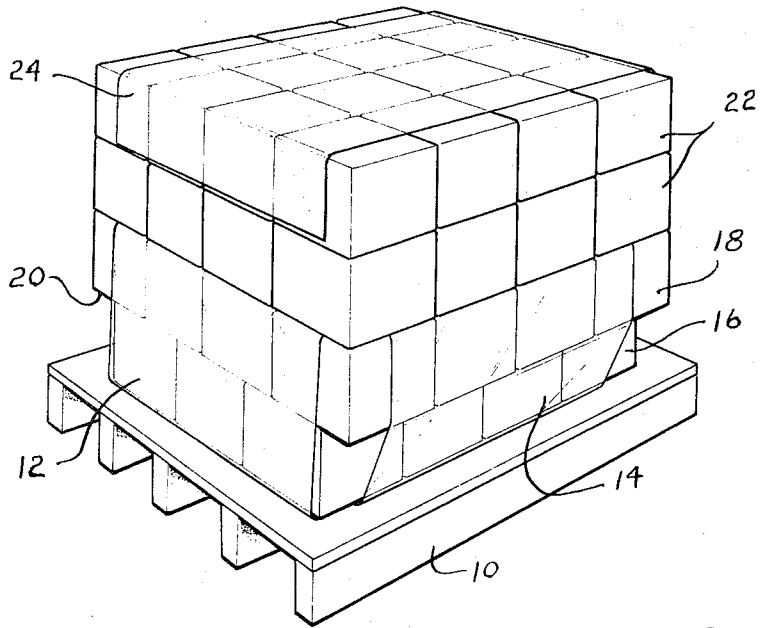


FIG. 3

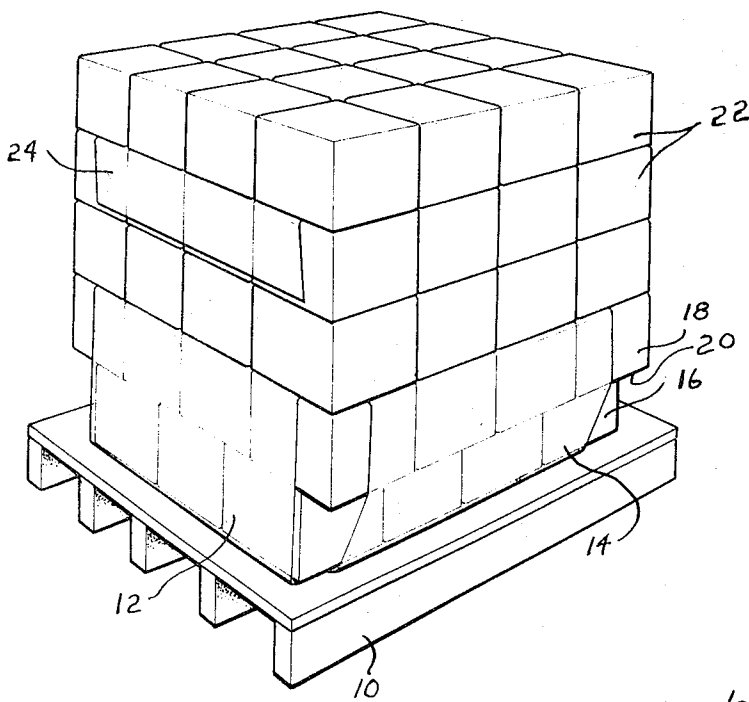


FIG. 4

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FIG. 5

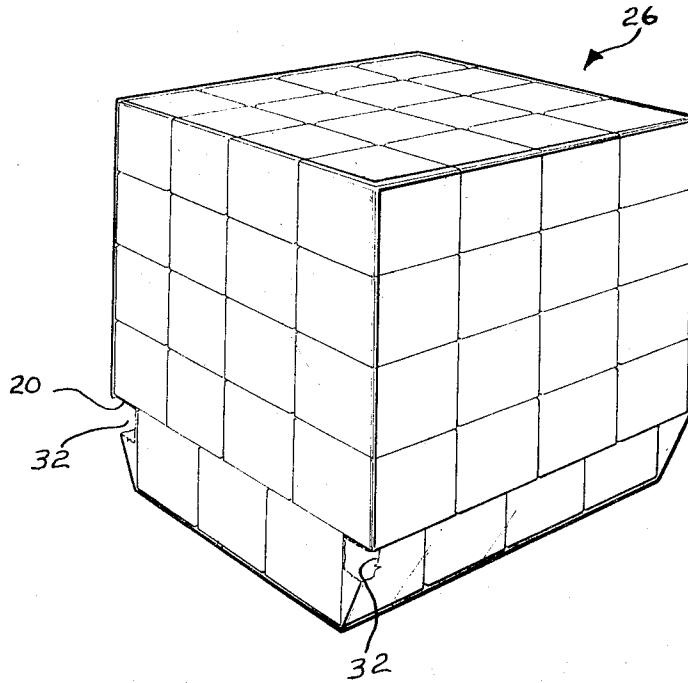
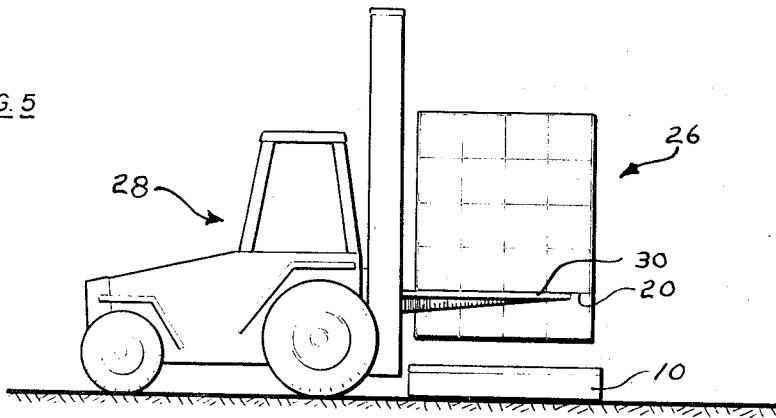


FIG. 6

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## UNITIZED PALLETLESS LOAD

## BACKGROUND OF THE INVENTION

The use of heat-shrinkable plastic films such as polyethylene and polyvinyl chloride to stabilize and protect loads of articles, particularly stacks of boxes, has become an important method of material handling. Such stacks of articles are commonly referred to in the industry as unit loads. To date, unit loads, which have been shrink-wrapped (the term applied to loads which have been covered with the heat-shrinkable plastic films mentioned), have been built on pallets. Palletless loads, such as the well-known slip sheet loads, have not been shrink-wrapped because of the problems involved in handling such loads when encased in plastic film. However, it is often desirable to avoid the use of pallets but still retain the advantages of shrink-wrapped unit loads, such as better load stability, product protection and lower cost of stabilizing materials. That is, in some cases, loads are shipped great distances, making return freight costs for pallets prohibitive. Often, customers do not wish to have pallets in their plants, while the shipper desires to have the ease of handling and economies of unit loads in his plant. Finally, there is frequently an unexplained and nearly uncontrollable "shrinkage" in the quantity of pallets returned, thus causing the shipper losses in the cost of replacing pallets thus lost. The present invention presents a unitized load and a method for making the same which will give a stable, palletless unit load that may be handled in much the same manner as a load built on a pallet, but, since the load is palletless, without the problems attributed to shipping unit loads with pallets.

## SUMMARY OF THE INVENTION

This invention relates generally to shrink-wrapping unit loads. More specifically, this invention relates to a palletless, shrink-wrapped, unit load and the method for making said load.

In practicing the invention, at least one strip of a thermoplastic material is laid on a suitable base. On this strip is built a first layer of articles to be unitized, most commonly, multiple individual boxes or cartons. A second layer is then built atop the first layer, the second layer having a slightly larger perimeter than the first layer. The difference in perimeter is equally distributed (although, if the size of the layers, so dictate, the overhang may be distributed over only two opposite sides of the first layer), the second layer thus overhanging the first layer on all four sides. Subsequent layers, of the same circumference, are then built atop the second layer until the load is of the desired height. The strip of heat-shrinkable material upon which the first layer was built will be raised vertically and laid horizontally across the top of one of the layers built on top of the first layer. The subsequent layers will then tend to secure the strip in position. After the load has been built to the desired height, the entire load is covered with a heat-shrinkable thermoplastic material. This step is accomplished most easily if the heat-shrinkable material is in the form of a bag, although sheets of material could be used. As a final step, the entire load is subjected to heat sufficient to cause the overall thermoplastic wrap to shrink and also cause the lower strip to both shrink and fuse into the overall wrap. The result is a very stable unitized load which does not require a

pallet for handling. The load may be picked up by inserting the forks of a fork lift truck under the ledge defined by the overhang of the upper layers over the first layer. The load may be handled in this manner for both storage and shipment.

## IN THE DRAWINGS

FIG. 1 is a perspective view illustrating the first step of placing lower load strips to begin the building process;

FIG. 2 is a perspective view, similar to FIG. 1, illustrating the building to a height of two layers;

FIG. 3 is a perspective view showing a stabilizing strip or shelf in place on the load;

FIG. 4 is a perspective view of the completed load before the overall plastic wrap is applied;

FIG. 5 illustrates the method of handling the completed load after the shrinking process; and

FIG. 6 is a perspective view showing the completed load of the invention in the form it assumes for storage or shipment.

## DETAILED DESCRIPTION OF THE DRAWINGS

It should be apparent that FIGS. 1, 2, 3, 4 and 6 are a series of views illustrating the various stages of the process of making the palletless load of the invention. The load is built on a conventional material handling pallet 10. The pallet 10 is used to handle the load until the completed load has been through the final heating process to shrink the plastic film and thus make the load stable. Until this process is completed, the load is very unstable and must be handled on the pallet 10. After the process, the load is removed from the pallet 10, allowing immediate reuse of the pallet 10. FIG. 1 illustrates how the load is begun. Two strips 12 and 14 of a thermoplastic material are laid atop the pallet 10 in an overlying manner to form a cross having arms of substantially equal length. While FIG. 1 illustrates the preferred embodiment of the invention in the use of two strips 12, 14, a suitable load could be constructed using either the strip 12 or the strip 14. A preferred material for the strips 12, 14, is heat-shrinkable polyethylene of from 0.002 inch to 0.005 inch in thickness. However, any heat-shrinkable thermoplastic material of from 0.001 inch to 0.015 inch in thickness could be successfully utilized. The length of the strips is not a critical factor, but the length of each of the arms of the cross formed by the overlying strips 12, 14, should be greater than the height of two of the articles to be unitized.

The objects to be unitized will most typically be boxes or cartons. As seen in FIG. 2, a first layer 16 consisting of a plurality of objects is assembled on the pallet 10 on top of the strips 12, 14. A second layer 18 of a plurality of objects is then assembled atop the first layer 16. The second layer 18 contains more of the objects to be unitized than does the first layer 16, and, consequently, the second layer 18 has a larger perimeter than the first layer 16. In the preferred embodiment, as shown in FIG. 2, the difference in perimeters is on only two sides, and is equally distributed to form ledges 20 overhanging the first layer 16. However, the perimeter of the second layer 18 could be larger than that of the first layer 16 on all four sides, thereby giving four overhanging ledges 20. As a final step in this initial portion of the preferred load building process, the arms of the strips 12, 14, are raised to the top of the second

layer 18 and laid one atop another as shown in FIG. 2. It should be kept in mind, however, that the arms of the strips 12, 14, could be retained in their raised position by means other than placing them on the second layer and holding them in place with subsequent layers. For example, the arms of the strips 12, 14, could be taped to the exterior of the layers and not laid over the top of the second layer. Furthermore, the arms of the strips 12, 14, could be left lying flat until the completed load is ready to be enclosed with a heat-shrinkable thermoplastic material, as discussed later. The arms of the strips 12, 14, in that case, would be raised to the desired vertical position and, for example, taped in place in touching relationship with the load-enclosing wrap.

Turning now to FIG. 3, it can be seen that subsequent layers 22 are assembled atop the second layer 18. The subsequent layers 22 are identical in size to the second layer 18. Although a straight up stack of objects is shown in FIG. 3, the objects could be arranged in an interlocking pattern for additional stability. An added measure of stability may be imparted to the completed load if a stabilizing strip 24 is placed as shown in FIG. 3. Preferably, the stabilizing strip 24 should be no wider than the width of a subsequent layer 22 and should be long enough to lie completely across the top of a subsequent layer 22 and hang down at either end at least the height of a subsequent layer 22. Furthermore, the strip 24, while serving as a lateral tensioning member to aid in load stabilization, also has the function of being a shelf. It can readily be seen that the unitized load may tend to sag in the center when elevated as a unit. The strip 24, particularly when several additional tiers of objects are positioned thereabove, will serve as a shelf and transfer some of the load or weight thereabove to the edges with the outside objects acting as columns, therefore lessening the load concentration supported by the forks on the center of the unitized load. The material of the stabilizing strip 24 should be the same as that of the strips 12, 14. The subsequent layer 22 upon which the stabilizing strip 24 is placed is not critical, but, as shown in FIG. 4, at least one subsequent layer 22 must be placed on top of the stabilizing strip 24 to hold it in position.

With specific reference to FIG. 4, there is shown a completed load ready to be enclosed with a heat-shrinkable thermoplastic material. This material should be the same as that used for the strips 12, 14, and the stabilizing strip 24, although the thickness may be varied as desired. The encapsulation or covering step is most easily accomplished with the thermoplastic material being in the form of a bag which can be slipped over the entire load. Alternatively, the load could be over-wrapped with the use of sheets of heat-shrinkable thermoplastic material. It should be kept in mind that the load-enclosing thermoplastic material should not be allowed to drape over the edges of the pallet 10, for reasons to be explained later.

The pallet 10, still supporting the now covered load, is next placed in a conventional shrink oven of a size sufficient to receive such loads. In the oven, sufficient heat is applied to cause the load-enclosing wrap to shrink and tightly hold the objects making up the load. The strips 12, 14, will experience some degree of shrinkage and thus tend to grip and hold the first and second layers 16 and 18. In addition, the strips 12, 14, and stabilizing strip 24 will become fused, by the heat, into the load-enclosing wrap resulting in a strong unit-

ized load. It is important during the shrink process that the load-enclosing wrap not extend over or below the edge of the pallet 10. If this occurs, the load-enclosing wrap may shrink around and grip the edges of the pallet 10 and cause incomplete fusion of the strips 12, 14, thereby creating an unstable load. Furthermore, removal of the load from the pallet 10 would be impossible without partial destruction of the unitized load.

FIG. 5 illustrates the removal of the unitized load 26 from the pallet 20 after the heating step. At this point, the unitized load 26 is suitable for storage or shipment and no longer needs to be carried on the pallet 10. A commercial lift type truck 28 having horizontally extending forks 30 would typically be utilized to move the unitized load 26. The forks 30 may be inserted under the ledges 20, and the unitized load lifted with the ledges 20 resting on the top of the forks 30. If care is used in this step, the forks 30 will not puncture the load-enclosing wrap. The load-enclosing wrap maintains a certain degree of flexibility even after having been shrunk. Consequently, the forks 30, when being lifted, will normally force the load-enclosing wrap lying under the ledges 20 upward until the forks 30 contact the ledges 20 with the now stretched load-enclosing wrap trapped between the ledges 20 and the forks 30. Upon removal of the forks 30, by first lowering and then retracting the load-enclosing wrap will return to substantially its original shape.

FIG. 6 shows the unitized load 26 after removal from the pallet 10. The first or bottom layer 16, the second layer 18 and subsequent layers 22 are supported and stabilized in part by the tension provided by the shrunk, load-enclosing wrap and in part by the fusion of the strips 12, 14, to the load-enclosing wrap. When the unitized load 26 is picked up using a fork lift truck 28, the load-enclosing wrap may occasionally be torn under the ledges 20 by the forks 30. These torn edges, designated as 32 in FIG. 6, do not appreciably weaken the unitized load 26, and will not disturb the inherent moisture barrier properties of the plastic strips. It should be noted, though, that before the unitized load 26 is lifted from the pallet 10, it is completely encapsulated. It is preferable to use care in removing the load 26 from the pallet 10 as discussed previously with reference to FIG. 5 to avoid the torn edges 32.

I claim:

1. The method of forming a unitized, stable load of a plurality of objects comprising, placing at least one elongated sheet of thermoplastic material on a support, assembling a first layer of objects on said sheet in a regular pattern, said sheet having ends thereof which extend beyond the perimeter of said layer, assembling a second layer of objects on said first layer, said second layer having a perimeter greater than said first layer to provide overhangs at opposed sides thereof, assembling a plurality of additional layers having a perimeter equal to that of said second layer in overlying relation thereto to form a complete load, enclosing the side walls of said load with a continuous sheet of heat-shrinkable thermoplastic material, positioning the extending ends of said elongate sheet in contacting relation to said continuous sheet, retaining said sheet in contacting relationship, heat-shrinking said sheet material about said load and simultaneously therewith fusing said enclosing material to said first sheet to thereby form a stabilized, unitized load capable of being handled by a fork lift en-

gaging the overhang, and removing said unitized load from said support.

2. The method of claim 1 further including, the step of placing an additional elongated sheet of thermoplastic material in cross-wise, overlying relationship to said first sheet prior to assembling said first layer, said additional sheet having ends extending beyond the perimeter of said first layer, positioning the ends of said second sheet in contacting relation to said continuous sheet and retaining said second sheet in contacting relationship.

3. The method of claim 1 further comprising, the step of placing at least one stabilizing strip of a thermoplastic material across the top of at least one of said additional layers prior to enclosing and heat-shrinking, said stabilizing strip being of sufficient length to hang vertically downward to an extent sufficient to provide a fused connection with the enclosing material during said heat shrinking.

4. The method of forming a unitized, stable load of a plurality of objects comprising, placing at least one elongated sheet of thermoplastic material on a support, assembling a first layer of objects on said sheet in a regular pattern, said sheet having ends thereof which extend beyond the perimeter of said layer, assembling a second layer of objects on said first layer, said second layer having a perimeter greater than said first layer to provide overhangs at opposed sides thereof, assembling a plurality of additional layers having a perimeter equal to that of said second layer in overlying relation thereto to form a complete load, raising the extending ends of said elongated sheet into generally parallel relationship to the sides of said load, retaining said ends in their raised position, enclosing the side walls of said load with a continuous sheet of heat-shrinkable thermoplastic material, heat-shrinking said sheet material about said load and simultaneously therewith fusing said enclosing material to said first sheet to thereby form a stabilized, unitized load capable of being handled by a fork lift engaging the overhang, and removing said unitized load from said support.

5. The method of claim 4 further including, the step of placing an additional elongated sheet of thermoplastic material in cross-wise, overlying relationship to said first sheet prior to assembling said first layer, said additional sheet having ends extending beyond the perimeter of said first layer, raising the extending ends of said additional elongated sheet into generally parallel relationship to the sides of said load, and retaining said ends in their raised position.

6. The method of claim 4 further comprising, the step of placing at least one stabilizing strip of a thermoplastic material across the top of at least one of said additional layers prior to enclosing and heat-shrinking, said stabilizing strip being of sufficient length to hang vertically downward to an extent sufficient to provide a fused connection with the enclosing material during said heat shrinking.

7. A method for unitizing a plurality of articles into a load suitable for storage and shipment comprising the steps of positioning at least one strip of a heat-shrinkable thermoplastic material of from 0.001 inch to 0.015 inch in thickness on a suitable base, placing a first layer of articles to be unitized on top of said strip, said strip having portions thereof extending beyond said first layer on either side of said first layer, placing

at least one additional layer of said articles atop said first layer, said additional layer having a perimeter greater than the perimeter of said first layer, said additional layer being centered with respect to said first layer, and positioned with an overhang provided at at least two opposed sides of said first layer, raising and placing the free ends of said strip horizontally across the top of said additional layer, adding subsequent layers of articles having a perimeter equal to the perimeter of said additional layer until the desired height of load is reached, said first, additional and subsequent layers of articles serving to define the sidewalls of said load, enclosing at least the sidewalls of said load with a heat-shrinkable thermoplastic material of from 0.001 inch to 0.015 inch in thickness, heat-shrinking said heat-shrinkable thermoplastic material about said load and fusing said underlying strip to said enclosing material, to thereby form a unitized load capable of being handled with lifting means positioned under the overhang, and removing said unitized load from said base for storage or shipment independently of said base.

8. The method of claim 7 further comprising the step of placing at least one stabilizing strip of a thermoplastic material across the top of at least one of said additional layers prior to enclosing and heat shrinking, said stabilizing strip being of sufficient length to hang vertically downward to an extent sufficient to provide a fused connection with the enclosing material during said heat shrinking.

9. The method of claim 7, wherein said heat-shrinkable thermoplastic material is polyethylene.

10. A unitized, palletless load of articles comprising, a stack of articles formed of a plurality of layers of a plurality of articles, the lowermost layer of said stack being formed of lesser horizontal dimension than the other layers and providing access to opposed lifting ledges, a strip of heat shrunk thermoplastic material underlying said lowermost layer and having opposed ends folded up and interposed said overlying layers, and a heat shrunk thermoplastic material completely enclosing said stack of articles and fused to said strip.

11. As an article of manufacture, a unitized palletless load of a plurality of articles suitable for storage and shipment comprising, a substantially rectangular first layer of said articles, a second, substantially rectangular layer of said articles, having a perimeter greater than that of said first layer, overlying said first layer, a third, substantially rectangular layer of said articles, having a perimeter substantially equal to that of said second layer, overlying said second layer, a strip of heat shrunk thermoplastic material underlying said first layer, extending up the side and interposed said second and third layers, a plurality of substantially rectangular subsequent layers of substantially equal perimeter overlying said third layer, and a heat shrunk thermoplastic material completely enclosing said first, second, third and subsequent layers and fused to said underlying strip.

12. The article of manufacture as defined in claim 11 further comprising, at least one strip of thermoplastic material laid horizontally across the top of at least one of said subsequent layers, having sufficient length to hang vertically at least the height of said subsequent layer and fused to said enclosing material.

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