

Dec. 27, 1949

R. A. FLETCHER
PALLET CONSTRUCTION

2,492,626

Filed July 24, 1946

4 Sheets-Sheet 1

Fig. 1.

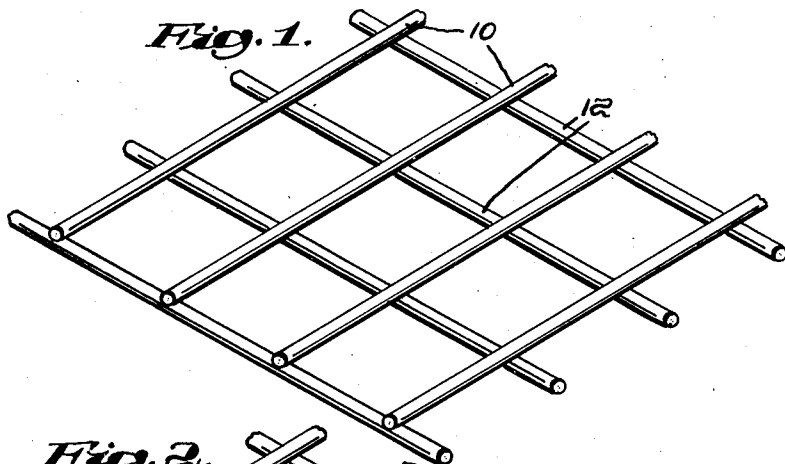


Fig. 2.

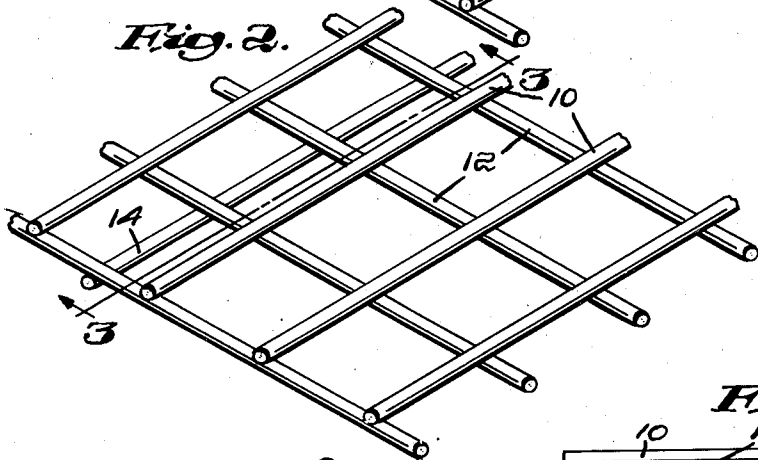


Fig. 3.



Fig. 4.

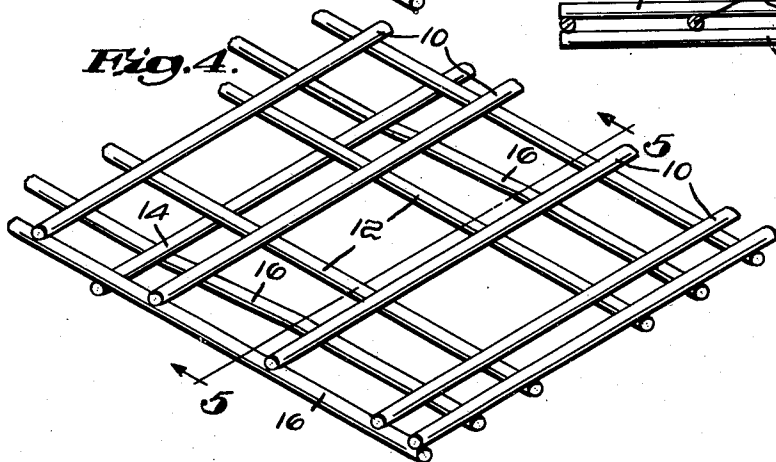


Fig. 5.



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Fig. 6.

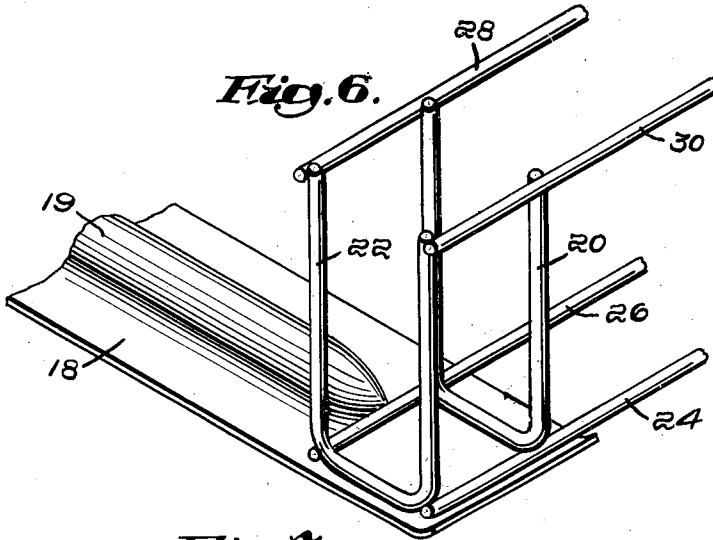
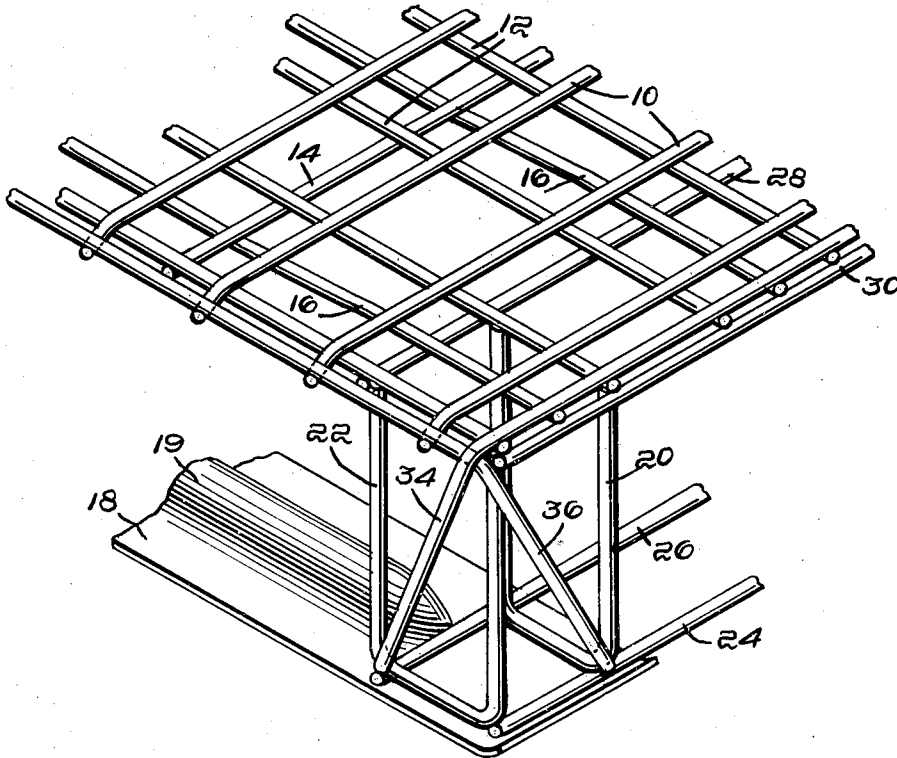


Fig. 7.



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Fig. 8.

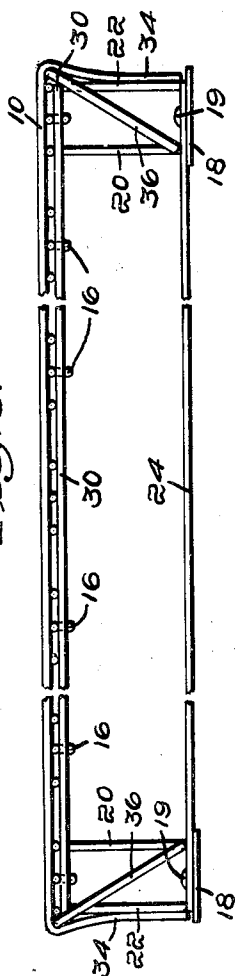


Fig. 9.

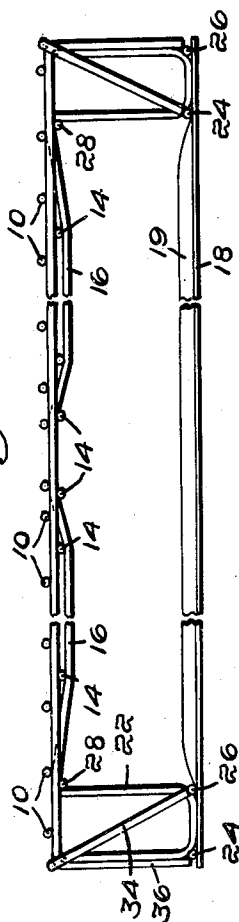
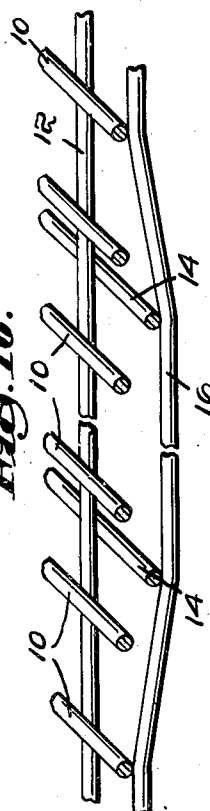


Fig. 10.



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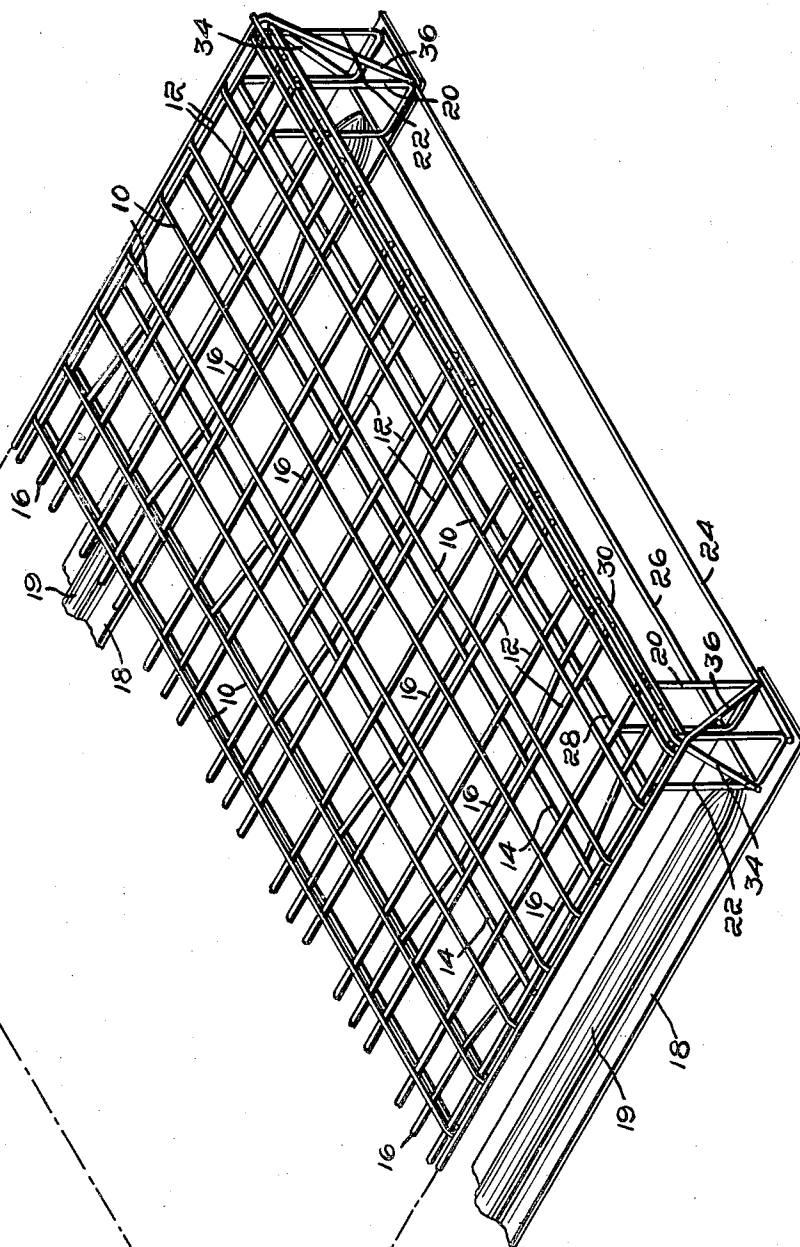
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Fig. 11.



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UNITED STATES PATENT OFFICE

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PALLET CONSTRUCTION

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5 Claims. (Cl. 248—120)

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This invention relates to transporting materials. More particularly the invention is concerned with improvements in pallets for use in supporting goods which are required to be moved about and stacked in transit.

The usual pallet construction includes a platform or deck; beams for supporting the deck in a raised position; and a base for receiving the beam members. A common arrangement of the beams has been to position two of these members along two opposite edges of the pallet with a third beam extending parallel to the first two and midway between them. This forms a pair of openings extending between two opposite sides of the pallet and with the remaining two sides being closed. Such a structure is referred to in the trade as a "two-way pallet."

A subsequent development has been to substitute relatively small blocks in place of the beam. The blocks are arranged to provide a central support, four corner supports and four intermediate side supports between the corner supports. With this arrangement a pair of openings is formed at all four edges of the pallet and this structure is referred to as a "four-way pallet" or sometimes as an "eight-way pallet."

Both of these pallets have been customarily built of wood in order to maintain the cost of such devices at a minimum and yet afford a proper degree of strength and durability. When using wood, it is necessary, in order to secure desired strength, to employ relatively thick planking and relatively large blocks. This tends to result in a cumbersome body, occupying an undesirably large amount of space and adding considerably to the weight of a palletized unit. These objectionable aspects of conventional pallets become even more undesirable owing to the development of a custom of shipping palletized units. Here the pallet may be used only a few times, or possibly only once, and its cost must be absorbed by the party sending the goods. Manufacture of relatively light-weight pallets at the lowest possible cost is thus of paramount importance.

An object of the invention therefore is to improve pallet structures and especially pallet decks with a view to providing a low-cost pallet which furnishes an adequate amount of strength and durability. Another object is to provide a pallet of outstanding light-weight character and compact construction. Other objects will appear from the following description of the invention.

With the foregoing situation in mind, I have designed a fabricated metal pallet structure hav-

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ing much less bulk and weight than the conventional pallets described. As a substitute for the common wooden pallet platform or deck, there is provided a reinforced reticulated deck requiring for its construction substantially less material. Similarly in place of the block supports heretofore used, I have devised skeletonized columns and in place of a continuous base I have provided a number of relatively small strips or plates.

An important feature of the invention therefore is a pallet having an open light-weight deck consisting of a mesh or fabric of rigid elements disposed crosswise of one another and firmly secured together. Secured to the mesh in a novel fashion are a plurality of reinforcing elements extending downwardly from several points of suspension in the deck to provide an unusual truss supporting effect. The trussed feature co-operates with the multilayer construction of a fabric made up of cross-laid wire-like elements, with the result that tension and compression stresses, set up in the deck when carrying a load, are more efficiently distributed throughout the constituent elements of the deck fabric.

In the accompanying drawings:

Fig. 1 is a fragmentary perspective view illustrating a step in forming a pallet deck;

Fig. 2 is another perspective view of a further deck-forming step;

Fig. 3 is a detail cross section and partial elevation taken on the line 3—3 of Fig. 2;

Fig. 4 is another perspective view;

Fig. 5 is a cross section taken on the line 5—5 of Fig. 4;

Fig. 6 is a perspective view illustrating assembly of base and column support means;

Fig. 7 is a fragmentary perspective view illustrating the joining of the deck and base means;

Fig. 8 is an end elevational view of the completed pallet;

Fig. 9 is a side elevational view of the pallet;

Fig. 10 is a detail perspective view of the trussed deck structure; and

Fig. 11 is a perspective view of the fully assembled pallet.

The structure illustrated in the drawings represents a preferred form of the invention and includes a fabricated deck made up of a plurality of rigid metal elements secured crosswise of one another to form a mesh or grating. The invention will be described in connection with a mesh deck formed of steel wire or wire-like elements. It should be understood, however, that the invention is not limited to the particular deck structure shown, and that decks fabricated from other

metals, plastic materials and the like may be utilized either in the shape of rods, strips, sheets or other forms.

In constructing the preferred embodiment of my improved pallet, I provide a wire mesh deck (Fig. 1) composed of a plurality of upper deck elements 10 extending in parallel spaced-apart relation to form a top deck section, and lower deck elements 12 also extending in parallel spaced-apart relation and at an angle to the upper deck elements 10, to form a lower deck section. The elements 10 and 12 are secured together at points of contact as by spot welding, thus providing a continuous network. At the under side of the deck, at separated intervals, is located a set of truss elements 14, one of which has been illustrated in Figs. 2 and 3 of the drawings. The truss elements 14 run at right angles to the bottom deck wires and are preferably secured by spot welding. The elements 14 also extend all the way across the deck in a straight line and are secured between two opposite edges to constitute an intermediate section or thickness of wire lying just below the mesh.

A second set of truss elements 16 are also located along the under side of the deck and secured thereto at two opposite edges in the manner shown in Fig. 4. The truss wires 16 are reversely bent upon themselves a slight amount and extend across and below the truss elements 14 as noted in Figs. 4 and 5. Those portions of the truss elements 16 running below the truss elements 14 thus constitute a fourth and bottom section or thickness of material in the pallet deck as shown in Fig. 5. It is pointed out that the elements 14 provide a truss effect for the deck elements 12 while the elements 16 provide a truss effect for the truss element 14 in an opposite dimension so that a multiple two-dimensional truss feature is developed.

The deck assembly described is then temporarily laid aside and a base structure is assembled. One suitable form of base structure consists of base plates 18 formed with corrugations 19 (Fig. 6). Two of these base plates for example are arranged in parallel spaced-apart relation. At their extremities, which are formed without the corrugations 20, are mounted skeletonized columns which form corner supports. Each column consists of two U-shaped elements 21 and 22. The bottoms of the U-shaped elements may be secured to the base plate in the manner shown in Fig. 6 with their legs extending upwardly in parallel relation. The U-shaped members are further reinforced by means of tie wires 24 and 26, running crosswise of the base plates and occurring at points directly below the bent portions of the U-shaped elements. There are also secured at the upper ends of the U's two other tie wires 28 and 30. These tie wires have immediately adjacent sides secured to the ends of the U-shaped portions as by welding in the manner already described. These upper tie wires are so positioned that their uppermost curved surfaces lie in tangential relation to a plane passing through the ends of the U-shaped portions.

The deck assembly illustrated in Figs. 1-5 inclusive, is then superimposed upon the columns in the position indicated in Fig. 7. In this position some of the lower deck elements 12 bear upon the tie wires 28 and 30 and also are arranged to overlap the extremities of the U-shaped elements occurring in each column as may be observed from an inspection of Fig. 7. Welding is employed to secure the contacting deck wires to both the ends

of the U-shaped elements 20 and 22 and the tie wires 28 and 30.

It is pointed out that when the deck elements are thus positioned and secured, the extremities of the truss elements 16 become interlocked between the tie wires 28 and 30 at their under sides and the upper deck wires 10 at their upper sides. For a portion of their lengths therefore the truss elements 16 lie in the same plane and deck section as the lower deck wires 12. This in effect provides a point of suspension for the truss elements from the edge of the deck. From these suspension points the truss elements pass downwardly under the truss elements 14 for a substantial distance.

It may also be desired to secure the ends of the truss elements in other ways as directly to one of the mesh wires and at points within the edges of the deck. There is, in this manner, obtained a multiple trussing construction which is peculiarly adapted to more efficiently supporting a palletized unit. A further modification may consist in using short slugs or spacing elements in place of the truss elements 14.

I may also desire to secure along the edges of the deck outer frame wires 34 and 36 as noted in Figs. 7 and 11. The ends of the frame wires may conveniently be passed downwardly in a diagonal direction and be secured to the base plates 18 adjacent to the U-shaped elements 20 and 22. Other arrangements may also be resorted to, for example the reinforced deck may be secured to other types of supports such as short pipe sections and the like, used with base plates or independently of them, and in place of the base plate sheet materials, fabricated wire mesh and other substitutes may be utilized. It is intended that the arrangement shown in the drawings may be further varied by suspending some or all of the truss elements at their extremities only, thus eliminating the central point of suspension. It may also be desired to insert truss elements at other points and in other ways as for example crosswise or diagonally with respect to the pallet deck.

It will be observed that by suspending multiple truss elements in and through a mesh deck of the character described, there is obtained a lowering of the neutral axis of the deck when carrying a load. This has definite structural advantage for a pallet body especially with a cross-laid wire-like type of fabric. Thus in a pallet deck formed of spaced-apart wire-like elements of circular cross section, the wire-like elements running in any one direction may be considered as a series of beams. When a load is placed on these beams, they constitute a supporting structure having a neutral axis passing through the centers of the beams. In a loaded beam of circular cross section such as round wire of the type referred to here, the greatest amount of metal is thus along the mid-portion at the neutral axis where it is not required. There is progressively less metal toward the top and bottom of the beam where the compressive and tensile stresses are progressively greater.

Upon adding truss elements and suspending them from the deck, this action of the stresses set up in the deck wires from a load is considerably changed. As the load is imposed on the trussed deck, the bottom truss element becomes almost entirely a tension member and the overlying wires take substantially all of the compressive stress. The neutral axis in this case assumes a position along points between the truss elements and the other deck wires. By using

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multiple truss elements, the neutral axis may be further lowered.

It will be apparent therefore that at any typical section of the deck, and especially at the middle of a span occurring between corner supporting columns, there is a relatively large amount of metal to take the compressive stress and also a relatively large amount of metal to take the tensile stress; along the neutral axis, on the other hand, there is substantially no metal except for the occasional truss element 14. The trussed construction therefore adds greatly to the strength of a reticulated deck because it makes better use of the metal involved. This promotes lightness and low cost with sufficient strength to meet requirements.

In actual practice it has been found that combining truss members with a pallet deck in the manner described produces unexpectedly high strength. Thus in a pallet 48" x 48" in which five truss members were employed, it was found that load-carrying capacity of the deck was increased four times. The requirements for which pallets are built range from one or two tons or less all the way up to eight and ten tons. It will readily be seen that different sizes of pallets may be required and in this connection the deck elements and other members may vary in gauge. One outstanding advantage in the trussed deck is the substantial reduction in the gauge of wire or other stock which may be required for carrying a given range of loads. Reducing the gauge of the wire or other stock has several desirable advantages, principal ones being a great reduction in cost of the pallet and a lowering of weight and bulk.

It becomes possible to develop an adequate amount of strength in an exceedingly light, cheap deck fabric, and this in turn makes possible the use of such devices for single shipments of palletized units without excessive expense.

Other advantages suggest themselves stemming from my improved reinforced fabricated pallet deck. For instance, the relatively high degree of stiffness and strength imparted to the pallet deck by the truss members greatly increases the length of span which it is feasible to utilize. This is of considerable advantage since it makes possible the use of a lesser number of supporting columns or blocks, and in addition to further lightening the pallet, increases its passageway area and facilitates entry of the lifting forks of trucks employed with pallets.

It is pointed out that the pallet of the invention is provided with only four corner columns whereas it has been necessary in the past to employ blocks intermediate the corners or beams running centrally through the pallet.

From the foregoing it will be evident that I have provided a pallet structure having an unusually rigid deck span which by reason of its fabricated character and trussing features is capable of developing a high load-carrying capacity in a light-weight structure, while reducing the cost of manufacture. As a result there is achieved an efficient pallet structure which can be manufactured sufficiently cheaply as to make it feasible to ship goods on these pallets as a unit.

I claim:

1. An improved pallet comprising a wire mesh deck member, means for supporting the deck member in an elevated position, a set of truss elements suspended from two opposite sides of the deck at points occurring between the supporting means and extending below the under side of the

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deck, a second set of truss elements suspended from the deck and passing between the said first set of truss elements and the deck, said second set of truss elements extending angularly with respect to the truss elements of the said first set to provide a two-dimensional multiple truss supporting effect.

2. An improved pallet comprising a wire mesh deck member, means spaced-apart for supporting the deck member in an elevated position, a set of truss elements suspended from the deck and extending below the under side of the deck between two opposite sides thereof, a second set of truss elements suspended from the deck at points between said supporting means and passing between the said first set of truss elements and the deck, said second set of truss elements extending angularly with respect to the said first set of truss elements and additional truss means lying below those portions of the said truss elements of the first set which occur immediately adjacent to their extremities.

3. An improved pallet comprising in combination a reticulated wire mesh supporting deck, spaced-apart column means for supporting the deck in an elevated position, truss means suspended from those deck portions which are immediately adjacent to the said column means and arranged to support intermediate edge portions of the deck.

4. An improved pallet comprising a mesh deck formed of upper and lower wire-like elements occurring in spaced-apart relation and laid across one another, a plurality of column members for supporting said deck, said column members consisting of pairs of U-shaped legs secured together with horizontally extending tie wires, said column members being mounted on separated base plates, a set of truss wires suspended from the deck at two opposite sides thereof, a second set of truss elements running below the first set and at right angles thereto, the extremities of said second set of truss elements being bent upwardly and lying in the same horizontal plane occupied by the lower elements of the mesh deck, said extremities further being secured to the said tie wires of the U-shaped legs.

5. An improved pallet comprising a wire mesh deck, means for supporting the deck in an elevated position, the means consisting of uprights having their upper extremities secured to the deck, truss elements secured to the under side of the deck and to adjacent upper ends of the uprights, a set of reversely bent truss elements extending below the under side of the deck between two opposite sides thereof, the extremities of the reversely bent truss elements being secured above such of the said first truss elements as occur along the edges of the deck and intermediate portions of the reversely bent truss elements being secured below others of the said first truss elements lying in spaced relation to the edges of the deck.

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