Nov. 17, 1964 E. H. BRIE, SR 3,157,423

MULTIPLE PALLET UNITIZING FRAME

Filed Oct. 19, 1962 6 Sheets-Sheet 1

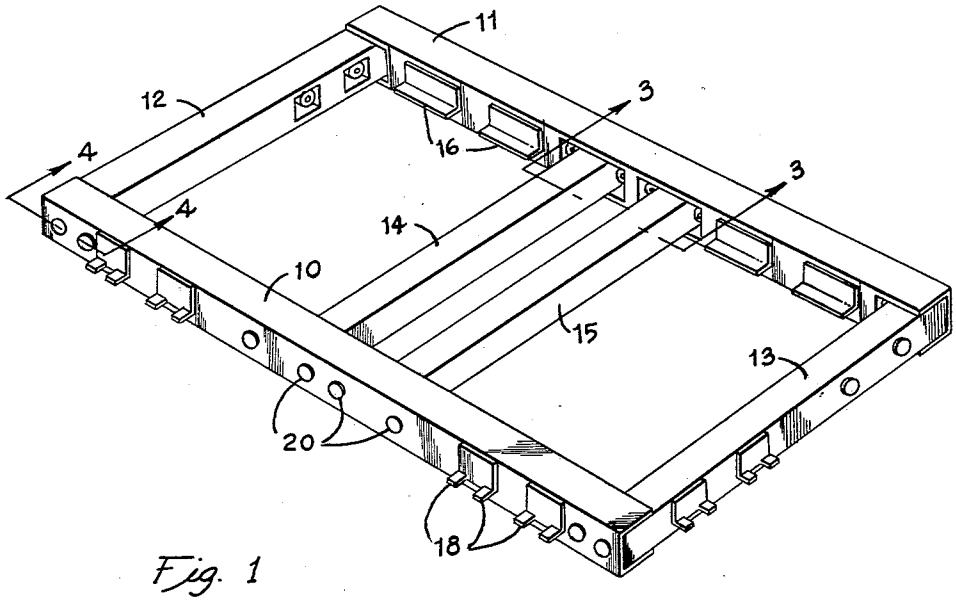


Fig. 1

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MULTIPLE PALLET UNITIZING FRAME

Filed Oct. 19, 1962 6 Sheets-Sheet 2

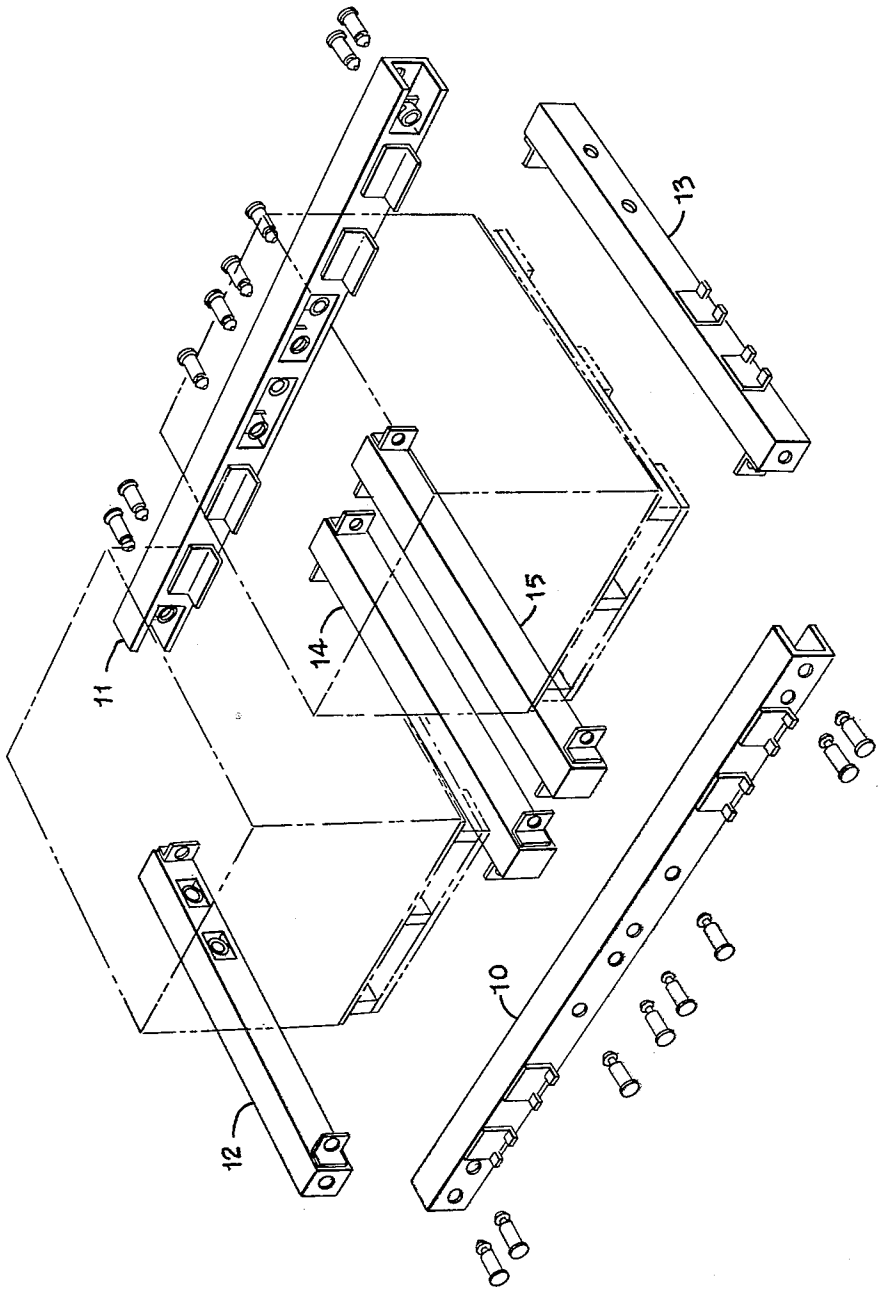


Fig. 2

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MULTIPLE PALLET UNITIZING FRAME

Filed Oct. 19, 1962 6 Sheets-Sheet 3

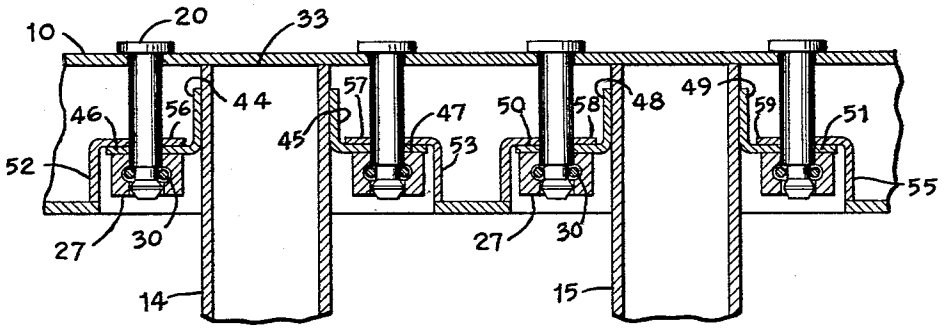


Fig. 3

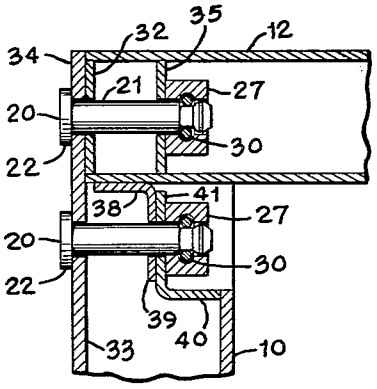


Fig. 4

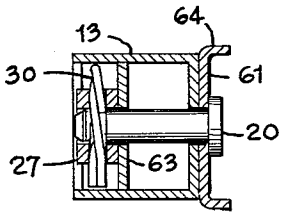


Fig. 7

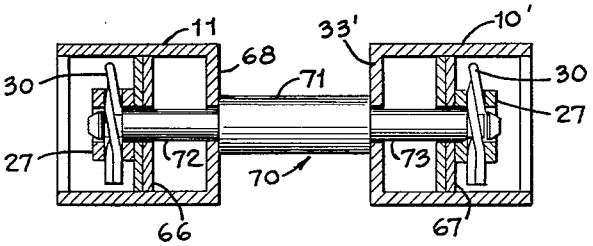


Fig. 8

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MULTIPLE PALLET UNITIZING FRAME

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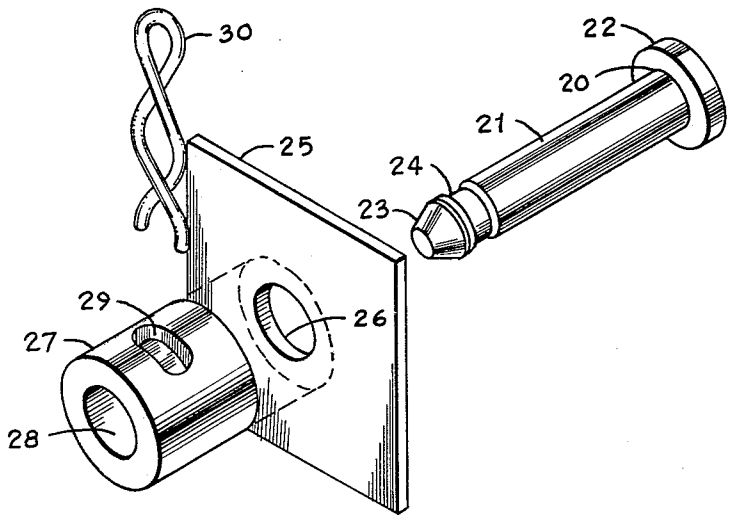


Fig. 5

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MULTIPLE PALLET UNITIZING FRAME

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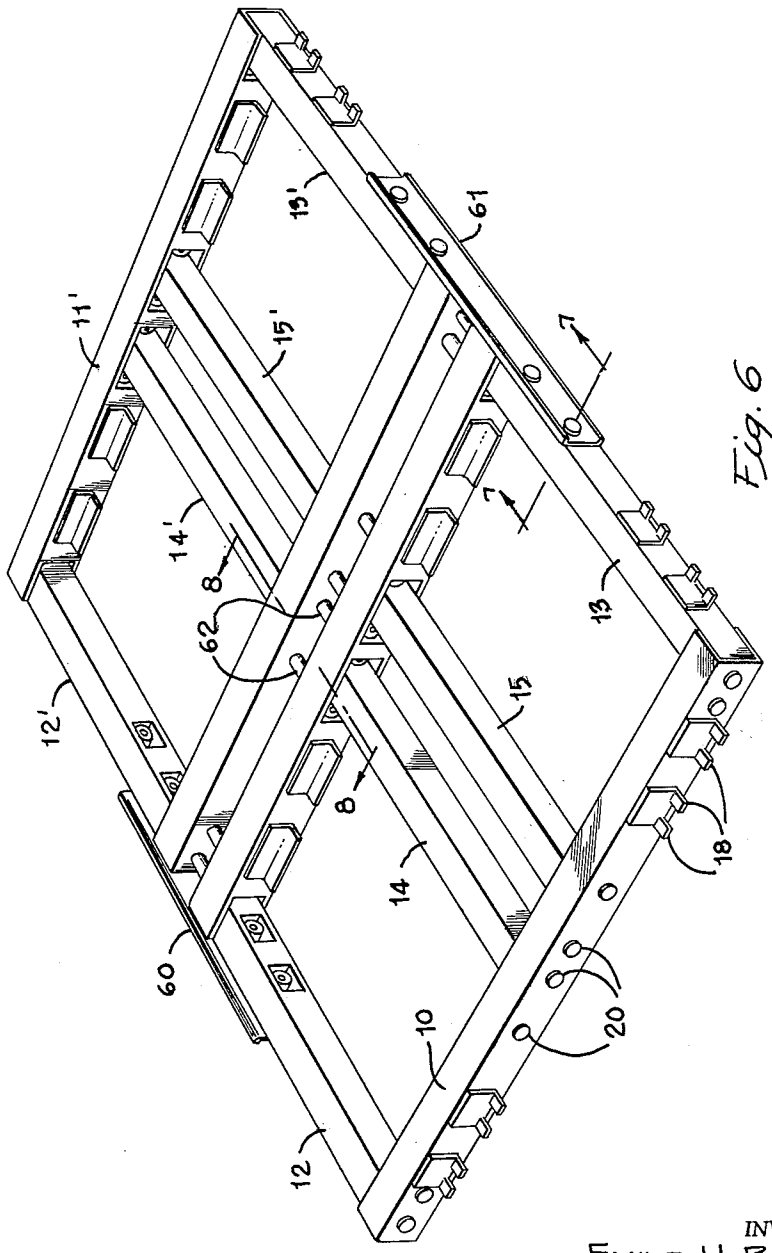


Fig. 6

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MULTIPLE PALLET UNITIZING FRAME

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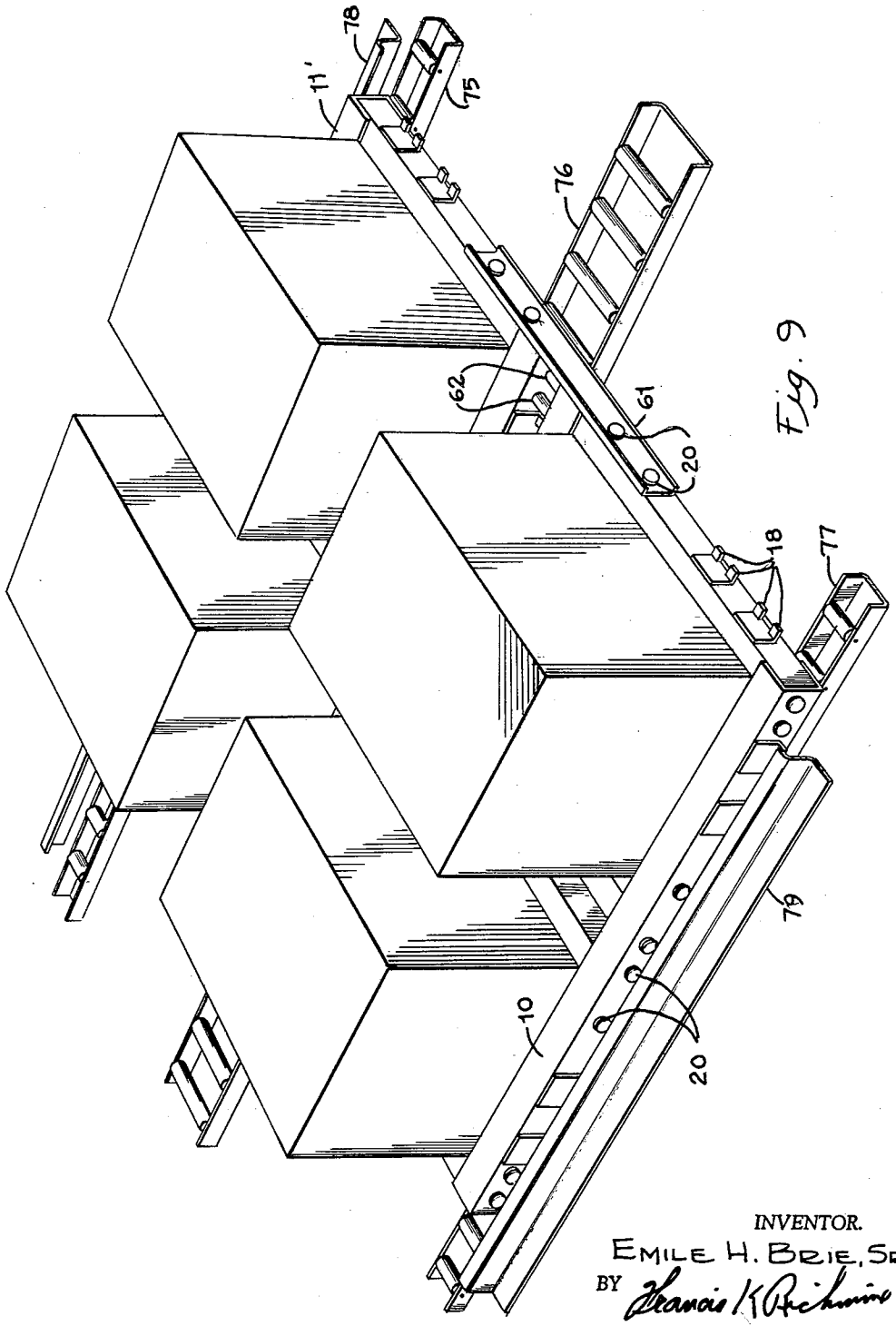


Fig. 9

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United States Patent Office 3,157,423 Patented Nov. 17, 1964

3,157,423

MULTIPLE PALLET UNITIZING FRAME

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Filed Oct. 19, 1962, Ser. No. 231,876
5 Claims. (Cl. 294—67)
(Granted under Title 35, U.S. Code (1952), sec. 266)

The invention described herein may be manufactured and used by or for the Government for governmental purposes without the payment to me of any royalty thereon.

This invention relates to improvements in apparatus for handling palletized cargo and more particularly to a frame structure for holding a number of loaded pallets together to constitute a unitary load for movement by cargo handling equipment such as portable cranes, ships hoisting gear and highway trucks and trailers. It is among the objects of the invention to provide a pallet unitizing frame which is of lightweight and simplified construction and comprises a variety of similar frame members which can be quickly and easily connected together to apply the frame to two or more loaded cargo pallets and which can be disconnected to remove the frame from associated pallets when desired.

It is a further object of the invention to provide a pallet unitizing frame which can be applied to pallets of different construction and will firmly engage the associated pallets and hold them together in a cargo unit for cargo loading, unloading and transporting operations.

It is a still further object of the invention to provide a load unitizing frame for cargo pallets which can be constructed from metal members of standardized shapes and dimensions, and to provide a simplified form of quick detachable fastening element to fasten the frame members together in operative arrangement and provide for rapid and easy disassembly of the frame when desired.

Yet another object of the invention is to provide a pallet load unitizing frame which can be utilized to unitize different even members of cargo pallets, such as two, four or six pallets and which may be arranged, if desired, to receive the lift elements of a fork-lift truck in different positions of the truck relative to the frame.

Further objects and advantages will become apparent from a consideration of the following description and the appended claims in conjunction with the accompanying drawings wherein:

FIGURE 1 is a perspective view of the cargo unitizing frame of the invention in assembled condition;

FIGURE 2 is an exploded perspective view of the frame;

FIGURE 3 is a fragmentary cross-sectional view on an enlarged scale on a plane indicated by the line 3—3 of FIGURE 1;

FIGURE 4 is a fragmentary cross-sectional view on an enlarged scale on a plane indicated by the line 4—4 of FIGURE 1;

FIGURE 5 is an exploded perspective view of a fastener assembly used to releasably connect the different components of the frame together;

FIGURE 6 is a perspective view of a double frame in assembled condition;

FIGURE 7 is a fragmentary cross-sectional view on an enlarged scale on a plane indicated by the line 7—7 of FIGURE 6;

FIGURE 8 is a fragmentary cross-sectional view on an enlarged scale on a plane indicated by the line 8—8 of FIGURE 6; and

FIGURE 9 is a perspective view of a double frame in assembled condition and engaged with associated and loaded cargo pallets, and supported on the floor structure of a cargo aircraft.

With continued reference to the drawings and particularly to FIGS. 1, 2, 3 and 4, the frame, as shown in FIG. 1, is rectangular in shape and comprises a pair of similar side members **10** and **11** each having a length at least as great as the aligned side edges of two juxtaposed cargo pallets and a depth somewhat less than the distance between the bottom surface of the pallet floor and the building floor or matrix upon which the pallet rests. The frame further comprises a pair of similar end members **12** and **13** and a pair of intermediate members **14** and **15**.

When the frame is assembled, as shown in FIG. 1, the side members **10** and **11** are disposed in parallel, spaced apart, coterminous relationship to each other and the end members **12** and **13** extend perpendicularly between the side members at the corresponding ends of the frame. The intermediate members **14** and **15** extend perpendicularly between the side members at correspondingly opposite sides of the midlength location of the side members, and are spaced from the adjacent end members a distance substantially equal to the distance between the side members **10** and **11** so that each end member with its adjacent intermediate member and the included portions of the side members provides a rectangular space into which a cargo pallet will closely fit.

Many cargo pallets, particularly the ordinary wooden pallets, comprise a plank floor or platform supported on a pair of spaced apart, parallel skids so that the edges of the floor overhang the sides of the skids to provide a ledge or flange along each side of the pallet. The skids are usually somewhat shorter than the length of the platform so that there are overhanging ledges along all four sides of the rectangular platform of the pallet. The structural members of the unitizing frame have a depth somewhat less than the depth of the pallet skids so that the upper edges of the frame members will fit under the overhanging edges of the pallet platform and the pallet is thereby supported on the frame to be lifted when the frame is lifted. Some pallets have flush side walls provided with openings to receive the tongues of fork-lift trucks. For supporting this type of pallet the side members **10** and **11** of the frame are provided on their inner sides with inwardly projecting lugs or flanges **16** which engage in the openings in the pallet side walls to lift the pallets with the frame. If desired, the frame side members **10** and **11** may be provided with openings through which the tongues of fork-lift trucks can be inserted to lift the frame and the associated cargo pallets.

The side and end members of the frame may be formed from sections of standard channel iron or rectangular tubing, of the proper dimensions and the intermediate members **14** and **15** may also be formed of channel iron or rectangular tubing, as may be desired. The outer sides of the side members **10** and **11** and the end members **12** and **13** are provided with spaced apart, outwardly projecting lugs **18** which may be used for connecting portable cranes or ships cargo gear to the frame, and which also fit under the flanged side rails on the floor of a cargo aircraft, as shown in FIG. 9, to hold the frame down on the floor of the aircraft.

While different quick detachable connectors may be used to secure the frame members together in assembled relationship, a connector that has been found to be particularly useful for this purpose is shown in FIGS. 2, 3, 4 and 5. As shown in detail in FIG. 5, the connector comprises a metal pin **20** having an elongated, cylindrical shank at **21**, provided at one end with an integral head **22** of cylindrical shape and with a diameter greater than the diameter of the shank. The head is preferably concentric with the shank and has a thickness much less than its diameter, as shown in FIG. 5. At its opposite end the shank **21** is beveled or cone shaped, as indicated at **23**, and inwardly of this cone shaped end portion, the shank is provided with an annular groove **24** the side walls of which are flared slightly outwardly away from

each other for a purpose which will presently appear. The numeral 25 indicates a fragmentary portion of the side wall of one of the frame members and this side wall is provided with a circular aperture 26 of a size to freely receive the shank of the pin 21. A cylindrical collar or sleeve 27 has one end disposed against one surface of the wall 25 with its bore 28 concentric with the aperture 26, and is welded or otherwise permanently secured at this end to the wall 25. The bore 28 is of the same diameter as the aperture 26 and freely receives the shank 21 of the pin 20. The collar is provided intermediate its length with diametrically opposed, elongated apertures, one of which is indicated at 29, and a wire spring member 30 is insertable through these elongated apertures to engage in the groove 24 of the pin shank and releasably secure the corresponding end of the pin in the sleeve 27.

The wire of the spring member 30 is looped at or adjacent to its midlength location to provide two coextensive legs which are bowed outwardly relative to each other and which cross each other near their free ends and have their free ends spaced apart. With this construction, pressure tending to force the free ends of the wire toward each other will widen the space between the oppositely bowed intermediate portions of the legs. With the spring member in place in the diametrically opposite slots 29 of the sleeve, the pin shank may be inserted through the opening 26 in the wall or tab 25 and forced through the spring member, the tapered end portion 23 of the pin forcing the legs of the spring member apart so that the groove 24 is received between the oppositely bowed portions of the legs of the spring member. The pin is thus releasably held with the end of the shank opposite the head retained in the sleeve 27 by the associated spring 30. While the spring member will retain the pin in position against ordinary forces incident to the use of the assembled frame, the outward flare of the groove walls adjacent the tapered end 23 of the pin will permit the pin to be driven out of the sleeve if it is not possible to reach the free ends of the spring member legs and release the pin from the spring member by pressure on the ends of the spring legs.

As shown in FIGS. 2 and 4, each of the end members, as shown for the end member 12, is provided in each end thereof with an end wall 32 having a centrally located aperture dimension to receive the shank 21 of a connecting pin 20. The web portion 33 of the associated side member 10 is extended, as indicated at 34, to overlie the end wall 32 and is provided with an aperture which registers with the aperture in the end wall 32. Inwardly of each end wall 32 a transverse wall 35 is provided in the end member, this transverse wall being parallel to the end wall 32 and spaced from the end wall a distance somewhat less than the length of the shank 21 of the pin 20. The transverse wall 35 is provided with an aperture in alignment with the aperture in the wall 32 and the web extension 34, a cylindrical collar 27 is secured to the wall 35 at the side thereof remote from the end wall 32 and this collar is provided with a pin receiving bore concentric with the pin receiving aperture in the wall 35. A spring member 30 is disposed in the collar 27 and a pin 20 is inserted through the aligned apertures in the web extension 34, the end wall 32 and the transverse wall 35 and into the bore of the collar 27 so that the groove in the pin shank is engaged by the spring member 30. The spacing of the wall 35 from the wall 32 is such that, when the spring member 30 is engaged in the groove of the pin shank, the head 22 of the pin is against the outer surface of the web extension 34 of the side member.

Angle members 38 are secured to the end member 12, one near each end of the latter, with one leg of the angle member securely welded to the face or side of the end member which is disposed inwardly of the corresponding end of the frame when the end member is associated with the frame side members. The other leg of this angle member projects perpendicularly from the inner surface of the end member in spaced and parallel relationship to the web 33 of the side member 10, as illustrated in FIG. 4, and this leg of the angle member constitutes a tab 39 provided with a pin receiving aperture.

The side member 10 is provided at its end connected to the end member 12 with an angle member 40 which extends inwardly from the inner side of the side member and has one leg 41 constituting a tab which is parallel to the web 33 of the side member and which abuts against the inner surface of the tab 39 of the angle member 38 secured to the end member 12. The tab 41 is provided with a pin receiving aperture aligned with the pin receiving aperture in the tab 39 and with a pin receiving aperture in the side member web 33, and a cylindrical collar 27 is secured to the inner side of the tab 41 with its bore in registry with the pin receiving aperture in this tab. A spring retainer 30 is mounted in the collar 27 and a pin 20 is inserted through the aligned apertures in the web 33, the web 39, and the tab 41 so that the groove near the tapered end of the pin is engaged by the spring retainer 30 and the head 22 of the pin is disposed against the other surface of the web portion 33 of the side member. This arrangement provides two spaced apart pins connecting the side member 10 and the end member 12 together at the corresponding corner of the rectangular frame, this arrangement holding the two frame members rigidly together against forces which tend to twist or otherwise distort the frame.

As all four corners of the frame are secured together in the same manner, a detailed description of the connection between the side and end members at the corner of the frame illustrated in FIG. 4 is considered sufficient for the purposes of this disclosure.

The manner of connecting the intermediate members 14 and 15 to the side members 10 and 11 is particularly illustrated in FIGS. 2 and 3. In this arrangement each of the intermediate members is provided near each end with angle brackets each bracket having one of its legs welded to a corresponding side of an intermediate member and its other leg projecting perpendicularly from the side of the intermediate member at a location spaced from the adjacent end of the intermediate member. The angle brackets for the intermediate member 14 are indicated at 44 and 45 in FIG. 3, and the outwardly projecting legs of these brackets provide tabs 46 and 47 each provided with a pin receiving aperture. The angle brackets for the intermediate member 15 are indicated at 48 and 49 and these brackets provide outwardly projecting tabs 50 and 51 each provided with a pin receiving aperture. Pin receiving collars 27 are secured to the tabs 46, 47, 50 and 51 at the sides of these tabs remote from the adjacent ends of the intermediate members and these collars are provided with the spring clips 30 as previously described.

The side member 10 is provided with spaced apart angle members 52, 53, 54 and 55 each having one leg perpendicular to and projecting inwardly from the inner side of the side member and its other leg parallel to and spaced from the web 33 of the side member. The legs 56, 57, 58 and 59 of the corresponding angle brackets 52, 53, 54 and 55 overlie the web adjacent surfaces of the tabs 46, 47, 48 and 49 respectively and are provided with pin receiving apertures which are in registry with the pin receiving apertures in the corresponding tabs 46, 47, 50 and 51 when the intermediate members 14 and 15 are in assembled position relative to the side member 10, as illustrated in FIG. 3. The web 33 of the side member 10 is provided with spaced apart, pin receiving apertures respectively in alignment with the pin receiving bores of the collars 27, and locking pins 20 are inserted one through each aperture in the web 33 and through the corresponding apertures in the tab portions of the angle brackets and into the bores of the corresponding collars 27 where they are engaged by the spring retainers 30. The angle brackets are so located that when the pins are engaged by the corresponding spring retainers, the heads of the pins bear against the outer

surface of the side member web 33, as is clearly illustrated in FIG. 3.

With this arrangement each of the intermediate members is secured at each end thereof to the corresponding side member by two spaced apart connecting pins and this arrangement materially reinforces the stiffness of the frame and enables the frame to further resist twisting or other frame distorting forces. As both ends of both of the intermediate members are secured to the frame side members in the same manner, the connections illustrated in FIG. 3 are considered sufficient for the purposes of this disclosure.

The unitizing frame as so far described will receive two loaded cargo pallets and hold these two pallets and their loads together for handling as a single cargo unit. In applying the frame to the cargo pallets the pallets are first placed in juxtaposed position with their corresponding side edges in alignment. The intermediate members 14 and 15 are then placed between the two pallets at the proper distance from each other and the end members are placed at the opposite ends of the two pallet assembly. The side members are then placed one along each side of the two pallet assembly and one side member and one end member are then brought into position such that the apertures for one of the corner locking pins are in alignment. This pin is then inserted and forced into place and the pin receiving apertures at another corner of the frame are then brought into alignment and that pin inserted. This process is continued until all of the locking pins have been placed in the frame and the frame members have thus been rigidly secured together in position to support the pallets when the frame is lifted.

When it is desired to unitize more than two pallet loads two of the unitizing frames, as described above, may be put together, as illustrated in FIG. 6. Since the two frames are identical, the members of one of the frames have been given the same reference numerals as used in FIG. 1 and the members of the other frame have been given these same reference numerals with a prime applied to each reference numeral. The two frames are disposed in side by side, parallel relationship and are spaced apart to facilitate the placing of the frames around the assembled pallets. The two frames are secured together by elongated plates or bars 60 and 61 overlapping the end members at correspondingly opposite ends of the two frames and are held in parallel and spaced apart relationship by spacers 62 disposed between adjacent frame side members 11 and 10'.

The manner of securing the overlapping plates 60 and 61 to the corresponding frame end members is shown in FIG. 7 for the plate 61. The plate is provided with spaced apart, pin receiving apertures and disposed substantially along its longitudinal center line and the end members are provided in their outer walls of webs with apertures which register with the apertures in the overlapping plates when the plates are properly positioned, as illustrated in FIG. 6. The end member 13 has an inner wall 63 spaced inwardly from and parallel to the outer wall or web of the end member and extending longitudinally of the end mmber. This inner wall is provided with pin receiving apertures registering with corresponding apertures in the outer wall of the end member and pin receiving collars 27 are secured to the wall 63 at the side thereof remote from the outer wall of the end member 13 each in registry with a corresponding pin receiving aperture in the wall 63. Each collar 27 is provided with a spring retainer 30, as described above, and pins 20 are inserted one through each group of registering apertures in the plate 61, the outer wall of the end member 13 and the inner wall 63 and into the corresponding collar 27 in which it is retained by the corresponding spring retainer 30 with the head of the pin against the outer surface of the plate 61. Preferably, at least four pins are used in each connecter plate, two pins securing the connecter plate to each of the two corresponding frame end members. This number and spacing of connecting pins provide rigid connections between the two parallel frames. The connecter plates 60 and 61 are preferably flanged along their longitudinal edges, as indicated at 64 in FIG. 7, to increase the longitudinal stiffness of these plates.

The adjacent frame side member 11 and 10' are provided with internal walls or partition members 66 and 67, as illustrated in FIG. 8, spaced from and parallel to the webs or outer walls 68 and 33' of these members. The outer walls of the side members are provided along their mid-width locations with spaced apart, pin receiving apertures and the inner walls 66 and 67 are provided with corresponding apertures registering with the apertures in the outer walls of the side members. As shown in FIG. 6, there are four of these additional pin receiving apertures disposed at the opposite ends of the parallel side members and pin receiving collars 27 are secured to the wall members 66 and 67 at the sides of these wall members remote from the webs 68 and 33' of the corresponding frame side members, the bores in these collars registering with the corresponding apertures in the walls 66 and 67. Spring retainers 30 are provided in the collars 27 to engage the spacing pins which firmly hold the side members in spaced apart and parallel relationship to each other.

A special form of pin, as illustrated in FIG. 8 and generally indicated at 70, is used to secure the adjacent frame side members together. This pin has a cylindrical intermediate portion 71 of a length equal to the desired spacing between the two frame side members, and shank portions 72 and 73 projecting longitudinally from the respectively opposite ends of the intermediate portion 71 coaxial with the intermediate portion. The intermediate portion 71 has a diameter larger than the diameter of the shank portions, and preferably the same as the diameter of the pin heads 22, to provide at each end of the intermediate portion an annular shoulder engageable with the outer surface of the outer wall of the corresponding frame side member around the aperture through which the pin shank projects. The shank portions 72 and 73 are the same as the shank 21 of the pins 20 and do not need to be further described. When the opposite shank portions of a spacer pin 70 are received in corresponding apertures in the two adjacent side members 11 and 10' and engaged by the spring retainers in the corresponding collars 27 they materially assist in holding the two unitizing frames together in the parallel relationship shown in FIG. 6 and reinforce the double frame construction against forces tending to twist or otherwise distort the frame. While special apertures are provided in the frame side members 11 and 10' for the spacers at the ends of these members, the apertures already provided for connecting these side members to the adjacent ends of the intermediate members 14, 15, 14' and 15' are used for the four spacer members disposed intermediate the length of the side members.

FIG. 9 shows one instance in which the four pallet unitizing frame just described can be used to advantage. In this figure the three spaced apart and parallel roller structure 75, 76 and 77 represent a part of the floor structure of a cargo aircraft. Flanged or Z-shaped guide rails 78 and 79 extend along the outer sides of the outside roller assemblies 75 and 77 and have flanges spaced above and directed inwardly of the corresponding outside roller assemblies. The four pallet unitizing frame is so dimensioned, preferably by using proper connecting plates 60 and 61 and spacers 62, that the outer sides of the outer side members 10 and 11' of the double frame extend along the upper flanges of the guide rails 78 and 79 and the lug formations 18 on these side members engage under the upper flanges of the guide rails so that, while the unitizing frame with its loaded pallets can be moved along the floor of the aircraft longitudinally of the roller structures, it cannot move up and down or transversely of the

roller structures and is thus held firmly in place in the aircraft. Suitable means are used to secure the frame in position longitudinally of the roller structures once it has been moved to the desired location. Such means may be a conventional tie down or hold down fitting.

The frame can, of course, be adjusted for other conveyances such as highway trucks, off-road cargo vehicles, ships and barges and in all cases will greatly facilitate the handling of cargo by providing cargo units which properly fit the cargo spaces provided in the various forms of conveyances and which also best utilize the load handling capacity of the various load lifting and transferring devices such as, fork-lift trucks, portable cranes and ships hoisting gear.

I claim:

1. A load unitizing frame for loaded cargo pallets comprising a pair of side members, a pair of end members having a length less than the length of said side members, said frame being usable with said side members disposed in spaced apart and coterminous relationship and said end members extending between said side members at corresponding ends of the frame, intermediate members extending between said side members adjacent to the midlength location of the said side members, and fastening means detachably connecting said end members and intermediate members at the ends thereof to said side members, each of said side and end members having pin receiving apertures therein and each of said fastening means comprising an apertured tab spaced from and parallel to an apertured wall of a corresponding side or end member, a collar secured to said tab in registry with the tab aperture and a spring retainer carried by said collar, and a pin having a shank inserted through aligned apertures in the corresponding frame member wall and the tab and into the corresponding collar, and a head at one end of said shank bearing against the frame member wall, said shank having at its opposite end a groove in which the spring retainer engages.

2. A load unitizing frame assembly comprising a pair of side members having pin receiving apertures near the ends and intermediate the length thereof, a pair of end members having pin receiving apertures near the ends thereof and extending between said side members one at each end of said frame assembly, intermediate members extending between said side members in spaced relationship to said end members and having pin receiving apertures at the ends thereof, all of said members being tubular members of rectangular cross-sectional shape, pin keepers secured to at least some of said members in alignment with pin receiving apertures therein, a resilient pin engaging element in each pin keeper, and pins inserted through pin receiving apertures and engaged in corresponding pin keepers to releasably connect said members together.

3. A load unitizing frame assembly comprising a pair of side members having pin receiving apertures near the ends and intermediate the length thereof, a pair of end members having pin receiving apertures near the ends thereof and extending between said side members one at each end of said frame assembly, intermediate members extending between said side members in spaced relationship to said end members and having pin receiving apertures at the ends thereof, pin keepers secured to at least some of said members in alignment with pin receiving apertures therein, a resilient pin engaging element in each pin keeper, and pins inserted through pin receiving apertures and engaged in corresponding pin keepers to releasably connect said members together, each of said pins comprising a cylindrical shank having a head on one end and an annular groove near its opposite end and being annularly beveled at the side of said groove remote from said head.

4. A load unitizing frame assembly comprising a pair of side members having pin receiving apertures near the ends and intermediate the length thereof, a pair of end members having pin receiving apertures near the ends thereof and extending between said side members one at each end of said frame assembly, intermediate members extending between said side members in spaced relationship to said end members and having pin receiving apertures at the ends thereof, pin keepers secured to at least some of said members in alignment with pin receiving apertures therein, a resilient pin engaging element in each pin keeper, and pins inserted through pin receiving apertures and engaged in corresponding pin keepers to releasably connect said members together, each of said pins comprising a cylindrical shank having a head on one end and an annular groove near its opposite end and being annularly beveled at the side of said groove remote from said head, and each of said pin keepers comprising a cylindrical collar having a pin receiving bore therethrough and diametrically opposed apertures in the wall thereof, and a resilient clip extending through said apertures and having opposed legs adapted to engage in the groove in a pin inserted in said collar.

5. In combination with a plurality of cargo pallets a cargo pallet unitizing frame for simultaneously lifting a group of at least four loaded cargo pallets comprising two rectangular frames of knockdown construction juxtaposed in side by side relationship and the members of said frames consisting of side members, end members and intermediate members, plates overlapping the end members of said juxtaposed frames and means releasably interconnecting the frame members and connecting said plates to said frame end members comprising locking pins insertable through pin receiving apertures in said frame members and said plates, pin keepers secured to said frame members in alignment with the pin receiving apertures and receiving said pins, and resilient pin engaging elements disposed one in each pin keeper to engage and releasably hold the associated locking pin.

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