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BEARING SUPPORTS FOR PALLET STACKING

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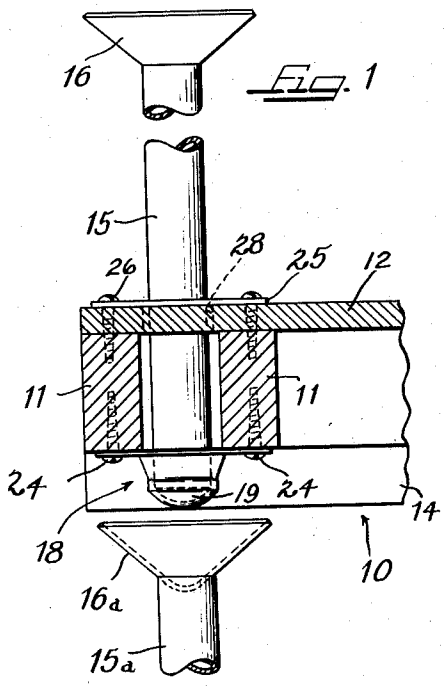


Fig. 1

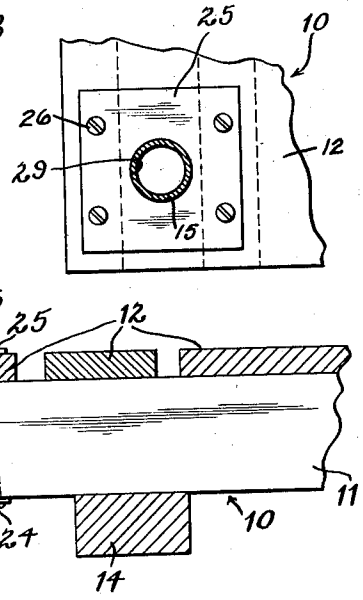


Fig. 2

Fig. 3

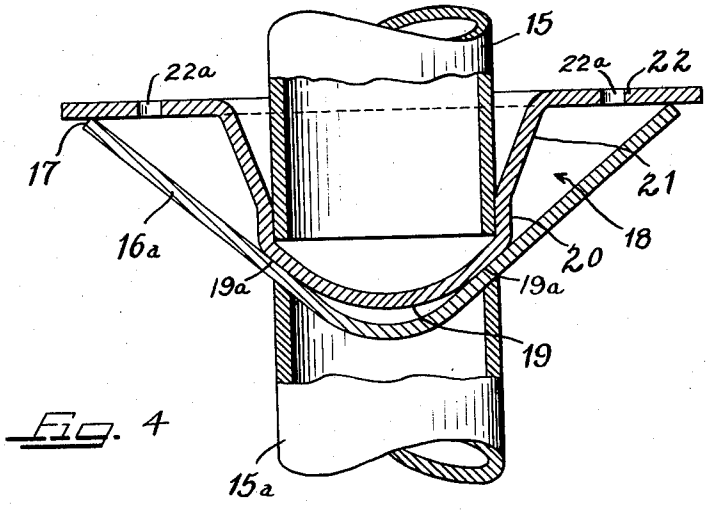


Fig. 4

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BEARING SUPPORTS FOR PALLET STACKING

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2 Claims. (Cl. 211—148)

The present invention relates to separable bearing supports employed in vertically spaced stacking of load-supporting platforms or pallets. More particularly, the invention relates to novel and improved male members of cooperating, vertically separable bearing supports adapted to nest with self-alining action in arrangements of the general type disclosed and claimed in Lundeen United States Patent 2,621,879, dated December 16, 1952.

The general aim of the invention is to provide a male bearing support member for support assemblies of the above general character embodying novel features of construction which reduce to a minimum the number of components required for the member; which eliminates a number of expensive operations such as welding, threading, etc. heretofore required in the manufacture of such members, thereby substantially reducing the cost of manufacturing the same; and which provides a simpler, more efficient mode of attachment to the pallet with which it is to be used.

Another object of the invention is to provide a one-piece male bearing support member which is attachable directly to the underside of a pallet or the like and which has an integrally formed tubular shoe portion for receiving the lower end of a vertical spacer column or post to thereby impart lateral stability to the latter.

A further object is the provision in such a male member of a snubbed, or relatively blunt central nose portion which not only fits with self-alining separable bearing contact in a concave socket member, but in addition presents a relatively blunt and sturdy bottom surface for supporting the pallet when the latter is placed on the ground or the floor.

Another object is to provide such a male bearing support member which utilizes a flange not only adapted to bear against the lip of a concave socket member to provide lateral outboard support, but also serving as a convenient means for attaching the male member to a pallet.

Still another object is the provision of such a male member which is simple and economical in construction, readily formed by a stamping or forging operation from sheet metal stock, yet which is reliable in use.

Other objects and advantages will become apparent as the following description proceeds, taken in conjunction with the accompanying drawing, in which:

Figure 1 is an exploded fragmentary side elevation, partially in section, of a pallet stacking arrangement employing a male bearing support member embodying the features of the invention;

Fig. 2 is a fragmentary front elevation of the pallet and male member shown in Fig. 1;

Fig. 3 is a fragmentary plan view of the pallet shown in Fig. 2; and

Fig. 4 is an enlarged detail view, in section, of the male member, showing its cooperative engagement with a support post and a concave socket member.

While the invention has been illustrated and is described in some detail with reference to a particular

embodiment thereof, there is no intention that it thus be limited to such detail. On the contrary, it is intended here to cover all alterations, modifications, and equivalents falling within the spirit and scope of the invention as defined by the appended claims.

Referring now to the drawing, only one corner of a pallet equipped with a male bearing support member of the present invention has been illustrated in Figs. 1–3. Upon reference to the above-mentioned Lundeen patent, the general organization of the pallets and vertical spacers or support posts, as well as the manner in which the pallets may be stacked in vertical tiers, will be clear.

Briefly, the arrangement is one in which a plurality of pallets of any suitable type, such as those adapted to be handled by well-known industrial fork lift trucks, are adapted to be stacked in vertical relation. The pallet **10** here shown by way of example is of the double-deck type formed from suitable lumber. It comprises spaced stringers **11** across which upper deck planks **12** are nailed or otherwise fastened, the stringers in turn being supported on larger and more widely spaced bottom deck planks **14**. At a plurality of spaced locations, for example, at its four corners, each of the pallets is adapted to receive in separable socketing relation a corresponding plurality of vertically and upwardly extending support columns or posts. These support posts may be of any suitable cross section, the two posts **15** and **15***a* here illustrated being made of circular pipe. The lengths of the support posts may be varied as desired to adjust the vertical spacing between successive pallets in a stacked tier, according to the nature of the material being stored or loaded on the pallets.

Secured at the upper end of each of the support posts, either by welding or by separable socketing engagement, is a generally concave socket member which extends transversely beyond the periphery of the post and opens upwardly. In the drawing, the posts **15**, **15***a* are capped by socket members **16**, **16***a*, respectively, which are conical in shape, although their apexes may be somewhat rounded as shown. The upper circular edges or lips **17** of the concave socket members **16**, **16***a* extend laterally for a considerable distance beyond the cross sectional area of the support posts so that, in the preferred construction, the diameters of said upper edges or lips **17** are more than twice the diameters of the support posts **15**, **15***a*.

To mate with the socket members **16**, **16***a*, a corresponding plurality of generally convex, downwardly extending male members are secured beneath each pallet. These male members are adapted to nestingly engage in corresponding socket members **16**, **16***a* when a pallet is lowered over a plurality of upstanding support posts. One such male member **18** is shown in the drawings and is described in detail below.

With the pallets **10** so equipped, they may be used in the ordinary manner for transporting various materials or items of manufacture on industrial fork lift trucks. To stack a plurality of the pallets in a vertically spaced tier, it is only necessary to insert a plurality of the support posts **15** in the corners of the bottom pallet and then lift the next pallet above and lower it onto the socket members at the tops of such support posts. Such procedure may be repeated until a tier having the desired number of pallets and extending to the desired height is obtained, the spacing between successive pallets in the tier and the total number of pallets in the tier being limited only by the nature and weight of the loads on the pallets.

In accordance with the present invention, the improved male member **18** is constructed to have the usual self-alining nesting engagement with the cooperating socket members **16**, **16***a* by virtue of a snubbed, relatively blunt,

central nose 19 which terminates in an upwardly extending tubular socket or shoe portion 20 serving to receive the lower ends of the support posts 15 when they are inserted through the pallets. Secondly, the tubular shoe portion joins with a skirt portion 21 flared upwardly and outwardly to terminate in a relatively large transverse flange 22 which affords, on the one hand, convenient attachment of the member to the under-side of the pallet and, on the other hand, bears against the upper peripheral lip 17 of the socket member 16*a* to provide lateral support outside the cross-section of the posts.

In the embodiment here illustrated, the male member 18 is conveniently formed by stamping or forging from heavy gauge sheet metal. Upon reference to Fig. 4, it will be seen that the male member 18 is formed with a central, downwardly extending, central nose portion 19 which is relatively blunt at its bottom extremity and curved upwardly at its edges. The portion 19, as the bottom wall of the male member, is of generally convex contour, having adjacent its marginal edges a surface area 19*a* complementally shaped with respect to the female, upwardly concave socket members 16, 16*a* with which it cooperates. When the member 18 is inserted into a socket member 16, 16*a*, the central nose portion 19 has an annular, upwardly inclined or frusto-conical surface 19*a* contacting the inner conical surface of the socket member. By virtue of the mating inclined surfaces, a high degree of self-alinement is achieved as the male member 18 is lowered into the socket member 16 or 16*a*. It is only necessary that the central nose portion 19 be roughly located within the upper periphery of the socket member, lowering of the male member into the socket member thus producing camming action which centers it in the position shown. Also, because the nose portion 19 has a relatively blunt bottom surface, it serves admirably to support the pallet 10 when the latter is placed on the ground or floor as the bottom pallet of a tier. Normally the bottom planks 14 take the weight of a pallet on the floor, but in the event these planks wear down, or they are omitted entirely, the male members 18 rest on the floor. In such case, there is less likelihood for the nose portion 19 to be deformed under heavy load than in the case of a male member terminated in a relatively sharp apex.

As an integral part of the male member 18, a tubular or shoe portion 20 extends upwardly from the nose portion 19, being matched in cross-section with the support posts employed. In a sense, the shoe portion 20 may be considered as a tubular socket portion having a first diameter, the rounded nose portion 19 extending axially from one end of, and tapering in diameter in an axial direction away from, the socket portion to close the one end of the latter. In this instance, the tubular shoe portion 20 is circular in cross-section and adapted to receive in socketed relation the lower end or foot of the support post 15. Because the shoe portion 20 bears with peripheral surface contact of considerable axial length against the foot of the post 15, the latter is braced substantially against lateral movement or inclination. Yet, the socket for receiving the post 15 is formed as an integral part of the male member 18.

Extending axially from the other end of the cylindrical shoe or socket portion 20, the male member 18 further includes a flaring skirt 21 which progressively increases in diameter. At the end of the skirt 21 remote from the socket portion 20, it is joined with or terminates in a radially disposed flange 22 of a second diameter which is relatively large as compared to the first diameter, i. e., the diameter of the socket portion 20. The flange is disposed in a plane at right angles to the common axis of the support posts 15, 15*a* and the cylindrical shoe portion 20. As indicated particularly in Fig. 4, the flange is adapted to rest with circular contact against the peripheral lip 17 of the corresponding socket member 16*a*. As a result, outboard support is provided between the male member 18 and the socket member 16*a*. That is, bearing contact is made outside the cross sectional area of the support posts 15, 15*a*, such outboard bearing contact preventing the two members from rocking relative to one another and affording lateral stability for the tier of pallets.

It will thus be seen that the male member has a socket portion 20 of substantially uniform diameter, with a nose portion 19 of decreasing diameter, and a skirt 21 of increasing diameter terminating in a large diameter flange 22, on opposite sides of the socket portion. This makes it possible for the single piece male member to perform the dual functions of (*a*) nesting with self-alinement and outboard support for stability in the concave part 16*a*, and (*b*) receiving the lower end of the post 15 to make the latter transversely stable.

In addition to the outboard bearing support imparting lateral stability to stacked pallets, the flange 22 serves as a convenient means for attaching the male member 18 directly to the underside of the pallet 10. As shown in Fig. 4, the flange may have a plurality of circumferentially spaced holes 22*a* which are located inboard of the flange periphery and which may receive a corresponding plurality of lag screws 24 (see Figs. 1 and 2) inserted into fastening engagement with the stringers 11.

To further enhance the lateral stability of the support post 15 when its lower end is socketed into engagement with the corner of the pallet 10, an apertured metal plate 25 may be fastened by suitable means such as wood screws 26 to the top of the plank 12 which overlies the male member 18. A vertical bore 28 is provided in the top plank 12 which registers with an aperture 29 in the top plate 25, the latter being of proper size to fit with snug but slidable relation around the post 15. Thus, to place a post 15 in vertically extending relation with the pallet 10, it is only necessary to slip the lower end of the post through the plate 25 and down into socketed engagement with the cylindrical shoe portion 20 of the male member 18. In a similar manner the several posts may be disassembled from engagement with pallets simply by pulling them out of engagement with the male members 18 and free of the plates 25.

From the foregoing it will be clear how a plurality of the pallets 10 equipped with male members 18 and reinforcing plates 25 may be assembled with a plurality of support posts 15 capped by socket members 16 to form a tier of the pallets in vertically spaced relation. Such a tier may be disassembled with equal facility simply by lifting off the uppermost pallet in each case and withdrawing the support posts 15 from engagement with the next pallet. The advantageous features and construction of the support member 18, however, may be briefly summarized.

The integral or one-piece male member 18 is easily formed by a stamping or forging operation from relatively heavy gauge sheet metal stock. Yet the construction of the male member is such that it provides self-alining engagement with the concave socket members 16, 16*a* by virtue of the inclined mating surface portions of the nose portion 19. The snubbed end of the nose portion 19 additionally provides a wide area contact when the pallet 10 is placed on the floor. But at the same time, the formation of the nose portion 19 of relatively small diameter permits the socket member to include as an integral part thereof the tubular shoe portion 20 which serves as a socket for receiving the foot of the support post 15 as it is inserted vertically into engagement with the pallet 10. No separate sleeve or welding of such sleeve is necessary. Further, it is not necessary to provide for the attachment of a separate sleeve to the pallet since the radial flange 22, suitably apertured, serves admirably for this purpose in cooperation with simple fastening means such as the screws 24. But the flange 22 in bearing against the upper lip 17 of the socket member 16*a* also affords outboard support enhancing the

lateral stability of the cooperating engagement between the mating members. As a result, the socket member **18** makes possible the realization of a highly stable and self-alining support of a plurality of the pallets, as well as the socketing of support posts into the pallet, simply by screwing or otherwise fastening a number of the members **18** to the underside of the pallets at selected locations.

I claim as my invention:

1. In a load-carrying platform structure having a supporting pallet with a plurality of pairs of axially aligned vertical posts one post of each pair extending above the pallet, the other post of each pair being disposed in supporting relation below the pallet and provided at its upper end with a general conical upwardly-concave socket member terminating in a circular upper edge which lies a considerable distance laterally outward beyond the cross-sectional area of said other post; a post-receiving member comprising, in combination, a central tubular socket portion of substantial length into which a substantial length of the post at its lower end fits snugly; a nose portion on the underside of said socket portion and closing said socket portion at the bottom thereof; said nose portion being relatively blunt at its bottom and having a frusto-conical side area; an outwardly-flaring skirt portion extending axially from the upper end of said socket portion; a radially out-turned flange at the outer end of said skirt portion which extends substantially at right angles to the axis of said socket portion, said flange having means formed thereon for facilitating attachment of said post-receiving member to the pallet; said flange also contacting the circular upper edge of the post-receiving member with the conical, upwardly concave socket member providing an aligning surface for the aforesaid nose portion and said frusto-conical side area contacting a portion of the conical upwardly concave surface.

2. In a load-carrying platform structure having a supporting pallet with a plurality of pairs of axially aligned vertical posts, one post of each pair extending above the pallet, the other post of each pair being disposed in supporting relation below the pallet and provided at its upper end with an upwardly concave socket member terminating in a circular upper edge which lies a considerable distance laterally outward beyond the cross-sectional area of said other post, a unitary post-receiving member comprising the combination of a central tubular socket portion; a relatively blunt convex nose portion on the outside of said socket portion and closing said socket portion at the bottom thereof; an outwardly-flaring skirt portion extending axially from the upper end of said socket portion and adapted to guide the end of a post into said socket portion; and a radially out-turned flange at the outer end of said skirt portion which extends substantially at right angles to the axis of the socket portion, said out-turned flange having a diameter which is large as compared to the diameters of the central socket portion and of the concave socket member, and means formed on said flange for facilitating attachment of the post-receiving member to a pallet.

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