May 19, 1970 P. ERISMANN 3,512,653

SUPPORT FOR LOADING PALLETS AND THE LIKE

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Fig. 1

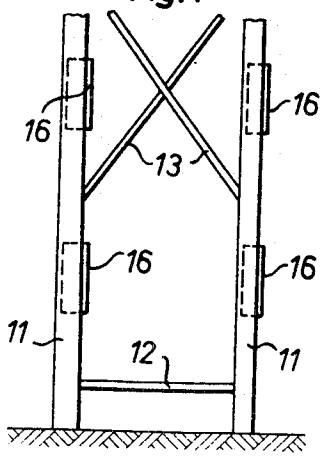


Fig. 2

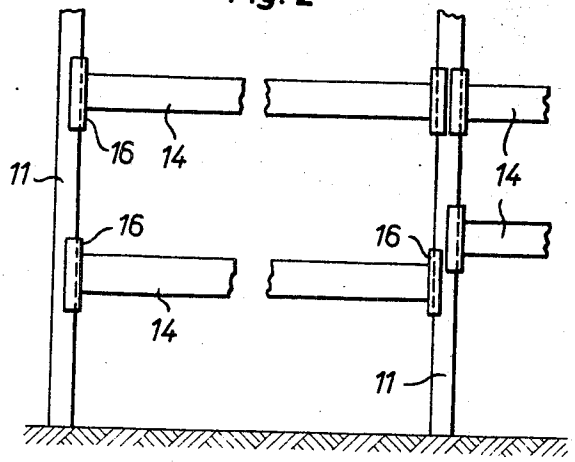


Fig. 3

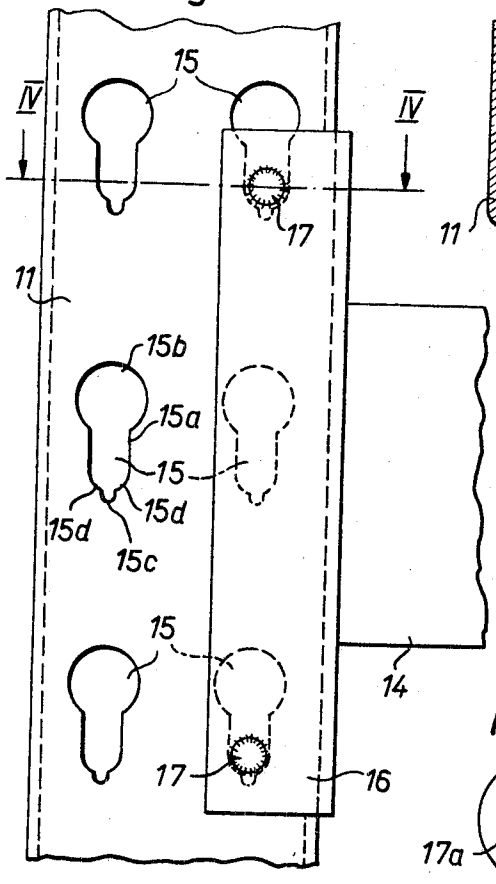


Fig. 4

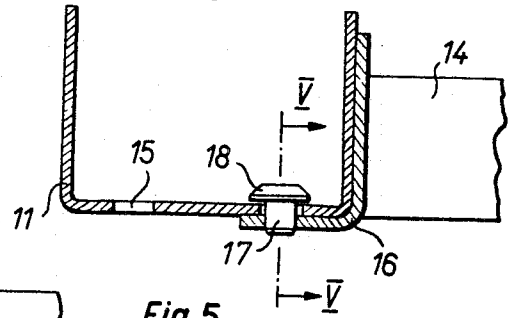


Fig. 5

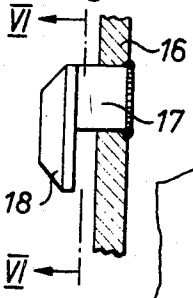


Fig. 6

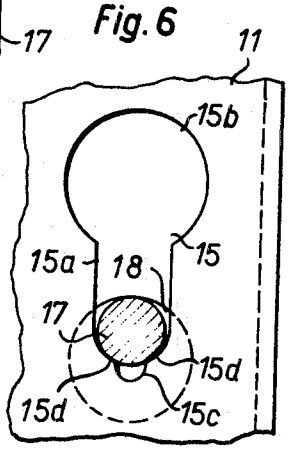
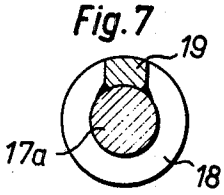


Fig. 7



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SUPPORT FOR LOADING PALLETS AND THE LIKE

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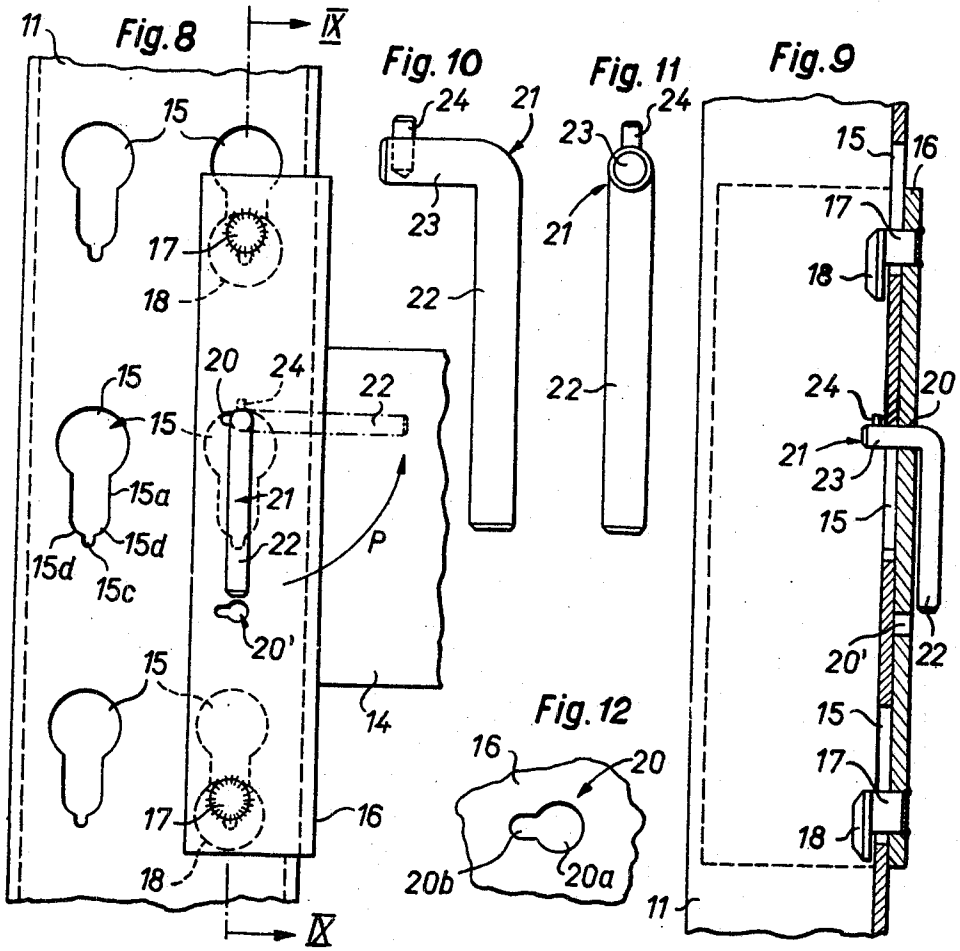

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SUPPORT FOR LOADING PALLETS AND THE LIKE

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Int. Cl. A47f 5/10
U.S. Cl. 211—176 4 Claims

ABSTRACT OF THE DISCLOSURE

A support for loading pallets and the like wherein a plurality of vertical columns are provided each having spaced catch-recesses therein. Shelf supports having a plurality of horizontally arranged suspension pins are mounted vertically adjustable in the catch recesses. The pins have a head and the catch recesses for accommodating the suspension pins each have the form of a vertically extending slot with a widened upper end portion for the insertion of said head and at the bottom thereof an extension narrower than the diameter of a suspension pin so that at the points of transition from said slot accommodating said suspension pin to said narrower extension two shoulders are formed spaced horizontally apart for supporting laterally free from play the suspension pin. Means are provided for locking the supports against accidental displacement.

This invention relates to a frame with vertical hollow columns and with vertically adjustable shelf supports fitted to catch-recesses in the hollow columns, having a multiplicity of suspension pins arranged horizontally and each provided with a head, the catch-recesses for accommodating the suspension pins each having the form of a vertically extending slot with a widened upper end for inserting the head of the suspension pin. The frame may be primarily intended for storing goods of different kinds; in particular it is designed for the application of loading pallets, on which the goods to be stored can be stacked.

The frame in accordance with the invention differs essentially from known frames of a similar kind and used for the same purposes, in that each catch-recess has at the bottom an extension which is narrower than the diameter of the suspension pin, so that at the point of transition from the slot accommodating the suspension pin to the narrowed extension, there are formed two shoulders, spaced apart horizontally, for lateral support without play of the inserted suspension pin.

The suspension pin may advantageously be formed cylindrical at least in its lower half, and the said shoulders may be made sloping inwards and downwards, while the contour of the shoulders may advantageously extend along two portions of a semicircle whose diameter corresponds to the width of the slot. In order to be able to carry out the suspension and release of the shelf supports without difficulty, the width of the slot accommodating the suspension pins is preferably made considerably larger than the diameter of the suspension pin, while the width of the narrowed extension at the top may be less than half the diameter of the suspension pin.

In order to facilitate the lifting of the shelf supports

from the catch-recesses, in a preferred embodiment the uppermost point of the periphery of the head of each suspension pin is arranged at not more than the height level of the uppermost geometrical envelope line of the relevant suspension pin. With this arrangement the shelf supports to be released can be lifted till the suspension pins abut against the upper end of the catch-recesses and then can be released from the frame columns, without any interference from the heads of the suspension pins.

In a particularly advantageous form of embodiment of the frame in accordance with the invention the shelf supports each have two spars extending horizontally and parallel to one another, each fixed at the ends with a vertical angle member whose arms straddle the appropriate column. There may be accommodated on an arm of each angle member two or more suspension pins extending at right angles to the longitudinal direction of the shelf support spar, superimposed at a distance apart from one another, in such a way that they project into the space bounded by the two arms of the angle member and can engage in two different catch-recesses of the column. In this way there is obtained a satisfactory, stable and play-free connection between the columns and the shelf support spars, so that it is only necessary to connect the columns present at the two ends of the spar in pairs by additional connecting stays, which extend transversely to the longitudinal direction of the spar.

This invention also provides a form of embodiment of the frame described, in which an effective security is obtained against accidental lifting up of the shelf supports and consequent lifting off of the suspension pins, in a very simple manner.

The measures provided for obtaining the said security consist in accordance with the invention in that at each arm of each angle member which has one or more suspension pins, at least one perforation is provided, the uppermost edge part of which has at least approximately the same position as the uppermost edge part of one of the catch-recesses of the column, and that a locking member releasable by the perforation of the angle member and by the catch-recess just mentioned, is inserted in order to secure the angle member against being lifted up and hence the suspension pin being accidentally lifted off.

The locking member may advantageously have on the outside of the relevant arm of the angle member a hand-grip portion hanging downwards in the rest position, and at the inner end in the hollow space of the column an upwardly directed projection gripping behind the uppermost edge part of the relevant catch-recess. Here the part of the locking member passing through the perforation of the angle member and through the catch-recess of the column may be a pin or bolt of circular section, the said bolt being rotatable round its longitudinal axis in the perforation of the angle member and the said perforation having a slot type extension, through which the projection at the inner end of the locking member can pass, after it has been brought into a suitable position by the rotation of the bolt by means of the hand-grip part, the said position being other than a position directed upwards.

Other objects and details of the invention will appear from the claims, from the detailed description which now follows, and from the attached drawings, which represent the invention partly diagrammatically and purely by way

of example. Two examples of embodiment of the frame in accordance with the invention and a partial variant will be described in more detail below with reference to the drawings, so as to make the features of the invention, further details, and the advantages thereof, clear to the person skilled in the art.

FIG. 1 shows a part of a first example of embodiment of the frame in accordance with the invention in side elevation;

FIG. 2 represents the same frame in a front view, seen from the right in FIG. 1;

FIG. 3 shows on a larger scale a detail of FIG. 2, that is to say one of the columns and the end part of a shelf support spar arranged thereon vertically adjustable;

FIG. 4 is a horizontal section along the line IV—IV in FIG. 3;

FIG. 5 is a vertical section along the line V—V in FIG. 4, on a larger scale;

FIG. 6 shows a cross-section along the line VI—VI in FIG. 5 through an individual suspension pin, which is in engagement with a catch-recess of the column;

FIG. 7 shows a similar cross-section through a variant embodiment of the suspension pin;

FIG. 8 is a similar representation to FIG. 3 of a second example of embodiment of the frame in accordance with the invention, differing from the first example by measures and means for securing the shelf support spar against accidental release from the column;

FIG. 9 is a vertical section along the line IX—IX in FIG. 8;

FIG. 10 shows the locking member serving for the securing, in its position visible in FIG. 9, but on a larger scale;

FIG. 11 is a view of the locking member seen from the left in FIG. 10;

FIG. 12 is a representation similar to FIG. 8, but on a larger scale, of part of the angle member with the perforation for inserting the locking member in accordance with FIGS. 10 and 11.

The frame, only diagrammatically represented in FIGS. 1 and 2, has a number of vertical columns **11** which are interconnected in pairs by horizontal transverse stays **12** and crossed stays **13**, as shown in FIG. 1. In the front view in FIG. 2 there can be seen only the front one of each pair of columns **11** interconnected by the transverse stays **12** and **13**, the rear one being hidden by the said front one. The front columns **11** of two successive pairs of columns are interconnected by a multiplicity of horizontal shelf support spars **14**. In exactly the same way the rear columns **11**, not visible in FIG. 2, are interconnected by horizontal shelf support spars. The front and rear spars **14** are located in each case at the same height level, and together form a shelf support for applying loading pallets on. In this case a direct transverse connection between the spars **14** on each shelf support is superfluous. Depending on the purpose for which the frame is intended, however, the spars **14** of each shelf support may nevertheless be interconnected by plates, gratings, transverse supports and so on.

The shelf support spars **14** are releasably connected with the columns **11** and are vertically adjustable. The following means and measures are provided for this purpose.

The columns **11** are made hollow in known manner and in the example of embodiment represented are of Ŭ-shaped cross-section with two longitudinal bent corners, as can be seen in FIG. 4. The web or end face surface lying opposite the open side of each column **11**, is provided with two adjacent rows of catch-recesses **15** (FIGS. 3, 4 and 7), each having the form of a vertically extending slot **15***a* with a widened circular upper end part **15***b*. At the bottom each catch-recess **15** has an extension **15***c*, narrower than the slot **15***a*; in the example represented it is semi-circular. At the point of transition between the slot **15***a* and the narrower extension **15***c* two shoulders **15***d* are formed, sloping inwards and downwards.

As clearly shown by FIGS. 3 and 7, the contour of the the shoulders **15***d* extends along two arcs of a semi-circle, whose diameter corresponds to the width of the slot **15***a*. The width of the narrow extension **15***c* at the top, that is to say at the point where it joins the shoulders **15***d*, is rather less than half the width of the slot **15***a*. The diameter of the widened circular end part **15***b* is about twice the width of the slot **15***a*. The successive catch-recesses of each vertical row are all the same distance apart. Horizontally, the catch-recesses **15** are each at a considerable distance from the longitudinally-extending bend corners of the appropriate column **11**.

Each of the shelf support spars **14** is fixed at each of its ends to an angle member **16** extending vertically. The spar **14** is here at right angles to one arm of the angle member **16**, while the other arm extending parallel to the longitudinal direction of the spar **14** projects beyond the relevant end of the spar. The angle members **16** are intended here to be placed outwardly straddling the columns **11**, the second-mentioned arm partly gripping over the web or end face surface (provided with catch-recesses **15**) of the columns **11**, as shown in FIGS. 3 and 4. There are welded to the last-mentioned arms two cylindrical suspension pins **17**, spaced apart one above the other, the longitudinal axes of which extend horizontally and at right angles to the longitudinal direction of the relevant spar **14**. The suspension pins **17** project into the space bounded by the two arms of the relevant angle member **16** and each have a plate-shaped head **18**.

The diameter of the head **18** is less than that of the widened end part **15***b* of each catch-recess **15**, but greater than the width of the slot **15***a*, which in turn is very considerably, e.g. 5 to 10%, greater than the diameter of the shank of the suspension pin **17**. In order to facilitate the insertion of the head **18** in the widened end part **15***b*, the periphery of the head **18** is made frusto-conical. The distance of the head **18** from the arm (of the angle member **16**) supporting the relevant suspension pin **17**, is slightly greater than the wall thickness of the columns **11**. FIGS. 5 and 6 show that the suspension pin **17** and the associated head **18** are arranged eccentrically in relation to one another, so that the uppermost point of the periphery of the head **18** is at the same height level as the uppermost geometrical envelope line of the suspension pin **17**.

The axes of the suspension pins **17** fixed to the same angle member **16** are at a distance apart which is a whole-number multiple of the distance apart from one another of corresponding points of the vertically successive catch-recesses **15**. In the preferred example of embodiment represented the center distances of the suspension pins **17** is such that they can be inserted and suspended in one catch-recess **15** and the next one above, as shown in FIG. 3. If desired, the two suspension pins **17** may, however, also be at a greater distance apart, so that they jump, not just over one catch-recess **15**, but over two or more. Similarly, if requisite, more than two suspension pins **17** can be accommodated in superimposition at each angle member **16**.

When the shelf support spars **14** are correctly applied to the columns **11** and particularly when they are supporting a load, the cylindrical lower peripheral part of each suspension pin **17** is applied free from lateral play on the two shoulders **15***d* of the relevant catch-recess **15**. As, that is to say, the two shoulders **15***d* of each catch-recess **15** are at a distance apart from one another horizontally, the suspension pins **15** are not merely supported in the vertical direction, but are also secured against horizontal movement in the longitudinal direction of the spars **14**, and indeed all the more so the greater the load resting on the spars **14**. This security against horizontal movement is due to the shoulders **15***d*, without the suspension pins **17** being applied against the vertically ex-

tending flanks of the slot **15***a*. The suspension pins **17** are therefore not clamped fast in the catch-recesses **15**, so that it is easy to lift up the pins **17** at any time for the purpose of adjusting the height of the spars **14**, since all that is necessary is to lift first one end and then the other end of each spar, until the heads **18** of the relevant suspension pins **17** can be moved out of the widened upper end part **15***b* of the catch-recesses **15**. This is facilitated by the eccentric arrangement of the head **18** of each suspension pin **17**, as after the upward movement of the suspension pin **17** until it abuts against the upper end of the catch-recess **15**, the head **18** cannot grip round the upper edge of the widened end part **15***b*. As the width of the slot **15***a* of each catch-recess **15** is considerably greater than the diameter of the suspension pin **17**, the two ends of the spar **17** to be adjusted need not be simultaneously raised by the same amount. It is possible to lift up or suspend the two ends of each spar **14** in succession and independently of one another.

When at least two or more shelf support spars **14** are inserted, the frame described is very stable and completely free from wobble. Thanks to the support free from lateral play, described above, of each suspension pin **17** on the two associated shoulders **15***d* of the relevant catch-recess **15**, the columns **11** are held firm by the shelf support spars **14**. The fact that each end of the spar **14** is connected by means of two suspension pins arranged at a considerable vertical distance apart, with the adjacent column **11**, adds considerably to the strength of the frame, since the application, free from lateral play, of each of these suspension pins on two shoulders **15***d* prevents any deviation of the column from the vertical, as long as the suspension pins are applied on the said shoulders. This is ensured all the more in proportion as the load on the shelf supports increases. The satisfactory connection described between the columns **11** and the shelf support spars **14** is therefore obtained by a locking action and becomes all the better as the load on the shelf supports is increased.

It might perhaps be thought that an extraordinarily high degree of precision is required for the formation of the catch-recesses and the suspension pins, and also for their arrangement, in order to be always able to obtain the simultaneous application of all four or more suspension pins of each shelf support spar on the associated shoulders **15***d* of the catch-recesses **15**. This, however, is not so. First of all it must be remembered that the frame is still stable even when it might happen that only one single suspension pin **17** were acting as a support at each end of the spar **14**. If then the shelf supports were heavily loaded it could happen that the shoulders **15***d* carrying one suspension pin **17** yielded slightly under the load, but this would only mean that they would adapt themselves better to the shape of the relevant pin **17** and then finally the second suspension pin **17** of the same angle member **16** would also come to rest on the shoulders assigned for this purpose of the relevant catch-recess **15**.

A further advantage of the frame described which may be mentioned is that the angle member **16** and the two or more suspension pins **17** fixed to it oppose any bending of the middle part of each shelf support spar **14**, because the upper suspension pins **17** prevent the upper end of the relevant angle member **16** from moving away from the adjacent column **11**, i.e. in FIG. 3 moving to the right, which would cause the spar **14** to bend. On the other hand the suspension pins **17** and the angle members **16** prevent any bending of the columns **11**, if the shelf support spar **14** should nevertheless ever bend downwards under too heavy a load. Thanks to the particular upper pin **17** concerned the column **11** is then, in fact, drawn inwards, i.e. in FIG. 3 to the right, but simultaneously the particular lower suspension pin **17** concerned then forces the relevant column **11** outwards to approximately the same extent, i.e., in FIG. 3 to the left, so that practically no noticeable deflection of the column **11** out of the vertical takes place. The tensile and bend strength of the columns **11** is furthermore hardly affected deleteriously by the catch-recesses **15** at all, as all these catch-recesses are arranged at a distance from the longitudinal edges of the columns, so that they do not involve any interruptions or other weakenings in the strength of the important longitudinal edge parts.

If the U-section of the columns **11** represented should for some purposes of application, not ensure sufficient strength, the said columns **11** may be given a C-section, i.e. the free ends of the flanges of the U-section in FIG. 4 are each bent over further in relation to one another. The columns then have four longitudinal corners each.

As each column has two rows of catch-recesses **15** and the angle members **16** in each case when fixed to the columns leave the second row of catch-recesses completely free, as shown in FIG. 3, shelf support spars **14** can be fitted on the right and on the left of the same column and at the same height or at different height levels (FIG. 2).

As the front columns **11** visible in FIG. 2, and also the corresponding rear columns of the frame, do not have to be connected by cross-ties in order to give the frame the requisite stability, all the shelf supports are readily accessible both from the front and also from the back, if the frame is standing by itself in a clear space. On the other hand, it is possible to arrange the front and rear columns **11** of each pair of columns in like manner, so that the web or end face surfaces provided with catch-recesses **15** are always turned to the front and consequently both the front and also the rear shelf support spars **14** can be fitted from the front, i.e. in FIGURE 1 from the right, and can be removed from the front.

If requisite the suspension pins may have the form represented in FIGURE 7, where a cylindrical portion **17***a* is arranged so axially with the head **18**. At its side facing upwards the cylindrical portion **17***a* is, however, provided with a beading **19**, extending at least to the uppermost point of the periphery of the head **18**. The beading **19** can, if desired, be produced merely by applying material by welding or hard soldering. Its duty is to prevent, during an upward movement of the suspension pin, the head **18** from being able to grip behind the upper edge of the widened end part **15***b* of the catch-recess **15**, if it is desired to lift up the pin out of the catch-recess.

When loading the frame described or removing loads from it, by means of mechanical conveying devices, such as fork lift stackers for instance, the danger occurs in some circumstances of a shelf support spar being unintentionally raised and the suspension pins at one end or both ends of the spar being lifted out of the catch-recesses of the columns. This may cause an upset of the articles stored on the shelf supports concerned and possibly also of the suspended shelf support spar, which might result in material losses and physical injuries. In order to avoid this the following measures are adopted in the second example of embodiment of the frame in accordance with the invention as in FIGS. 8 to 12.

Each of the angle members **16** has in each arm, which is provided with the suspension pins **17**, two equal perforations **20** and **20'** (FIGS. 8, 9 and 12), one of which is arranged in such a way that its uppermost edge part has at least approximately the same position as the uppermost edge part of a catch-recess **15** of the column **11**. This is the case in the example of embodiment represented with the upper perforation **20**. The lower perforation **20'** could incidentally be omitted; its purpose will be explained later.

A locking member **21** is inserted through the said upper perforation **20** and through the catch-recess **15** lying below this. The latter has a hand-grip part **22** hanging downwards on the outside of the angle member **16**, a pin or bolt **23** passing through the perforation **20** and the catch-recess **15** and a projection **24** projecting upwards at the inner end of the same, which grips behind

the uppermost edge patr of the catch-recess **15**. The hand-grip part **22** and the bolt **23** consist of a single bar type piece of material of circular cross-section, which is bent through 90° between the said parts. The projection **24** is formed by a pin inserted radially in the bolt **23**.

The perforation **20** consists of a circular bore **20***a* corresponding to the cross-section of the bolt **23** and a slot type extension **20***b*, which is arranged radially to the bore **20***a* and extends horizontally. The slot type extension **20***b* is given such dimensions that the projection **24** can pass through it, when the said projection has been brought out of its upwardly pointing direction into a horizontal position by an appropriate rotation of the locking member **21**, in which horizontal position the hand-grip part **22** assumes the position indicated in chain line in FIG. 8. The cylindrical peripheral surface of the bore **20***a* forms a bearing for the rotatable support of the bolt **23**.

When the locking member **21** is inserted as shown in solid line in FIG. 8 and in accordance with FIG. 9, the hand-grip part **22** automatically hangs vertically downwards under the influence of gravity, while the projection **24** simultaneously projects vertically upwards. As the projection thereby engages behind the uppermost edge part of the relevant catch-recess **15** in the hollow space of the column **11**, the locking member is secured against slipping out of the said catch-recess **15** and out of the perforation **20**. In this position the locking member **21** simultaneously secures the angle member **16** against any movement upwards, so that any lifting up of the suspension pin **17** out of the catch-recess **15** assigned to its of the column **11** is prevented.

If it is desired to release the angle member **16** and the pins **17** from the said securing action against lifting, the handle **22** is gripped and swivelled in the direction of the arrow P in FIG. 8, into the position shown in chain line, by which the bolt **23** is rotated round its longitudinal axis. This brings the projection **24** exactly behind the slot **20***b* of the perforation **20**, so that the bolt **23** can be drawn out of this perforation. Now the angle member **17** can be raised and released by lifting the pipes **17** from the associated catch-recess **15** of the column **11**.

In order to render the securing action operative again after the application of the angle member **16** and the suspension of the pins **17**, the reverse is done. With the handle **22** in the horizontal position the locking member **21** is inserted in the conjugate perforation **20** and through the catch-recess **15** lying behind this. The handle **22** is then released, on which under the influence of gravity it automatically assumes its rest position hanging downwards, and thereby the projection **24** engages behind the uppermost edge part of the relevant recess **15**.

The means and measures described for securing the angle member **16** to the column **11** are simple in construction and therefore very effective. Furthermore the locking member **21** is simple to use, and the easily visible handle **22** means that the position in which the locking member is placed can be identified even from a considerable distance, and it can be checked that it is in its correct position on the inside for ensuring security.

The second perforation **20'** (the lower one in FIGS. 8 and 9) in the angle member **16**, serves to accommodate the bolt **23** of the locking member **21** in the case when the right and left ends of the particular shelf support spar **14** have exchanged places. This then means that in suspending the pins **17** on the column **11** the second perforation **20'** comes into position in front of one catch-recess **15** in such a way that the uppermost edge parts of the perforation and of the relevant catch-recess **15** have at least nearly the same position, so that even in this case security can be obtained by means of the locking member **21** in the manner described above.

If requisite the perforation **20** in the angle member **16** could also be arranged in such a way that the locking member **21** inserted through it comes into engagement with the same catch-recess **15** in which a suspension pin **17** also engages. This could be the case for instance with the catch-recess **15** in FIGS. 8 and 9 accommodating the lower suspension pin **17**.

I claim:

1. A support for loading pallets and the like comprising a frame having a plurality of vertical columns each having spaced catch-recess therein, vertically adjustable shelf supports mounted in said catch recesses, a plurality of horizontally arranged suspension pins cylindrical in their lower halves on each of said shelf supports, each of said pins having a head, each of said catch recesses for accommodating said suspension pins having a vertically extending slot with a widened upper end portion for the insertion of said head and at the bottom of said slot an extension thereof narrower than the diameter of a suspension pin so that at the points of transition from said slot accommodating a suspension pin to said narrower extension two concave curved shoulders sloping inwardly and downwardly are formed spaced horizontally apart for supporting laterally free from play said suspension pin, the contour of said shoulders extending along two arcs of a semicircle having a diameter corresponding to the width of said slot, said slot having a width greater than the diameter of said suspension pin and the width of said narrower extension being less at the top thereof than half the diameter of a suspension pin, each of said shelf supports comprising a vertically extending angle member having two arms which straddle an associated column, one of said arms having at least one of said suspension pins projecting into the space bounded by said two arms, a spar fixed at its ends to angle members upon two spaced columns, each of said angle members having at least one suspension pin and a perforation whose uppermost edge part has approximately the same position as the uppermost edge part of one of said catch recesses of the associated column and a locking member is releasably inserted through said perforation and through said associated catch recess to secure said angle member against being lifted up and securing said suspension pin from being accidentally displaced, said locking member having a handle located outside of the angle member hanging downwardly in rest position and is provided at the inner end within the space of the associated column with a projection engaging behind the uppermost edge part of the associated catch recess.

2. A support for loading pallets and the like comprising a frame having a plurality of vertical columns each having spaced catch-recesses therein, vertically adjustable shelf supports mounted in said catch recesses, a plurality of horizontally arranged suspension pins cylindrical in their lower halves on each of said shelf supports, each of said pins having a head, each of said catch recesses for accommodating said suspension pins having a vertically extending slot with a widened upper end portion for the insertion of said head and at the bottom of said slot an extension thereof narrower than the diameter of a suspension pin so that at the points of transition from said slot accommodating a suspension pin to said narrower extension two concave curved shoulders sloping inwardly and downwardly are formed spaced horizontally apart for supporting laterally free from play said suspension pin, the contour of said shoulders extending along two arcs of a semicircle having a diameter corresponding to the width of said slot, said slot having a width greater than the diameter of said suspension pin and the width of said narrower extension being less at the top thereof than half the diameter of a suspension pin whereby jamming of said pin is prevented.

3. A support as set forth in claim **2** wherein each of said shelf supports comprises a vertically extending angle member having two arms which straddle an associated column, one of said arms having at least one of said suspension pins projecting into the space bounded by said two arms, a spar fixed at its ends to angle members upon two spaced columns, each of said angle members

having at least one suspension pin and a perforation whose uppermost edge part has approximately the same position as the uppermost edge part of one of said catch recesses of the associated column and a locking member is releasably inserted through said perforation and through said associated catch recess to secure said angle member against being lifted up and securing said suspension pin from being accidentally displaced.

4. A support as set forth in claim 3 wherein said locking member having a handle located outside of the angle member hanging downwardly in rest position and is provided at the inner end within the space of the associated column with a projection engaging behind the uppermost edge part of the associated catch recess.

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