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Colbridge

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[54] **ADJUSTABLE STORAGE RACK**

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[52] **U.S. Cl.** **211/176,** 248/224, 248/243

[51] **Int. Cl.** **A47b 96/12,** A47f 5/08

[58] **Field of Search** 211/175, 183, 176, 117; 108/110, 108; 248/407, 224, 243

[56] **References Cited**

UNITED STATES PATENTS

2,971,658	2/1961	D'Altrui	211/176
3,422,962	1/1969	Burns	211/176
3,251,478	5/1966	Frazier	211/176
2,966,228	12/1960	Kowalski	182/229 X
3,152,670	10/1964	Selkregg	211/176 X
3,642,320	2/1972	Ward	248/407 X
3,512,654	5/1970	Olsen	211/176
3,212,648	10/1965	Baker	211/176 X
2,577,286	12/1951	Streeter	248/238
3,647,080	3/1972	Denny	211/176
3,337,062	8/1967	Seiz	211/176
2,872,144	2/1959	Hobson	248/243 X
2,971,805	2/1961	Weiss	248/243 UX
3,136,520	6/1964	Reiss	248/243
3,550,785	12/1970	Seiz	108/108 X
1,698,974	1/1929	Vance	211/60 R

FOREIGN PATENTS OR APPLICATIONS

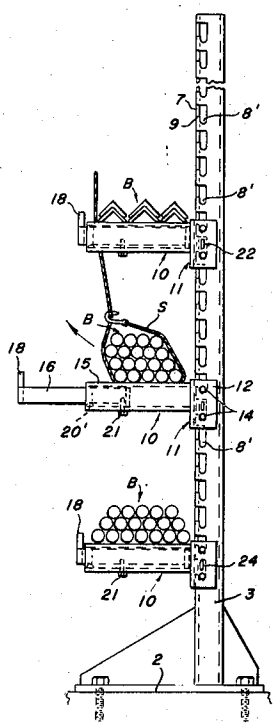
669,080	3/1952	Great Britain	211/176
669,697	9/1963	Canada	248/243

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Assistant Examiner—Abraham Franken
Attorney, Agent, or Firm—Parmelee, Miller, Welsh & Kratz

[57] **ABSTRACT**

There is disclosed an adjustable storage rack with vertically adjustable arms that are horizontally extensible and retractable to facilitate placement of material on or removal of material from the rack, especially where an overhead crane is used for this purpose.

4 Claims, 8 Drawing Figures



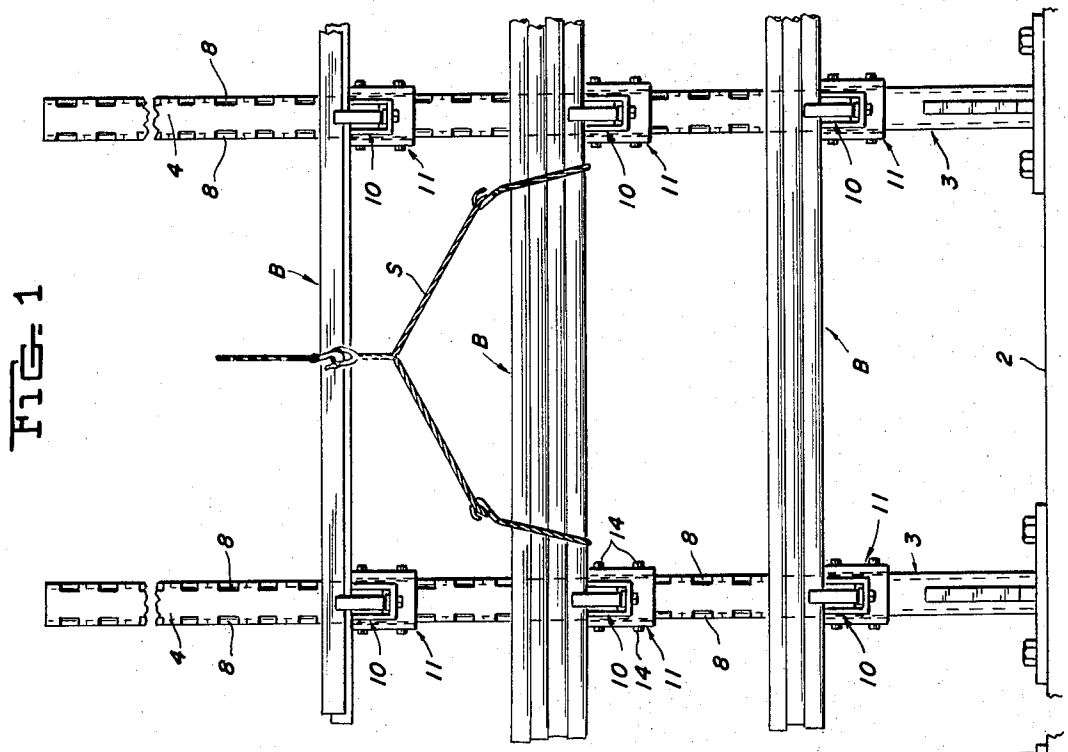


FIG. 1

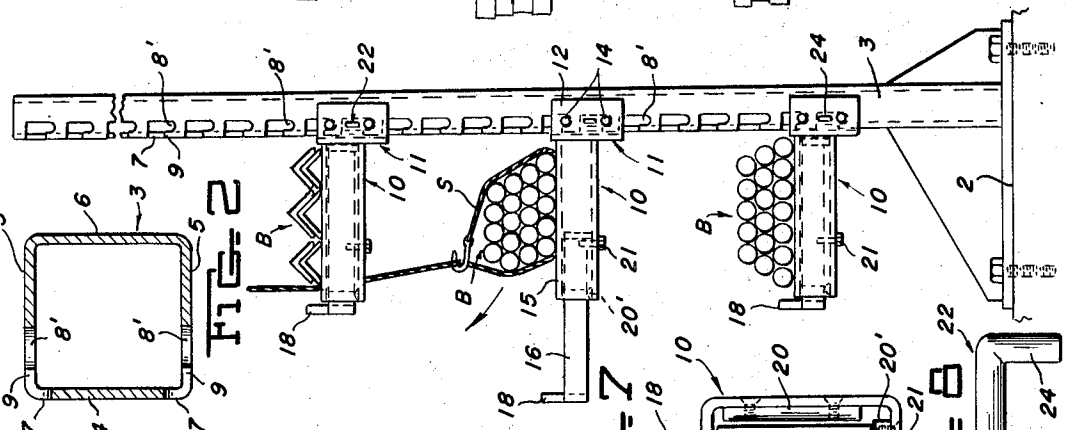


FIG. 2

FIG. 4

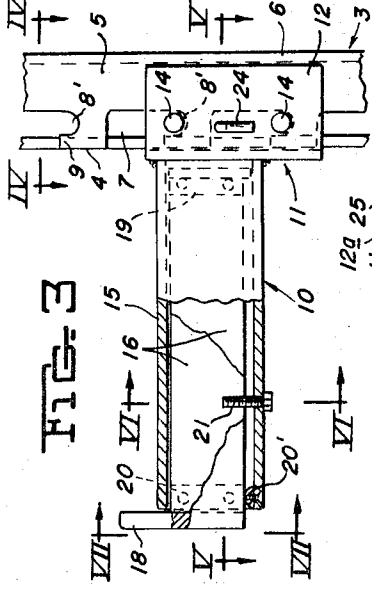


FIG. 3

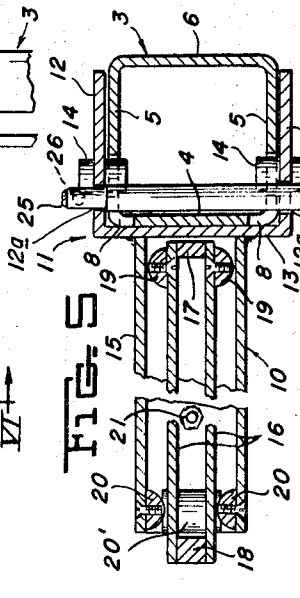


FIG. 5

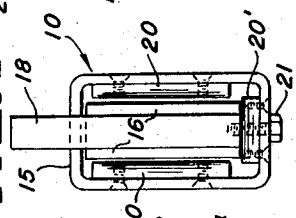


FIG. 7

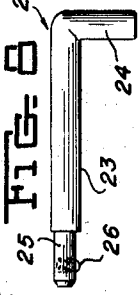


FIG. 8

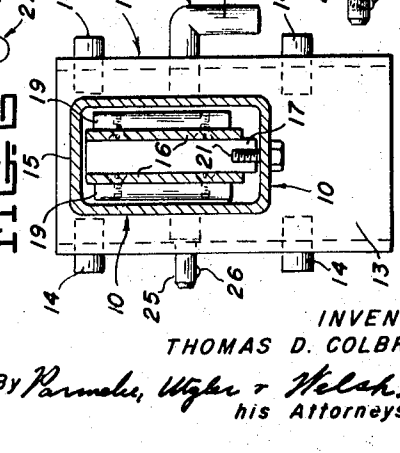


FIG. 6

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ADJUSTABLE STORAGE RACK

This invention is for an improvement in industrial storage racks and more particularly a supporting arm therefor.

Storage racks of the type to which this invention is particularly applicable are widely used in manufacturing and other industrial establishments where elongated metal products, such as rods, bars, angles and other structural shapes are stored to be available when needed. Usually such materials are handled in bundle-like lots with all pieces in a bundle being of uniform length, and usually a load or bundle is much too heavy to be lifted onto or removed from a rack by manual labor.

These storage racks commonly comprise two or more spaced vertical columns, and each column is notched at regular short intervals. Load-bearing arms are hooked into the notches at selected elevations. There are laterally extending arms on the two columns at selected elevations so arranged that at each level a bundle or group of elongated articles are laid across them or some of them. The uprights frequently extend from the floor to a height much higher than can be reached with a high lift fork truck, and the arms are arranged in vertically-spaced relation one above another at intervals on the columns. The arms on the columns may be vertically spaced at regular intervals, or irregular distances, depending on the stock to be stored and the need for more or less clearance between the top of one load and the bottom of the next load above, but for a particular product to be stored, there will always be at least two arms at the same level, and more if required to support the load placed thereon in a horizontal position.

Generally but not necessarily the arms are of uniform length, so that the load on the arms at one level is located directly above another, and while this imposes little difficulty when a loose bundle of bars, for example, is being placed on or removed from the arms at a level where a high lift fork truck can be used, there is great difficulty when the load is being slung from an overhead crane hook because a load at one level cannot be lifted or lowered vertically because of interference from the arms, and may be loaded on the arms at a higher or lower level.

The present invention is designed to enable an overhead crane to be more readily used for loading or unloading material from the supporting arms of a storage rack at any level.

To this end each arm has a yoke-like terminal member for attaching the arm at a selected level to the upright, and to this member there is welded an arm which is a hollow box section. Telescopically guided in this arm is an extension that is normally received entirely within the arm, but which may be pulled out horizontally to effectively increase the length of the arm. Normally the extensible section is retracted with the arm and the load is supported on the arms in the usual manner. To remove a load or bundle from the supporting arms at a particular level, the crane sling is secured around the load and the extensions are then pulled out. With the arms extended the crane operator may move the bundle out onto the extensions, often by maneuvering the lifting cable against the load on the next level above. A load to be placed on the rack can also be lowered onto the extensions and if necessary workmen, on

safety ladders or some other support, can work the load back onto the arms and then push the extensions into place.

The accompanying drawings show a preferred embodiment of the invention. In the drawings:

FIG. 1 is a front elevation of a storage rack embodying the invention;

FIG. 2 is a side elevation of FIG. 1, showing the extensible arms in extended position and showing a cable sling about the bundle of material in position on the arms;

FIG. 3 is a fragmentary view on a larger scale, showing in side elevation a single extensible arm with a portion of the arm broken away to show the extension telescoped within it;

FIG. 4 is a horizontal transverse section through one of the supporting columns, in the plane of line IV—IV of FIG. 3;

FIG. 5 is a longitudinal plan section through the arm and column in substantially the plane of line V—V of FIG. 3;

FIG. 6 is a front elevation of the arm with its yoke-like terminal portion, the arm, however, being shown in vertical section in the plane of line VI—VI of FIG. 3;

FIG. 7 is a front end view of the arm, the terminal or yoke portion being omitted; and

FIG. 8 is a side elevation of a removable locking pin for preventing accidental removal of the arm assembly from the column.

Referring to the drawing showing a basic rack structure of only two uprights, 2 designates a base to which two spaced vertical columns 3 are secured, the spacing of the columns from each other depending to some extent on the length of the material to be stored on the rack. Sway bracing which is often used to connect the two columns has not been shown.

The columns 3 are of a generally square or rectangular configuration, being formed either from flat steel plate that is punched to provide notches and then bent to shape, or as here shown, being of heavy gauge tubing in which the notches, hereinafter described, are milled. Such columns, which in themselves are conventional, each have a front wall or web 4 and spaced parallel side walls 5. As here shown there is a rear wall or web 6, but in columns formed from metal plate the rear of the column may be open. For the purpose of this invention only the front and side walls are significant.

As is usual in racks of this type each column 3 has notches 7 at closely-spaced intervals in each of the two front corners throughout the greater portion of its height, the notches in one corner being horizontally aligned with those in the other corner. These notches are so formed that from the front they appear as vertically elongated narrow rectangular openings 8 in the front wall (see FIG. 1). In the side walls 5 the notches have the configuration shown in FIG. 3 with a rectangular opening in the side wall and a deeper notch 8' spaced back from the corner so that there is a lug 9 between this part of the notch and the front corner. The shape of these notches is conventional in racks of this kind.

The upright columns have horizontaly extending arm assemblies 10 thereon arranged in horizontally aligned pairs at selected spaced levels above the base on which bundles or loads B of elongated objects, such as rods, bars, pipes or tubes, angle section or the like are placed

for storage until needed. Each arm assembly has a yoke-like terminal member or base **11** having spaced parallel sides **12** and a front wall **13,** the yoke being so formed that it has a close working fit when it straddles a vertical column with its front wall **13** against the front wall **4** of the column. The side walls **12** of the yoke each have upper and lower studs **14** passing therethrough and welded in place, these studs being of such length and so spaced vertically that when the member **11** is moved into position at the front of the column the notches **7** with the front openings **8** will provide clearance for them, but when the front end of this yoke member is against the front of the column the studs will be positioned above the notch portions **8'** of each of two separate notches in the upright and the yoke member may then be lowered so that the studs will then be back of the lug portions **9** and the yoke member thus removably anchored to the column. Some such arrangement as this is known and used and is not in itself new in adjustable storage racks.

According to this invention there is a hollow arm **15** securely welded to the front wall portion **13** of the yoke member. Preferably the arm is a rectangular box section with the long axis of the rectangle being vertical. The arm is of the length normally required to support the load on the shelf. There is an extension arm telescopically received in the hollow arm **15.** As here shown it comprises two parallel side plates **16** joined at their inner ends by a block **17** and at their outer ends by a vertical block **18.** On the outer faces of the inner end plates **16** there are half-round guide pieces **19** that bear against the inner faces of the side walls of the arm **15** and at the front end of the arm **15** there are half-round vertical guide pieces **20** removably attached to the inner side faces of the arm. These half-round guide strips allow the extension section to slide freely in the arm **15** without excessive side play, and the vertically projecting block **18** at the front end of the extension provides a convenient part to grasp in sliding the extension out of the arm. There is a bolt **21** threaded through the bottom of the arm providing an abutment in the path of movement of the block **17** on the inner end of the extension to limit the outward movement of the extension and prevent it from being pulled out of the arm to an unsafe extent. There is also a half-round guide piece **20'** under the extension at the outer end of the hollow arm over which the extension slides.

The yoke member **11** has aligned openings in the sides **12** thereof indicated at **12a** in FIG. **5** between the upper and lower studs through which a removable locking pin may pass. This pin, separately shown in FIG. **8,** is designated **22** and has a shank **23** with a bent portion **24** at one end forming a handle and a terminal **25** at the other end is of reduced section and has a spring-ball detent at **26.** The hole in one side wing **12** is large enough to receive the shank of the pin while the aligned hole in the other wing is only large enough for the reduced end of the pin to be passed therethrough. The ball detent is located where it will prevent accidental removal of the pin when it is in place. The opening for the locking pin in each wing is centered in a vertical plane slightly forward of the vertical plane of the centers of the studs **14.** As best seen in FIG. **5,** the shank of the locking pin when it is in place passes through one wing **12** of the yoke, then, because of the notches, it extends across the upright column practically against the inner face of the front wall **4** of the column. The reduced end of the shank passes out the opposite notch in the column into the smaller hole of the other side **12** of this yoke.

Normally the locking pin may not be needed for each arm on each upright of the rack, but there is a possibility that in maneuvering a load or bundle of articles into place on the rack the arms which are being loaded or unloaded, or one or both of the ones immediately above might be accidentally bumped or lifted in such manner that one or more arms could be unhooked from one or the other, or even both of the uprights. Therefore if a locking pin is not provided for each arm on the rack at all times, then one should be applied to each of the pairs of arms during the time they are being loaded or unloaded and perhaps also to the ones immediately above.

In use the rack supports the loads at the various levels in the usual manner as indicated in FIGS. **1** and **2** of the drawings and the arm extension is telescoped to its full extent into the arm. If, for example, an overhead crane is to be employed to remove a load from one pair of arms below the top, a workman pulls out the extensions from the arms which are to be unloaded. If the locking pins **22** have not previously been put into place, this is also done. The crane sling is then placed around the load to be removed, as indicated at S and by manipulation of the lifting cable, sometimes perhaps by getting a "purchase" against the articles immediately above, the load can be "walked" or dragged in increments onto the extensions where it is clear of the articles at other levels and then lifted vertically. The extensions, of course, support the load when slack is developed in the lifting cable during the process of walking or dragging the load from the supporting arms **15.** Likewise the extensions may be used in maneuvering a load into place on the rack, or support a board to be used at a lower level as a temporary scaffold on which a man may stand for helping with the moving of the load onto or off from the arms. Except when needed, the extensions are pushed back into the arms where they will not interfere with ready access to the arms at other levels or project into an area-way along which the crane may be transporting a load, or the like. When the extensions are retracted, the front block **18** extends to a level above the top of the arm assembly **15** where it may prevent an object or objects on the arms from accidentally rolling off and this is especially important where the rack supports such round objects as lengths of round rod or pipe.

In the foregoing description and drawings I have described and shown a rack having two uprights with three arms on each upright, but as is well known in the art there may be additional columns, depending on the weight and length of the articles to be stored and the length of the wall area or corridor in which the racks are located and the number and spacing of the arms will vary in different storage installations.

I claim:

1. A storage rack comprising spaced parallel uprights, each having a front web and a side wall extending rearwardly from each vertical edge of the front web with a corner portion where each side wall joins the front web, the side walls being parallel, each upright having a succession of equally spaced notches in each corner in such manner that a portion of the front web is open at each notch and a portion of the side wall is open at each notch and the opening in the side wall at

each notch has the portion remote from the front web deeper than the opening in the web, and at least one load-supporting arm member on each upright, each arm member having a yoke with a front wall and side walls arranged to fit against the front web of the upright with its side walls close against the side walls of the upright on which it is carried, the two side walls of the yoke having confronting opposed studs thereon projecting inwardly from the side walls of the yoke parallel with but spaced rearwardly from the front wall of the yoke, the arrangement being such that when the yoke is moved in a direction to embrace the upright the notches enable the studs to clear the front web and then the yoke may be lowered to enter the studs into the deeper notch portions in the side walls with the front wall of the yoke against the front web of the upright and the weight of the arm member and any load which it supports is transmitted through the studs to the side walls of the upright, the yoke having the load-supporting arm member rigidly secured thereto and projecting forwardly from its front wall, wherein each side wall of the yoke has a hole therethrough that registers with a portion of the notch in each of the side walls of the upright when the studs of the yoke are seated in the deeper notch portions in the side walls of the upright, and a removable pin passing through the holes in the side walls of the yoke and through the open portions in the side walls at each of the notches in the side walls of the upright and so positioned that the pin has a sliding clearance at the inner face of the front web of the upright to removably clamp the yoke against accidental displacement or removal from the upright as long as the pin is in place.

2. The storage rack defined in claim **1** in which the arm member has a telescopic extension thereon selectively movable between a retracted position and an extended position.

3. The invention defined in claim **2** in which the arm member is hollow and the extension is telescopically received in the arm member when it is retracted and arranged to be pulled out from within the arm member for a limited distance when it is extended.

4. The invention defined in claim **2** wherein the arm member is rectangular in section with its major axis vertical and the extension which slidably telescopes into it comprises parallel vertical strips joined together at their inner ends by a block and at their outer ends by a block of a dimension greater than the interior dimension of the rectangular section so that the outer end of the extension cannot enter the arm member and remains available to be grasped when the extension is in the retracted position, and means on the arm member projecting into the path of travel of the inner block as the extension is moved to its extended position to prevent the extension from being completely withdrawn from the arm member.

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