Sept. 13, 1966 J. STUCKI 3,272,581

STORAGE RACK

Filed Oct. 3, 1963 3 Sheets-Sheet 1

Fig.1

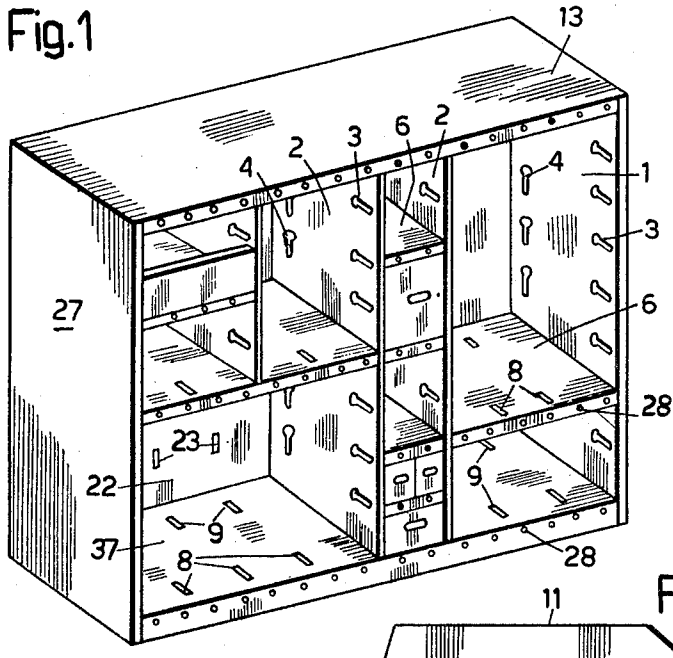


Fig.2

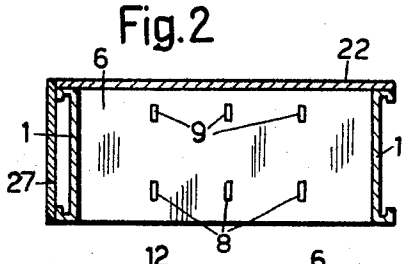


Fig.3

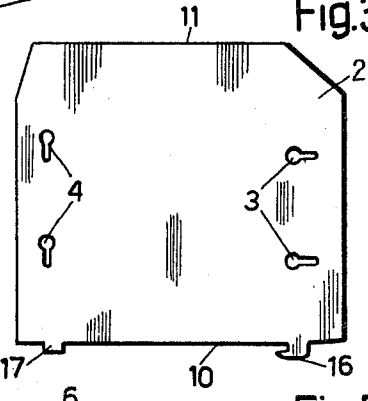


Fig.4

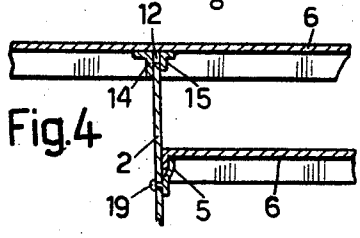
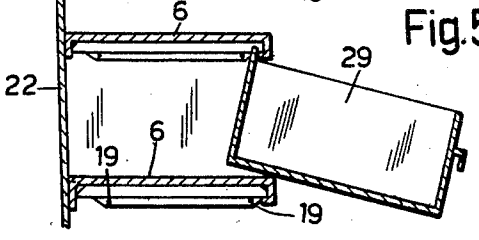


Fig.5



Sept. 13, 1966 J. STUCKI 3,272,581

STORAGE RACK

Filed Oct. 3, 1963 3 Sheets-Sheet 2

Fig.6

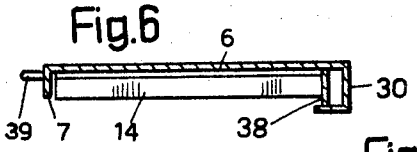


Fig.7

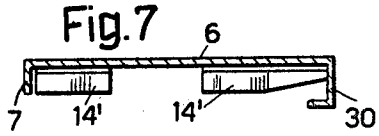


Fig.8

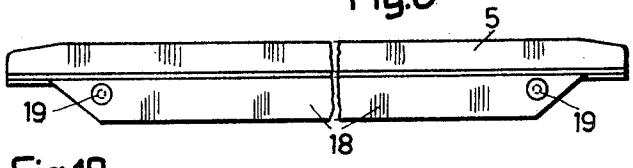


Fig.9

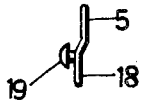


Fig.10

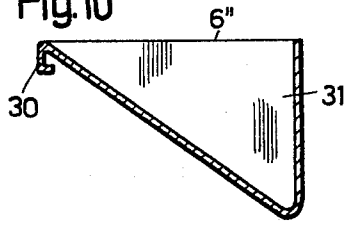


Fig.11

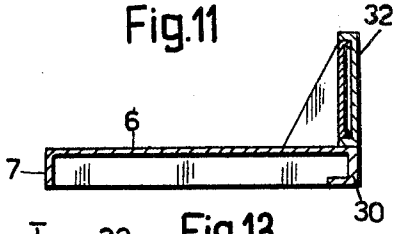


Fig.12

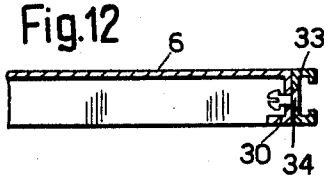


Fig.13

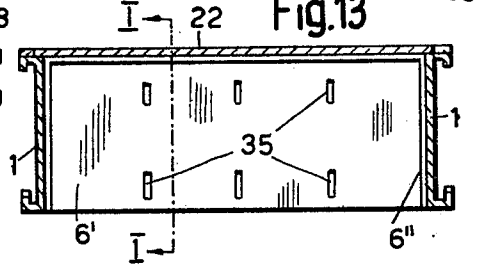


Fig.14

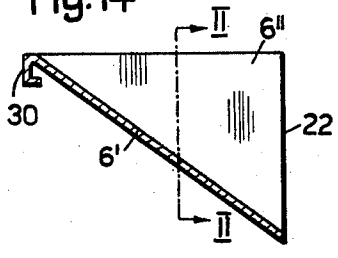
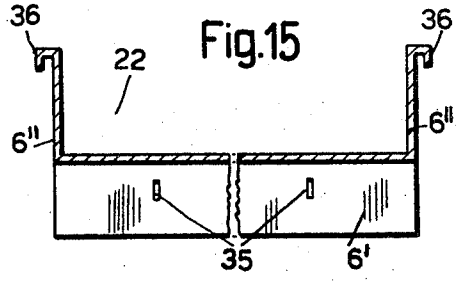


Fig.15



Sept. 13, 1966 J. STUCKI 3,272,581

STORAGE RACK

Filed Oct. 3, 1963 3 Sheets-Sheet 3

Fig.16

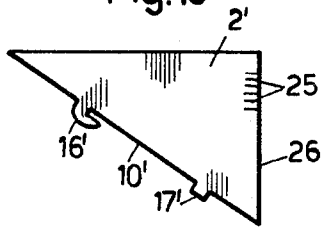


Fig.17

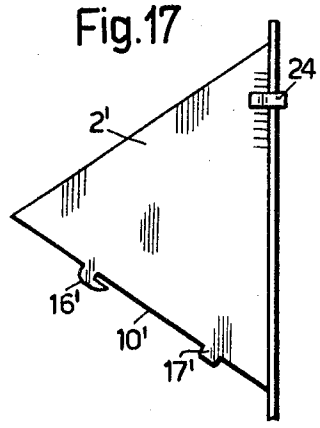


Fig.18

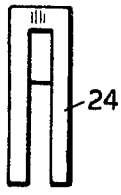


Fig.19

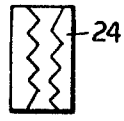


Fig.20

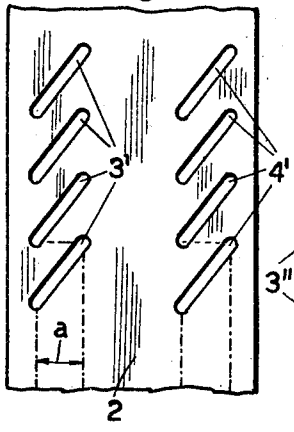


Fig.21

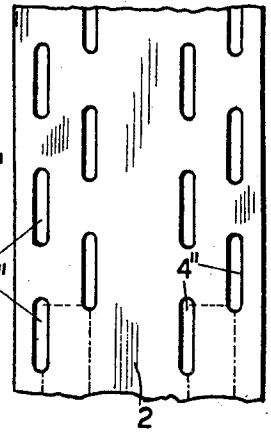


Fig.22

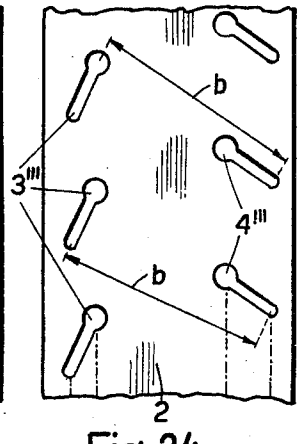


Fig.23

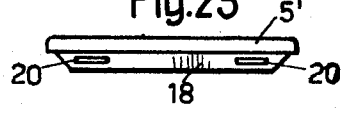
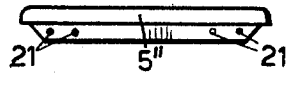


Fig.24



United States Patent Office 3,272,581 Patented Sept. 13, 1966

3,272,581

STORAGE RACK

Jakob Stucki, Neulandenstr. 32, Wil, Switzerland

Filed Oct. 3, 1963, Ser. No. 313,463
Claims priority, application Switzerland, Oct. 6, 1962, 11,702/62
10 Claims. (Cl. 312—234.4)

My present invention relates to improvements in storage racks in general and in particular to combinable racks accessible from one or two sides for stores, archives and the like, and the objects of my improvements are first to provide a modular construction to afford cells of variable width and height but of given depth, wherein such variation may be effected without the use of tools and without need for knocking down the entire frame; second to provide a modular construction rack of which the shelves may be rearranged on split levels without using tools; third to provide rack shelves adapted to receive drawers having horizontal or sloping bottoms for piece goods, free-flowing bulk or granular materials, packaged and liquid goods side-by-side or above each other, such drawers also being subdivisible; and fourth to provide a modular construction comprising cells of any desired shape and dimensions either in uniform arrangement or intermixed, or partly uniform and partly intermixed so as to satisfy all reasonable wishes and needs.

One form of the invention and detail modifications thereof are shown in the drawings, in which:

FIG. 1 shows in perspective the assembled rack involving one kind of shelf and cell subdivision both in length and height;

FIG. 2 is a horizontal section through FIG. 1;

FIG. 3 is an elevation of a partition involving two pairs of "keyhole" apertures;

FIG. 4 is a partial vertical section involving cells of different height;

FIG. 5 is a vertical section through a cell comprising a drawer;

FIG. 6 is a vertical section through a heavy-load shelf comprising a reinforcing rib in front and a supporting leg in the rear;

FIG. 7 is a vertical section through a non-reinforced shelf;

FIG. 8 shows a supporting member in elevation;

FIG. 9 depicts the latter in sideview;

FIG. 10 is a vertical section through a bin for liquid goods;

FIG. 11 is a vertical section through a cell involving a front wall, intended to receive free-flowing bulk or granular materials;

FIG. 12 is a vertical section through a shelf comprising in front a C-member adapted to receive lettered identification strips;

FIG. 13 is a horizontal section through a cell comprising an inclined floor to form a bin with the rack rear wall;

FIG. 14 is a vertical section through FIG. 13 on the line I—I thereof;

FIG. 15 is a vertical section through FIG. 14 on the line II—II therein;

FIG. 16 shows an auxiliary partition in elevation, adapted to be locked to a sloping floor;

FIG. 17 depicts another auxiliary partition for a sloping floor;

FIGS. 18 and 19 show in plan and elevation respectively a retainer lug for securing the partitions to the rack rearwall;

FIGS. 20 to 22 show in elevation different examples of hole systems in the rack sidewalls and partitions; and

FIGS. 23 and 24 depict in elevation two different supporting members for the members shown in FIGS. 20 to 22.

The sidewalls 1 of the rack or support are sheets of which the front and rear edges are bent outwardly in C-shape. A rack rearwall 22 is welded to the sidewalls 1. In order to mask the elongated holes 3 and 4 in the sidewalls 1, cover sheets 27 may be welded to the edges of the sidewalls 1. The rack top is formed by a cover sheet 13 of which the front edge also is bent in C-shape.

The rack bottom sheet 37 also is C-shaped in front, but its front edge is about three times higher than that of cover 13, thus forming a base. The other three base sides are angularly bent downward.

The elongated holes 3 and 4 in the sidewalls 1 and partitions 2 are arranged in two vertical series the front holes being horizontal and the rear holes 4 vertical, so that the lower portion of each hole 4, which suitably terminates in a circle, is situated level with the center line of a front hole 3 corresponding therewith.

The rack floor 37 welded to the sidewalls 1 and the rear wall 22 also is provided with elongated holes 8, 9 extending parallel to the sidewalls 1, being rectangular and disposed in series and which extend in the same sense as the rear wall 22, the holes 8 of the front series being longer by the amount of grip of the hooked lug 16, than the holes 9 of the second series which lie precisely in the rear thereof.

The holes 8, 9 divide the distance between the sidewalls 1, i.e., the rack width, into an even number of sections of uniform width. Thus, in a rack according to FIG. 1, are provided seven pairs of holes which result in sections of one-eighth of the rack width.

The holes 8, 9 serve for receiving partitions 2 which comprise a hook 16 and a lug 17 on their lower edge 10 that slopes upwardly in front of the hook, by means of which hook and lug said partitions are inserted in the holes 8, 9 and are anchored thereby, first the hook 16 being inserted in a hole 8 and then being moved rearwardly by the length of the hook-beak. Then only the lug 17 can drop into a hole 9, whereby the partition 2 is secured against horizontal dislocation forwards or backwards, and through the hook 16 also upwards.

In order to fix the partitions 2 on cover sheet 13 also, two unequal angle irons 14, 15 that form a gap 12 are welded to the underside thereof similar to that shown in FIG. 4. Into this gap are inserted the partitions 2 of which the top edge 11 is sloped in front and in the rear, from the side with the smaller angle-iron leg 15, until they are engaged by the hook 16 and the lug 17 in the holes 8, 9 and may be fixed, as explained above. Similar angle irons also are welded to the cell floors 6 which will be described more closely later on. The angle irons need not fill the entire depth of the rack but may be interrupted, as shown for example in FIG. 7, in a section through the cell bottom, so that they comprise two or more parts of an angle 14'. The gap 12 formed by the angles 14, 15 is positioned accurately above the holes 8, 9 of the rack floor or of the inserted cell floors 6 respectively.

The partitions 2, similarly to the sidewalls 1, comprise elongated holes 3, 4 corresponding thereto. For assemblying a rack, partitions of various height are made available, the rack height being subdivided by the holes 3, 4 in equal sections, and the respective height of the partitions being chosen equal to one of these sections or a multiple thereof.

In order to subdivide the rack in height by the cell floors 6 and form cells, supporting members 5 are provided for the cell floors 6. These members 5 are made from a double-bent metal sheet strip in the surface 18 of which, that is destined to butt against the sidewalls 1 or

the partitions **2**, are provided two neck rivets **19** by means of which they are inserted into the holes **3**, **4**. The spacing of the neck rivets from each other corresponds to the distance between the holes **3** and **4**. The lower step portion **18** of the members **5** has recesses in front and rear, and the upper step section has rounded-off and slanting portions on both ends. The front neck rivet **19** is first inserted into the enlargement of the forward hole **3**, and then the rear neck-rivet **19** into the appurtenant vertical hole **4**. When moving member **5** forwardly, both neck-rivets slide from the enlarged portions of holes **3**, **4** into the narrow portion and thus are secured against upward or lengthwise movement.

The cell floors **6** of which the various lengths correspond to one or more eighths of the lateral rack module according to FIG. 1, are bent on their frontside **30** in C-shape and at right angles on their rearside **7** as well as on their depth sides. A cell floor that is to be laid down on the members **5** attached to the walls **1** and **2**, is laid down with its rearside **7** on the edges of the member and then pushed rearwardly until the rearside **7** slides down over the rear end of the members, which end for such purpose is rounded off, and engages same from the rear. In this position also the frontside **30** of cell floor **6** has engaged the member **5**, and the bell floor thus is fixed immovably. In the reverse order, the cell floor may again be disengaged from its anchorage.

In the case of heavy-load racks, as shown in FIG. 6, comprise a reinforcing member **38** welded into the C-shaped double bend **30**, and to the downwardly-bent longside **7** one or more carrying pins **39** are welded, depending on the length of the cell floor, which pins are engaged in the upright and rectangular slots **23** of rearwall **22** to bear thereon. A double rack (not shown) that is accessible from two sides, is formed by welding a floor **37**, two walls **1** and a cover sheet **13** to the counterface of rearwall **22**, as shown in FIG. 2, the original rearwall **22** then serving as material-separating wall.

In the rack construction described above, the novelty is that in a rack that is smooth on all sides per se, square and rectangular cells of the most diversified sizes and also intermixed may be formed in the rack floors and walls in the ratio of the selected steps of the hole system, all the cell walls that come into contact with the contents being entirely smooth, and all the cell-forming parts inserted in a rack being fixed on all sides against dislocation without the use of screws and auxiliary tools.

In FIG. 5 further is shown how one or more bins may be slid side-by-side into such a cell, the height and depth of such bins fitting the cell. The rearwall of this bin **29** is slightly higher than its frontwall and sidewalls in order that upon withdrawal and thus in a slightly depending position, it will engage from the rear the superjacent cell floor **6** or the U-shaped double band **30** and thereby will be prevented from falling off.

On the frontsides of cover sheet **13**, the cell floor **6** and the floor **37** are provided with holes **28** at half the spacing of the minimum width of the lateral subdivisions. Into these holes may be inserted, by means of split pins **34** or plug pins or screws, lettered strips **33** of which the maximum length corresponds to the minimum lateral rack divisor, i.e. to one-eighth of the rack width according to the example in FIG. 1. Owing to the chosen spacing of the holes **28**, the lettered strips on the upper or underside of a cell always may be arranged so that the letters lie in the lateral middle of a cell, irrespective of the form and size of the latter.

In FIG. 11 is shown a cell floor which comprises a welded-on front wall **32**. This cell floor forms a bin with the sidewalls and partitions between which it is inserted, which bin may be used in particular for free-flowing granular or bulk materials. The height of the frontwall depends on the quantity of the goods to be poured in, suitably corresponding however to one or more steps of

the height divisor chosen in the walls **1** and **2** between the pairs of holes.

In FIG. 22 is shown a partition which is connected with a similarly equipped partition or sidewall offers the possibility of inserting inclined cell floors. Here the holes **3‴** and **4‴** are inclined relatively to each other, the holes **4‴** being inclined substantially at an angle equal to that of the inserted cell floor, while the holes of the rear series are circular. Line *b* here substantially indicates the slope of the cell floor to be inserted and corresponds to the distance between the neck rivets **19** of the floor-supporting member **5** to be inserted (FIG. 8). From FIG. 22 may be readily seen how a cell floor has to be inserted in such sidewalls. A rack of such construction also may be subdivided in cells as described above.

In the rack example described so far, the cell floors may be reset stepwise only. FIGS. 20 and 21 show perforations in the sidewalls **3'**, **4'** and **3″**, **4″** respectively, which allow a stepless resetting. At the same time it is possible, in accordance with this construction, to insert and anchor the cell floors on a forward or rearward slope.

In FIG. 20 are provided two series of elongated holes in such arrangement that the end of one hole is situated on the level of the next-following hole, the hole end-portions being semi-circular. The holes **3'**, **4'** which in the drawing lead upwardly from left to right, may of course also be aranged in the reverse order. The same effect is attained when the holes of one series are inclined with respect to the other series or inclined away therefrom.

In this construction of the partitions **2**, supporting members **5'** are used which have slots **20** in place of neck-rivets. They may be fixed in any desired position by means of nut screws passed through the members **5'** and the sidewalls or partitions respectively. Distance *a* here shows the length of the slots **20** (FIG. 23). Since in such construction of the sidewalls the latter have to be accessible for passing the nut screws therethrough, the sidemasks **27** are not welded to the sidewalls **1** but connected thereto detachably. This also is necessary in the case of sidewalls which according to FIG. 21 comprise four series of vertical slots, which series are combined pairwise. Here the slots **3″**, **4″** in each series-pair are staggered relatively to each other, and here also the end of a slot disposed in a series-pair is situated on the level of the following adjacent slot. The member **5″** used here comprises four holes **21** through which are passed the nut screws. The spacing of the holes **21** corresponds to that of the slots **3″**, **4″**. The supporting members **5'** and **5″** in FIGS. 23 and 24 respectively otherwise are used in the same way and manner as the member **5** shown in FIGS. 8 and 9.

In FIGS. 13 to 19 is shown an inclined cell floor **6'** which comprises sidewalls **6″** and which together with the rack rearwall forms a bin **31**. This cell floor (not shown) is pushed on the supporting members with its bent portions **36** disposed up on the sidewalls **6″**. In the cell floor **6'** are arranged slots **35** into which may be inserted auxiliary partitions **2'**. In order to prevent these walls from tilting, grooves **25** are disposed on the rear edge **26** thereof, in which grooves are engaged retaining pins **24** that are adjustable in elevation and pass through slots in rearwall **22**. The configuration of these retaining pins **24** may be seen from FIGS. 18 and 19.

The slots **23** in the rack rearwall **22** again are spaced in accordance with the subdivision of the cell floors and sidewalls and partitions respectively, as mentioned before. Partitions according to FIG. 16 are used when a cell is to be formed that is to be filled horizontally; and partitions according to FIG. 17 are used when a cell is desired that allows a superelevated filling.

As material for the rack disclosed by the invention, metal is contemplated in the first place, preferably sheet steel. It, however, is positively within the range of the invention to use wood, plastic, semi-products such as

perforated sheets and plaitings and the like. Suitably that material is chosen which is most appropirate for the goods to be stored.

I claim:

1. In a combinable storage rack comprising two sidewalls, a bottom sheet and a top sheet, intermediate shelves and cell floors adjustable in elevation and of different lengths, some of said cell floors being inclined, and partitions of different height spaced as desired and extending parallel to the sidewalls and also carrying cell floors, said partitions having retainers insertable in elongated holes of the cell floors, whereby may be formed cells of square or rectangular form of the most diversified sizes, either uniform or all the forms and sizes intermixed, the improvement comprising said sidewalls and partitions provided with uniformly spaced elongated holes disposed in series, said cell floors being provided with front and rear flanges, horizontal members for supporting the cell floors, said members being crimped in cross-section and adapted to be detachably secured to the sidewalls and partitions through said holes therein, the cell floors bearing on said members and engaging same from the rear with their rear flange and from the front with their front flange, and unequal angle irons welded to the underside of the cell floors and the top sheet to project therefrom with their unequal legs and to leave a gap between the latter substantially equal in width to the thickness of the partitions, the lower edges of said partitions having retainers inserted in said floor holes and said partitions being positioned with their top edge in said gap between said angle irons.

2. A storage rack as set out in claim 1 in which the partition retainers comprise a hook and a lug on the lower side of the partition, said hook in the locking position engaging the cell floor from below.

3. A storage rack as set out in claim 1 in which the elongated holes in the sidewalls and partitions are disposed in two spaced vertical series, the holes of the front series being horizontal and those of the rear series being vertical.

4. A storage rack as set out in claim 1 in which the cell-floor supporting-members may be used on the left or right and each comprises a lengthwise crimped strip of which the leg butting against the sidewall or partition carries two neck-rivets which are spaced the same distance from each other as the tandem series of elongated holes.

5. A storage rack as set out in claim 1 in which the sidewalls and partitions comprise two vertical tandem series of sloping elongated holes, the upper edge of the respective lower elongated hole being substantially level with the lower edge of the superjacent hole, and the supporting members being held on the respective desired

level by means of nut screws passed through said holes and slots provided in the supporting members.

6. A storage rack as set out in claim 1 in which the sidewalls and partitions comprise four series of upright elongated holes, the upper ends of the holes in one series being level with the lower ends of the holes in the adjacent series, and in which the supporting members are held at the respective desired elevation by means of nut screws passing through the sidewall and partition holes respectively and through holes in said members.

7. A storage rack as set out in claim 1 in which the sidewalls and partitions comprise two generally vertical series of sloping elongated holes staggered in elevation with respect to each other.

8. A storage rack as set out in claim 1 in which the rearwall has series of upright holes through which pass retaining pins to be engaged in grooves of the rear edges of auxiliary partitions, the latter through pins and hooks integral with their bottom edges being held in the cell floors to secure same against lateral inclination.

9. A storage rack as set out in claim 1 in which heavy-load cell floors comprise on their front edges inside the C-shaped double bend a welded-in reinforcing web, and on their rear edge at least one welded-in carrying pin protruding into the elongated holes of the rack rearwall to bear thereon.

10. A storage rack as set out in claim 1 in which the front edges of the rack bottom sheet and cover sheet and cell floors are provided with series of holes to receive fastening elements for letter strips, at least two such holes being associated with a panel of the horizontal rack subdivision, the hole spacing corresponding to one half of the minimum lateral rack division, and the length of said strips corresponding at the most to the lateral width of the smallest rack cell.

References Cited by the Examiner

UNITED STATES PATENTS

1,178,612	4/1916	Weiss	312—257 X
1,745,784	2/1930	Davis	211—182
1,805,989	5/1931	Levene	248—242
2,630,096	3/1953	Conley	312—234.4 X
2,721,632	10/1955	Surpierre	312—257 X
2,905,336	9/1959	Higberg	211—184
3,042,473	7/1962	Vincens	312—257

FOREIGN PATENTS

1,233,071	10/1960	France.
820,150	9/1959	Great Britain.
511,889	1/1955	Italy.

FRANK B. SHERRY, *Primary Examiner.*

CHANCELLOR E. HARRIS, *Examiner.*