United States Patent

[11] 3,624,780

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[54] FLOOR AND CEILING MOUNTING FOR RACK AND SHELVING SYSTEM

7 Claims, 3 Drawing Figs.

[52] **U.S. Cl.** **211/86,** 211/183, 248/221, 248/357, 52/36
[51] **Int. Cl.** **A47f 5/00**
[50] **Field of Search** 211/126, 86, 175, 177, 176, 148, 183, 184, 107, 103, 110; 248/125, 221, 357; 52/36, 239, 241

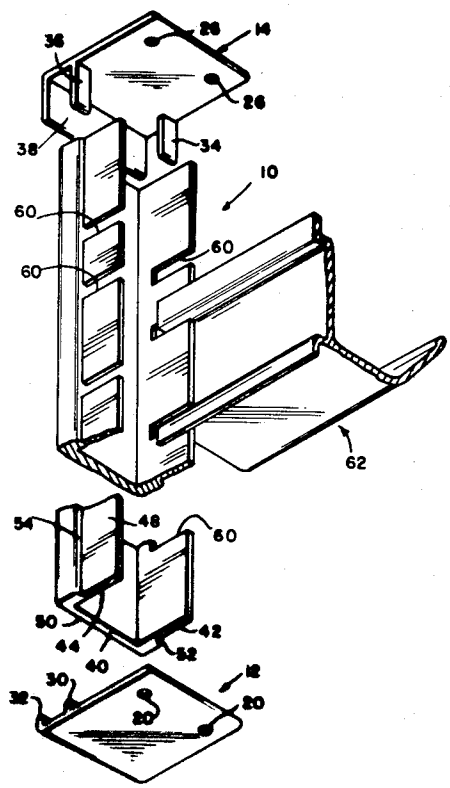
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ABSTRACT: For use in a storage space providing a floor and a ceiling, a rack system comprising a plurality of vertically extending standards, a baseplate for connecting each standard to such a floor and supporting it thereon, and a ceiling plate for connecting each standard to such a ceiling, the base and ceiling plates being provided in pairs to be securely fastened, respectively, to such floor and ceiling in vertical registry. The baseplates, ceiling plates, and standards are proportioned and designed so that each standard can be connected to a pair of the plates by engaging the upper end of the standard with downwardly extending means of the ceiling plate, lifting the standard vertically upwardly and, then, lowering the lower end of the standard into secure engagement with upwardly extending means of the baseplate. Thus, tools and fastening elements are not required to assemble and disassemble the rack system of the present invention.



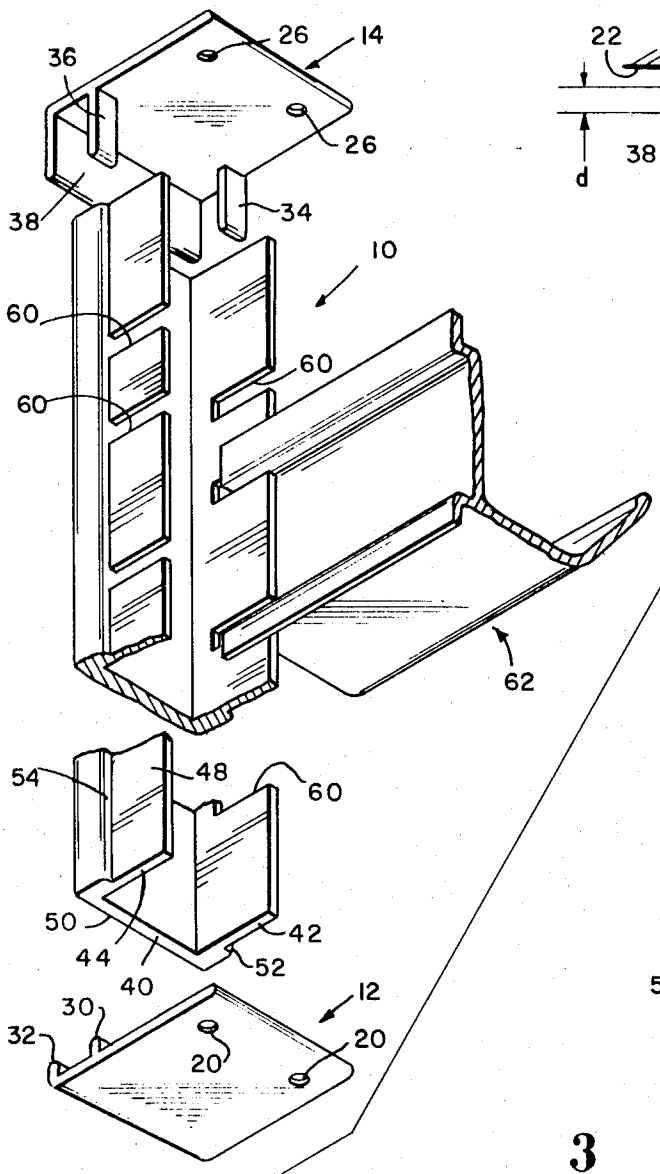


Fig. 1

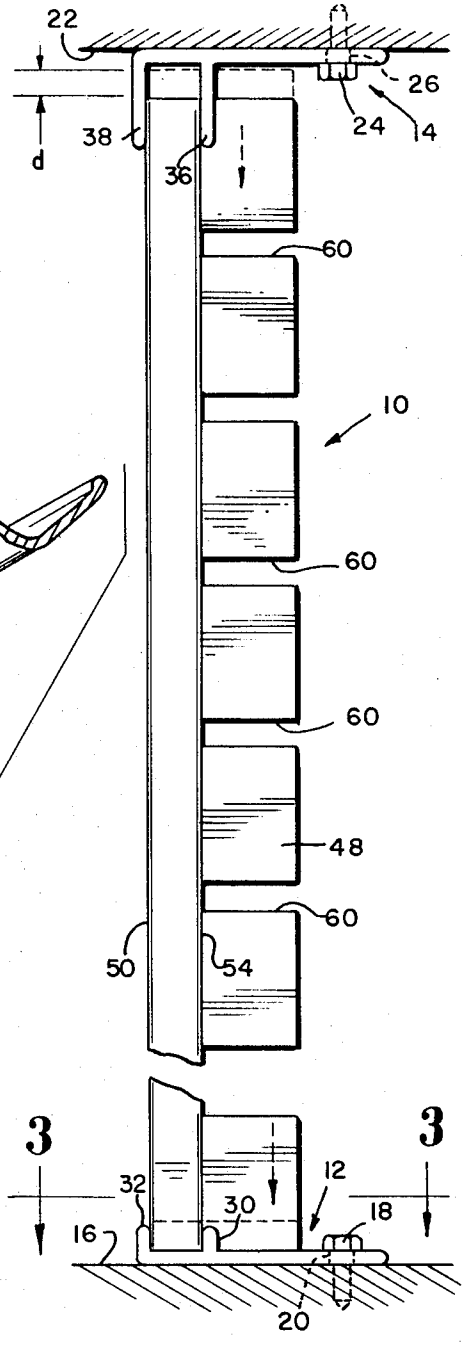


Fig. 2

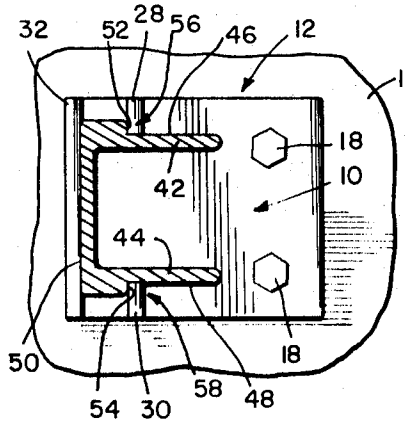


Fig. 3

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FLOOR AND CEILING MOUNTING FOR RACK AND SHELVING SYSTEM

It is a primary object of our invention it provide a rack system which is particularly suited for use in storage areas such as in walk-in refrigerators or freezers, which storage areas are provided with floors and ceilings to which, respectively, baseplates and ceiling plates may be securely fastened.

Our rack system comprises a plurality of vertically extending standards, the lower end of each of which is to be connected to and supported by a baseplate and the upper end of each of which is to be connected to a ceiling plate. It is our concept that each of these standards is to be easily connected to a vertically registered pair of base and ceiling plates without the use of fastening elements or hand tools.

For a discussion of the type of rack and shelving system toward which our present invention is directed, we refer to the presently pending application Ser. No. 839,373 filed July 7, 1969 by Michael M. Elliott. This prior copending application discusses a rack and shelving system which is particularly suited for use in walk-in refrigerators or freezers. The vertically extending standards of the present invention may be identical to the vertically extending standards disclosed in the said prior copending application. These standards are proportioned and designed so that a plurality of horizontally extending guide members or guide rails can be mounted on the standards to provide a plurality of laterally spaced-apart, horizontally extending runners for supporting opposite side edges of trays, pans, shelves, boxes and the like. In accordance with the disclosure of the said copending application, the standards are disposed in rows and columns in a storage space with each standard rigidly fastened to the floor and to the ceiling by means of fastening elements. The baseplates, ceiling plates and standards of the present invention are proportioned and designed so that each standard can be removably connected to a vertically registered pair of base and ceiling plates by engaging the upper end of the standard with the downwardly extending means of the ceiling plate, lifting the standard vertically upwardly and, then, lowering the lower end of the standard into secure engagement with the upwardly extending means of the baseplate. Then, the standard can be removed or disconnected from the vertically registered plates by lifting the standard vertically upwardly, disengaging the lower end of the standard from the baseplate and then lowering the standard out of engagement with the ceiling plate. The ceiling plate, therefore, is provided with downwardly extending means for engaging the upper end of the standard, which downwardly extending means is proportioned and designed to guide the standard connected thereto for generally vertically reciprocation by an amount greater than the height of the upwardly extending means of the baseplate disposed therebelow and less than the difference between the length of the standard and the vertical distance between the plates.

Other objects and features of our invention will become apparent as this description progresses.

To the accomplishment of the above and related objects, our invention may be embodied in the form illustrated in the accompanying drawings, attention being called to the fact, however, that the drawings are illustrative only, and that change may be made in the specific construction illustrated and described, so long as the scope of the appended claims is not violated.

In the drawings:

FIG. 1 is a fragmentary, perspective view of a standard, ceiling plate and baseplate of our present invention;

FIG. 2 is a fragmentary, elevational view showing a standard connected at its upper end to a ceiling plate and at its lower end to a base plate; and

FIG. 3 is a fragmentary sectional view taken generally along the lines 3—3 in FIG. 2.

Referring now to the drawings, it will be seen that we have illustrated a standard **10**, a baseplate **12** and a ceiling plate **14**. The baseplate **12** may be rigidly fastened to a floor, such as indicated at **16**, by means such as illustrated screws **18** which penetrate through openings **20** in the baseplate. Similarly, the ceiling plate **14** may be fastened to a ceiling, such as indicated at **22**, by means such as the illustrated screw **24** which extends through an opening **26** in the ceiling plate. For reasons which will become apparent as this description progresses, each pair of base and ceiling plates **12, 14** will be mounted as shown in FIG. 2 with the ceiling plate disposed above and in vertical registry with the baseplate.

In accordance with our invention, each baseplate **12** is provided with upwardly extending means for engaging the lower end of a standard **10** and each ceiling plate **14** is provided with downwardly extending means for engaging the upper end of a standard **10**. Further, in accordance with our invention, the downwardly extending means of each ceiling plate **14** is proportioned and designed to guide the standard **10** connected thereto for generally vertical reciprocation for a small distance as will be discussed hereinafter. In the illustrative embodiment, the upwardly extending means of each baseplate **12** includes first, second and third upwardly extending projections **28, 30, 32** and the downwardly extending means of each ceiling plate **14** includes first, second and third downwardly extending projections **34, 36, 38**. In the illustrative embodiment, these projections **28–38** are vertically and laterally extending flanges or tabs, the projections of vertically registered base and ceiling plates **12, 14** lying in parallel planes.

Each illustrative standard **10** is an elongated member, preferably an extrusion, having a generally C-shaped cross section providing a longitudinally extending main body portion **40** and first and second parallel and longitudinally extending flange portions **42, 44** extending therefrom and providing generally parallel, oppositely facing outer surfaces **46, 48**. This main body portion **40** provides a generally flat, longitudinally extending back surface **50** which is generally perpendicular to the said outer surfaces **46, 48** and first and second generally flat, longitudinally extending front surfaces **52, 54** which are generally parallel to the back surface **50**. The front surface **52** and outer surface **46** intersect to provide a first corner **56** extending longitudinally throughout the length of the standard **10** and, likewise, the front surface **54** and the outer surface **48** intersect to provide a second corner **58** extending longitudinally throughout the length of the standard.

As best seen in FIGS. **2** and **3**, when a standard **10** is resting on and connected to a baseplate **12**, the projection **28** of the plate engages the lower portion of the first corner **56** of the standard, the projection **30** of the plate engages the lower portion of the second corner **58** of the standard and the projection **32** of the baseplate engages the lower portion of the back surface **50** of the standard. Similarly, when the upper end of a standard **10** is connected to a ceiling plate, the projection **34** of the plate engages the upper portion of the first corner **56** of the standard, the projection **36** of the plate engages the upper portion of the second corner **58** of the standard and the projection **38** of the ceiling plate engages the upper portion of the back surface **50** of the standard.

Referring specifically to FIG. **3**, it will be seen that the two projections **28, 30** are flanges which are parallel to the flange-type projection **32**. The two projections **28, 30** are equidistantly spaced from the projection **32**. Further, the distance between the innermost edges of the projections **28** and **30** is equal to or just slightly greater than the distance between the outer surfaces **46, 48** which are received between the projections. Still further, the distance between each projection **28, 30** and the projection **32** is equal to or just slightly greater than the distance between the front surfaces **52, 54** and the back surface **50** of the standard **10**.

Each ceiling plate **14** is preferably identical to each baseplate **12** with the exception that the downwardly extending projections **34, 36, 38** of the ceiling plates are longer than the upwardly extending projections **28, 30, 32** of the baseplates, this difference being best seen in FIG. **2**. Thus, when a baseplate **12** and ceiling plate **14** are, respectively, fastened to a floor and ceiling to be in vertical registry as illustrated in FIG. **2**, the downwardly extending projections **34, 36, 38** are, respectively, in vertical alignment with the upwardly extending projections **28, 30, 32**.

The downwardly extending projections **34, 36, 38** of each ceiling plate **14** are proportioned and designed to permit the standard **10** connected thereto to be reciprocated vertically by the short distance represented by *d* in FIG. **2**. This distance *d* is greater than the height of the upwardly extending projections **28, 30, 32**, but equal to or less than the difference between the length of the standard **10** and the vertical distance between the plates **12, 14**. The ability to lift each standard **10** by this small distance *d* permits easy installation of the standards. Specifically, a standard **10** may be connected to a vertically registered pair of base and ceiling plates **12, 14** by engaging the upper end of the standard with the downwardly extending projections **34, 36, 38** of the ceiling plate, lifting the standard vertically upwardly by this small distance *d* and, then, lowering the lower end of the standard into secure engagement with the upwardly extending projections **28, 30, 32** as shown in FIGS. **2** and **3**. Each standard **10** can be disconnected from its base and ceiling plates **12, 14** by lifting the standard by this small distance *d*, moving the lower end of the standard laterally relative to the baseplate, and then lowering the upper end of the standard out of engagement with the downwardly extending projections **34, 36, 38** of the ceiling plate.

In our rack system, any load which is applied to a standard **10** will be a vertical load which will tend to hold the lower end of the standard in secure engagement with its baseplate **12**.

It will be seen that each flange portion **42, 44** of the illustrative standard **10** is slotted as indicated at **60**. The purpose of these slots **60** is clearly explained in the above referred to application Ser. No. 839,373. Specifically, runners or guides of the type indicated generally at **62** in FIG. **1** are connected to the standards **10** by engaging flange portions of each guide with the slots **60** of the standard. The manner in which we prefer to connect the guides **62** to the standards **10** is fully disclosed in the said application Ser. No. 839,373 and does not constitute a part of the present invention.

We prefer to provide standards **10** which are fabricated from aluminum extrusions having the above described cross-sectional shape and by cutting the slots **60** in the flanges **42, 44**. Similarly, we prefer that the base and ceiling plates **12, 14** be fabricated from aluminum extrusions having cross-sectional shapes identical to the elevational views of these plates **12, 14** shown in FIG. **2**. The plates **12** are formed by cutting the proper extrusion to the desired length to provide the width of the plate and then by cutting one flange of the extrusion to provide the space between the projections **28, 30**. Similarly, the plate **14** is formed by cutting the proper extrusion to the desired length to provide the width of the plate and then cutting one of the flanges of the extrusion to provide the space between the projections **34, 36**.

The following dimensions, provided in tabular form, for the standard **10**, ceiling plate **14** and baseplate **12** constitute our presently preferred dimensions:

Standard Dimensions

Width of back surface **50**	1.625 inches
Distance from back surface **50** to front surfaces **52, 54**	0.500 inch
Distance between outer surfaces **46, 48**	1.375 inches
Width of front surfaces **52, 54**	0.125 inch

Ceiling Plate Dimensions

Width of projection **38**	2.000 inches
Distance between projection **38** and projections **34, 36**	0.531 inch
Distance between inner edges of projections **34, 36**	1.404 inches
Depth of projections **34, 36, 38**	0.750 inches

Baseplate Dimensions

Width of projection **32**	2.000 inches
Distance between projection **32** and projections **28, 30**	0.531 inch
Distance between inner edges of projections **28, 30**	1.404 inches
Height of projections **28, 30, 32**	0.187 inch

It will be seen that the height of the projections **28, 30, 32** of our preferred system is slightly less than 0.2 inch which means that the small distance *d* of FIG. **2** does not have to be significantly greater than, for instance, 0.3 or 0.4 inch. The preferred depth of projections **34, 36, 38** of 0.750 inches will compensate for normal floor to ceiling height tolerances.

We claim:

1. For use in a storage space providing a floor and a ceiling, a rack system comprising a plurality of vertically extending standards, a baseplate for connecting each standard to such a floor and supporting it thereon, and a ceiling plate for connecting each standard to such a ceiling, said base and ceiling plates being provided in pairs to be fastened, respectively, to such floor and ceiling in vertical registry, each baseplate providing upwardly extending rigid means for engaging the lower end of one of said standards, and each ceiling plate providing downwardly extending rigid means for engaging the upper end of one of said standards, said downwardly extending means of each ceiling plate being proportioned and designed to guide the standard connected thereto for generally vertical reciprocation only by an amount greater than the height of said upwardly extending means of the baseplate disposed therebelow and equal to or leas than the difference between the length of the standard and the vertical distance between the plates and positively to restrain the upper end of the standard from moving laterally, said upwardly extending means of each baseplate being proportioned and designed to guide the standard connected thereto for generally vertical reciprocation only and positively to restrain the lower end of the standard from moving laterally when said lower end is engaged therewith, whereby, each standard can be connected to a pair of said plates by engaging the upper end of said standard with the downwardly extending means of the ceiling plate, lifting the standard vertically upwardly and, then lowering the lower end of said standard into secure engagement with the upwardly extending means of the baseplate, the engagement of the lower end of said standard with said upwardly extending means being maintained by gravity.

2. The rack system of claim **1** in which each of said standards includes a main body portion, each upwardly extending means includes means defining upwardly opening means for receiving the lower end of a main body portion, and each downwardly extending means includes means defining a downwardly opening means for telescopically receiving the upper end of a main body portion.

3. For use in a storage space providing a floor and a ceiling, a rack system comprising a plurality of vertically extending standards, a baseplate for connecting each standard to such a floor and supporting it thereon, and a ceiling plate for connecting each standard to such a ceiling, said base and ceiling plates being provided in pairs to be fastened, respectively, to such floor and ceiling in vertical registry, each baseplate providing upwardly extending means for engaging the lower end of one of said standards, and each ceiling plate providing downwardly extending means for engaging the upper end of one of said standards, said downwardly extending means of each ceiling plate being proportioned and designed to guide the standard connected thereto for generally vertical reciprocation by an amount greater than the height of said upwardly extending means of the baseplate disposed therebelow and equal to or less than the difference between the length of the standard and the vertical distance between the plates, whereby, each standard can be connected to a pair of said plates by engaging the upper end of said standard with the downwardly extending means of the ceiling plate, lifting the standard vertically upwardly and, then lowering the lower end of said standard into secure engagement with the upwardly extending means of the baseplate, each standard including an elongated member having a generally C-shaped cross section providing a longitudinally extending main body portion and first and second parallel and longitudinally extending flange portions extending therefrom and providing generally parallel, oppositely facing outer surfaces, said main body portion

providing a generally flat, longitudinally extending back surface generally perpendicular to said outer surface and first and second generally flat, longitudinally extending front surfaces generally parallel to said back surface, said first front surface and the outer surface of said first flange intersecting to provide a first corner and said second front surface and the outer surface of said second flange intersecting to provide a second corner, the downwardly extending means of each ceiling plate including a first downwardly extending projection for engaging said first corners, a second downwardly extending projection for engaging said second corners, and a third downwardly extending projection for engaging said back surfaces, and the upwardly extending means of each baseplate including a first upwardly extending projection for engaging said first corners, a second upwardly extending projection for engaging said second corners, and a third upwardly extending projection for engaging said back surfaces.

4. The rack system of claim 3 in which said first, second and third downwardly extending projections are laterally and downwardly extending flanges with said first and second downwardly extending projections being parallel to and spaced forwardly of said third downwardly extending projection, and in which said first, second and third upwardly extending projections are laterally and upwardly extending flanges with said first and second upwardly extending projections being parallel to and spaced forwardly of said third upwardly extending projection.

5. The rack system of claim 4 in which said first and second downwardly extending projections are equidistantly spaced from said third downwardly extending projection, and in which said first and second upwardly extending projections are equidistantly spaced from said third downwardly extending projection.

6. The rack system of claim 5 in which the distance between said first and second downwardly extending projections and said third downwardly extending projection is slightly greater than the distance between the back surface and the front surfaces of the standard engaged thereby, and in which the distance between said first and second upwardly extending projections and said third upwardly extending projection is slightly greater than the distance between the back surface and the front surfaces of the standard engaged thereby.

7. The rack system of claim 6 in which the distance between the inner edges of said first and second downwardly extending projections and the distance between the inner edges of said first and second upwardly extending projections is slightly greater than the distance between the outer surfaces of one of the standards engaged thereby.

* * * * *

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UNITED STATES PATENT OFFICE
CERTIFICATE OF CORRECTION

Patent No. 3,624,780 Dated November 30, 1971

Inventor(s) Michael M. Elliott and John M. Thomas

It is certified that error appears in the above-identified patent and that said Letters Patent are hereby corrected as shown below:

Column 1, line 1, (first line after the title) "it" (second occurrence) should be -- to --; same column, penultimate line, after "as" insert -- the --.

Column 4, lines 9 and 48, "system" should be -- apparatus --; same column, lines 15, 17, 54 and 56, cancel "for"; same column, line 23, "leas" should be -- less -- same column, lines 30 and 31, cancel "when said lower end is engaged therewith"; same column, line 31, cancel "can"; same column, line 32, cancel "be" and substitute -- is --; same column, line 64, cancel "can be" and substitute -- is --.

Column 5, line 2, "surface" should be -- surfaces --; same column, lines 9, 11, 12, 14, 15 and 16, cancel "for".

Column 6, line 7, "downwardly" should be -- upwardly --.

Signed and sealed this 22nd day of August 1972.

(SEAL)
Attest/

EDWARD M.FLETCHER,JR.
Attesting Officer

ROBERT GOTTSCHALK
Commissioner of Patents