United States Patent

Konstant

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[54] STORAGE RACK AND BRACKET THEREFOR

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[51] **Int. Cl.** **A47f 5/14**

[58] **Field of Search** ..... 211/182, 153, 177, 134; 108/114; 287/54 A, 54 B; 52/702

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[57] **ABSTRACT**

A cantilever storage rack including tubular cantilever arms extending outwardly from an upright primary support. Tubular stringers are supported at the end of the cantilever arms by integral brackets having first and second wings extending perpendicular to each other. The first wing is inserted into the hollow stringer and has a projection extending across the interior opening therewithin. The second wing is inserted into the tubular cantilever arm and a second projection extends across the interior opening within the arm. Another stringer can be supported extending from the other side of the cantilever arm using another such bracket.

9 Claims, 3 Drawing Figures

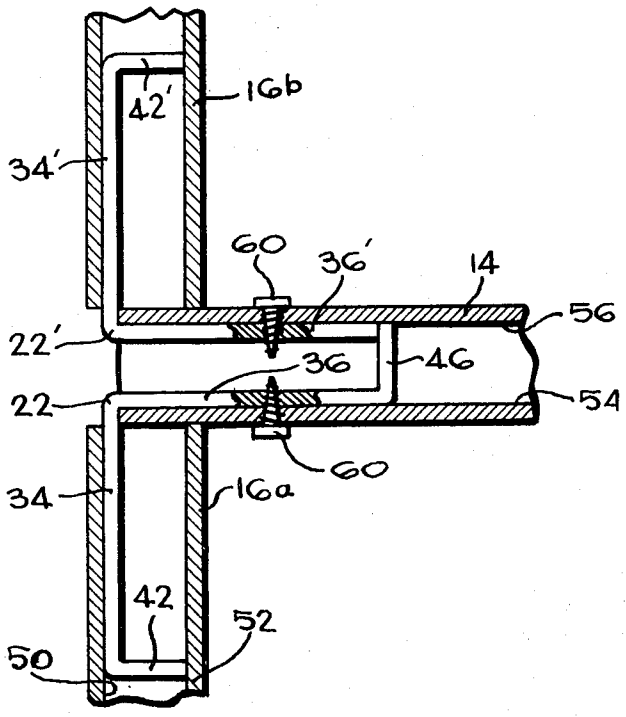


Fig.1

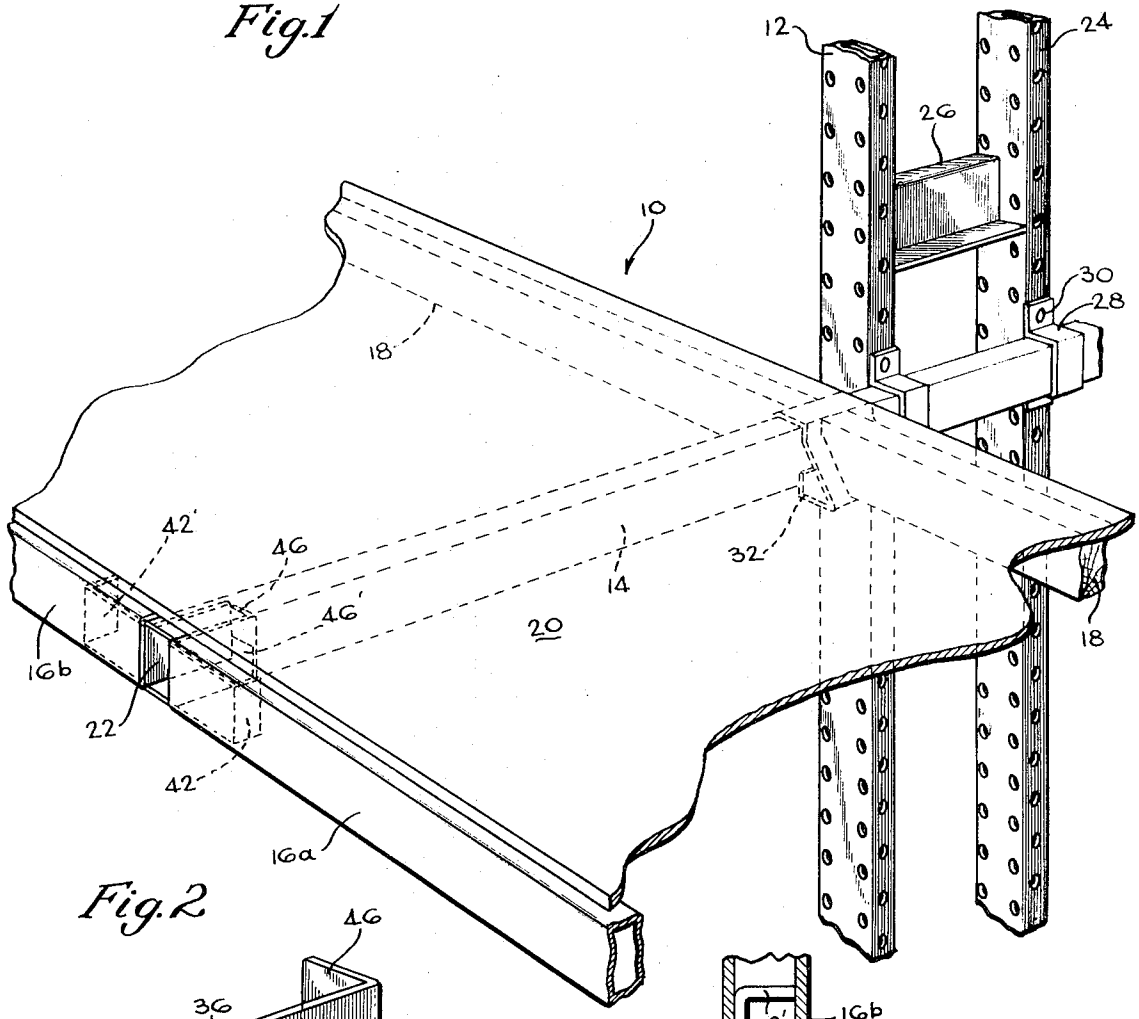


Fig.2

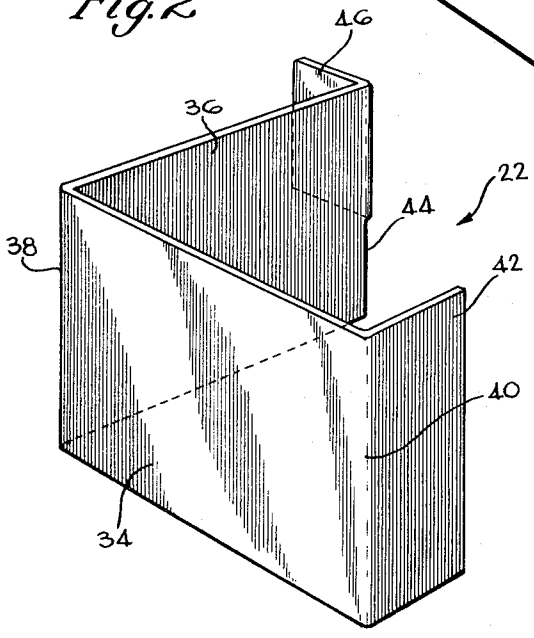
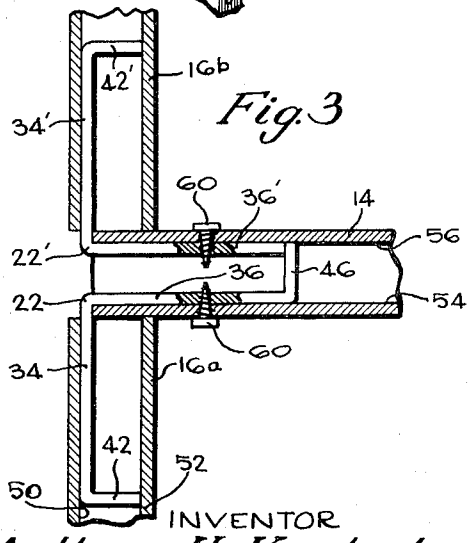


Fig.3



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STORAGE RACK AND BRACKET THEREFOR

The present invention relates to brackets and, more particularly, to brackets useful in the rapid assembly of a cantilever storage rack.

Cantilever storage racks are particularly useful in containing merchandise where a minimum of floor space is available for occupancy, such as in a warehouse, or where a relatively large volume or amount of merchandise is to be stored in readily accessible position without regard to the horizontal spacing of the vertical supports or columns or other parts of the rack. Such storage racks are advantageously employed where the utilization of individual cells or compartments of fixed size are undesirable due to the waste or loss of space when the items to be stored are of varying size. Typically, a storage rack of this type is in the form of a plurality of spaced columns fitted with cantilever arms projecting outwardly therefrom, so that columns for supporting the outer edges of the decks are not required. With such a construction, it is possible to provide superposed decks of indefinite length in which the whole length of each deck can be effectively and efficiently utilized. A particularly useful embodiment of such a storage rack is shown in Konstant U.S. Pat. No. 3,028,976.

In providing a cantilever storage rack, it is particularly advantageous to employ stringers at the outer and inner edges of each deck of the rack, in lieu of support columns, to give strength and rigidity to the decks. Each stringer desirably extends transversely to a respective cantilever arm, one at the front or outer end of the arm and one or more on the interior of the deck with one at the junction of the arm with the supporting column. In the assembly of a rack employing stringers, it is desirable to employ assembly devices that enable rapid construction of the storage rack or structure.

Accordingly, an object of the invention is to provide an improved device useful in assembly of the front stringers of a cantilever storage rack to their respective cantilever arms.

Another object of the invention is to provide an improved bracket for rapid assembly of a storage rack including a cantilever arm and a front stringer, wherein the bracket readily connects the arm and the stringer without the necessity of employing construction tools.

These and other objects of the invention will become apparent with reference to the following description and accompanying drawings in which:

FIG. 1 is a fragmentary perspective view showing a cantilever storage rack assembled using brackets embodying various features of the invention;

FIG. 2 is an enlarged perspective view showing a bracket used in the assembly of the storage rack shown in FIG. 1; and

FIG. 3 is a sectional plan view of a pair of brackets of the type shown in FIG. 2 in operative position.

Referring to FIG. 1 of the drawing, there is shown a cantilever storage rack or structure generally designated by the reference numeral **10**. The storage rack **10** generally includes a plurality of upright trusses or vertical support members **12** (only one of which is shown for clarity) and a plurality of hollow cantilever arms **14** extending outwardly from each upright truss **12** at corresponding elevations. Front and rear stringers **16** and **18** extend between adjacent cantilever arms and additional stringers intermediate therebetween may also be used for additional support. The front stringers **16** are hollow and connect the outer ends of the cantilever arms **14** at one elevation. A deck **20** rests upon the upper surface of the cantilever arms **14** and their respective front and rear stringers **16** and **18** at a given elevation.

Novel means is provided for connecting the front stringers **16** to the adjacent cantilever arms **14** in the form of a bracket **22**. The bracket **22** is adapted to fit into the interior openings in the cantilever arm **14** and the abutting front stringer **16** in order to rapidly connect the stringer to the cantilever arm in the assembly of the storage rack **10**. The bracket **22** is particularly useful in the assembly of cantilever storage racks **10** of the type shown in FIG. **1**.

The upright trusses or vertical support members **12** of the rack **10** provide primary support for the structure and may be of any suitable form, but each typically includes a pair of perforated columnar members **24** disposed in parallel, vertical relationship and connected by cross-bracing members **26**. Each truss **12** is suitably supported as by being disposed within a base (not shown) or by being connected over the aisles to adjacent rows of cantilever uprights or to the roof or the walls of the building.

Cantilever arms **14** for providing secondary support extend outwardly in an horizontal direction from each upright truss **12** at the same elevation to provide a foundation for the horizontal deck **20**. The cantilever arms **14** are desirably hollow, tubular steel members having a rectangular cross-section. Although the illustrated cantilever arm **14** is shown extending outwardly from the truss **12** on both sides thereof, it should be understood that the arms **14** can extend outwardly on only one side of the truss However, cantilever arms often extend on both sides of the truss and thus provide a more stable storage rack **10** as merchandise disposed on both sides of the truss **12** tends to balance the respective torques applied to both ends of the arm **14**.

The plurality of such cantilever arms **14**, each disposed at an equal elevation upon one of the upright trusses **12**, define one plane at which a deck **20** can be located. By disposing additional cantilever arms **14** on each truss **12** at other equal elevations thereupon, a plurality of superposed planes are defined. Usually two or three such storage planes are utilized in each storage rack. Each cantilever arm **14** is mounted upon a respective truss **12** by a suitable supporting bracket, such as the cantilever arm bracket **28** shown in FIG. **1**. The illustrated bracket **28** is U-shaped, partially circumscribing the arm **14** and being secured at its ends by bolts **30** or the like to the supporting upright truss **12**.

The front stringers **16** are disposed transversely to the cantilever arms **14** and are axially aligned along the outer ends of the arms of a given deck **20** to further provide secondary support for the front edge of the deck. The front stringers **16** are preferably hollow, steel tubular members of rectangular cross-section, and each front stringer **16** is of sufficient length to extend between adjacent cantilever arm **14** at the same elevation. The front stringers **16** and the rear stringers **18** extend substantially perpendicular to the cantilever arms **14** and have their upper surfaces generally flush with the upper surfaces of the supporting cantilever arms **14** to define a planar surface that is covered with a deck **20**.

The rear stringers **18** may simply be 2 × 4 inch lengths of lumber and are located adjacent the junctions of the cantilever arms and their respective upright trusses **12**. The rear stringers **18** support the rear edges of each deck **20** and are mounted to the cantilever arms **14** by saddle brackets **32**. These brackets **32** straddle the arm **14** at the desired location and support a stringer **18** at each side of the arm. Such brackets **32** might also be used to support intermediate stringers. The illustrated saddle bracket **32** is formed from a blank of sheet steel which is punched to provide two rectangular apertures. The blank is folded so that the apertured portions are disposed diagonally and so that the next adjacent portions are inturned to provide horizontal supports for the stringers **16** which reside in each aperture. The ends of the bracket are folded upwardly to provide flanges which lie flush against the side surfaces of the cantilever arms **14**. Of course other suitable brackets might be utilized to join the rear stringers **18** to their supporting cantilever arms **14**.

Typically, the deck **20** for supporting the items to be stored upon the rack **10** is fabricated of wood sheathing or the like and is suitably secured to the rear stringers **18** as by nails. However, it is noted that the deck **20** need not be employed where the objects, e.g., steel pipes, are of sufficient size that they can rest directly upon the cantilever arms or the stringers.

The preferred embodiment of the bracket **22** for securing each front stringer **16** to its respective cantilever arm **14** can best be viewed in FIG. **2**. The bracket **22** is preferably formed

from a single piece of sheet steel. The bracket **22** has first and second wings **34** and **36** extending at substantially right angles to each other, which wings are planar in form and are equal in dimensions. However, the dimensions of the bracket **22** are directly dependent upon the dimensions of the members to be joined, as will become apparent below, and the wings need not be equal in size in all applications. The first and second wings **34** and **36** have a mutual edge defining a junction **38**.

At an edge **40** of the first wing **34**, which is opposite to the junction edge **38**, the bracket is bent to form an inturned first projection **42** which extends from the first wing **34** in the same direction as the second wing **36**. The first projection **42** is planar and rectangular in form, and it is preferably disposed at substantially a right angle to the first wing **34**. Accordingly, the first projection **42** is preferably substantially parallel to the second wing **36** and is dimensioned so that it can be received in the rectangular opening in hollow front stringer **16**, being for this reason of substantially the same height as the first wing **34**.

The second wing **36** has an outturned second projection **46** extending outwardly from its free edge **44** which is opposite from the junction edge **38** where the first and second wings meet. The second projection **46** is planar and rectangular in form and preferably extends at substantially a right angle to the second wing **36**, thus being substantially parallel to the first wing **34** while extending outwardly from the second wing **36** in the opposite direction to the first wing **34**. For a purpose which will become apparent upon further discussion, the second projection **46** is preferably no greater than about one-half the height of the second wing **36** as measured along the edge **44**. In the illustrated embodiment, the shorter second projection **46** is formed along the upper portion of the edge **44** when the bracket **22** is viewed as oriented in FIG. **2**. However, the second projection **46** could alternatively be formed along the lower half of the edge **44**.

The use of the bracket **22** in the storage rack **10** is perhaps best seen in FIG. **3**. There it can be seen that the first wing **34** and the first projection **42** of the bracket **22** are inserted into the right-hand front stringer **16a**. The first wing **34** extends into the interior opening in the hollow front stringer **16*a*** such that it lies generally adjacent an interior wall surface **50** of the stringer. Typically, the first wing **34** is about 4 inches long and about 2¾ to 3¾ inches high, the height of the wing depending upon the internal vertical dimension of the rectangular opening in the tubular stringer. Hence, the first projection **42** is located a distance of about 4 inches into the front stringer **16*a***, at which point it extends across the interior opening in the stringer between the wall **50** and an opposite wall **52**. The first projection **42** is typically about three-fourths to 1⅜ inches in width and has the same height as the first wing **34**. In general, the first projection **42** is proportioned to just easily fit into the opening in the hollow tubular stringer **16*a***. Preferably, the projection **42** is rectangular in shape and just slightly smaller than the interior opening in the stringer **16*a*** so that engagement of the edges of the first projection against the interior walls of the stringer **16*a*** prevents the bracket **22** from turning in or disengaging from the front stringer when it is supported in place at the end of the cantilever arm **14**. If the projection is bent at other than a right angle to the wing **34**, it is preferably formed proportionately larger so that it still spans the distance between the interior walls **50** and **52**.

Although the first wing **34** and the first projection **42** are located within the interior opening in the front stringer **16*a***, the second wing **36** is prevented from entering therein as it is wider than the internal width between the walls **50** and **52** of the stringer. Thus, the second wing **36** extends across the opening to the interior of the front stringer **16*a*** and therebeyond. To support the front stringer **16*a*** from the cantilever arm **14**, the second wing **36** and the second projection **46** are inserted into the interior opening in the hollow, tubular cantilever arm **14**. The second wing **36** may extend into the interior opening in the cantilever arm **14** to a depth of about 4 inches and lies generally adjacent an interior wall **54** of the arm. The second projection **46** may have substantially the same width as the first projection **42** where the cantilever arm **14** and the stringers **16** are made of tubes having similar dimensions and consequently will extend substantially across the interior opening in the arm **14** between the wall **54** and an opposite wall **56**. If the projection **46** is bent at other than a right angle to the wing **36**, it is preferably formed proportionately larger so that it still spans the distance between the interior walls **54** and **56**. Thus, the bracket **22** serves to rapidly and easily connect a front stringer **16** to the cantilever arm **14**, and when the bracket is fully inserted into the cantilever arm **14**, a very stable connection results.

As can be seen in FIGS. **1** and **3**, a pair of the brackets **22** are used to secure a front stringer **16** adjacent each side of the front end of the cantilever arm **14** for those arms **14** located in the central portion of the rack. The bracket **22** is formed such that it can be employed either as shown in FIG. **2** or in a reverse position. Thus, as shown in FIGS. **1** and **3**, the bracket **22** is employed to secure one front stringer **16*a*** to the right-hand side of the arm **14**; and a second bracket **22'** is employed in reverse orientation to secure a second front stringer **16*b*** to the left-hand side of the front end of the same arm **14**. The second projection **46** of the right-hand bracket **22** extends across the upper one-half of the interior opening in the cantilever arm **14**, between the opposing walls **54** and **56**. When the left-hand bracket **22'** is inserted into the interior opening in the same cantilever arm **14**, its second projection **46'** extends across the lower one-half of the interior opening in the arm **14**, and it is aligned in the same plane as the second projection **46** of the first bracket **22**. Thus, in the fully inserted position, the second projection **46** of the right-hand bracket **22** lies above and in closely engaging relationship with the second projection **46'** of the left-hand bracket **22'**.

Should it be desired to further secure the front stringers **16** to the cantilever arm **14**, fasteners **60**, such as self-piercing, self-tapping screws (FIG. **3**) may be driven through the sidewalls **54,56** of the cantilever arm **14** and into the second wings **36,36'**, respectively. Instead of employing threaded fasteners **60**, registering holes might be provided in the sidewalls **54,56** of the cantilever arm **14** and the second wings **36** through which L-shaped locking pins or the like might be inserted to link the brackets **22** to the cantilever arm. To remove the brackets **22** should it be desired to relocate the cantilever arms **14** at a different vertical location, any connection between the decking **20** and the front stringers **16** and any fasteners **60** are first removed. Then, the front stringers **16** are pulled away from the truss **12** to disengage the second wing **36** and the second projection **46** axially from the cantilever arm **14**.

The present invention thus provides an improved device useful in rapid assembly and disassembly of a storage structure or rack. The invention further provides an improved bracket for ready assembly of a cantilever storage rack by connecting the ends of corresponding front stringers and cantilever arms of a deck thereof. Still further, the invention provides an improved bracket for the assembly of a storage structure without employing construction tools.

While one specific form of the invention has been shown and described, it should be apparent that various modifications could be made therein without departing from the scope of the invention. For example, instead of the first and second wings **34** and **36** being disposed at substantially a right angle to one another, the wings could be disposed at a different included angle, thereby allowing the cantilever arm **14** and the respective front stringer **16** to be secured together at that included angle. Moreover, instead of using fasteners **60** to secure the brackets **22** to the cantilever arms **14**, the saddles **32** holding the rear stringers **18** may be suitably fastened to the cantilever arms **14**. Then, the front stringers **16** are held in place by using decking having a depending flange along its front edge and which is suitably linked to the rear stringers **18** as by nailing or by a similar depending flange along its rear edge.

Various of the features of the invention are set forth in the following claims.

What is claimed is:

1. A cantilever storage rack including an upright primary support member, a tubular cantilever arm extending outwardly and supported from said upright primary support member, a tubular secondary support member extending transversely to said cantilever arm adjacent the outer end thereof, and an integral bracket having first and second wings extending at an angle to one another, said first wing having a first projection extending at an angle thereto, said first wing and said first projection being disposed within said tubular secondary support member such that said first wing lies adjacent an interior wall of said secondary support member and said first projection extends across the interior opening within said secondary support member, said second wing having a second projection extending at an angle thereto, and said second wing and said second projection being disposed within said tubular cantilever arm such that said second wing lies adjacent an interior wall of said arm and said second projection extends across the interior opening within said arm whereby said secondary support member is connected to said supporting cantilever arm.

2. A storage rack according to claim 1 wherein said first projection and said second wing extend in the same direction from said first wing and at substantially right angles thereto.

3. A storage rack according to claim 1 wherein said first wing and said second projection extend in opposite directions from said second wing and at substantially right angles thereto.

4. A storage rack according to claim 1 wherein said second projection is no greater than about one-half the height of said second wing.

5. A storage rack according to claim 4 wherein there is also included a second tubular secondary support member in axial alignment with the first-mentioned secondary support member and extending transversely to the outer end of said arm adjacent the opposite side thereof, and a second bracket of similar construction to said first-mentioned bracket, connecting said second tubular secondary support member to the end of said cantilever arm, the second projection of said second bracket extending across the interior opening in said arm in the same plane as but vertically displaced from said second projection of the first-mentioned bracket.

6. A storage rack according to claim 5 wherein said cantilever arm and said tubular support members are rectangular in cross-section, and wherein said first and second projections are rectangular.

7. A storage rack according to claim 1 wherein means is provided to interconnect said second wing of said bracket to said cantilever arm and thereby prevent movement of said second wing out of said arm.

8. A reversible bracket for the assembly of generally tubular members at right angles to a tubular supporting member having a rectangular interior cross section, which bracket comprises a first wing and a second wing formed at a right angle to each other, a first projection extending at substantially a right angle to said first wing and in the same direction therefrom as said second wing, said first wing and said first projection being adapted for insertion into the open end of a generally tubular member extending horizontally from one side of said supporting member, and a second projection extending at a right angle to said second wing, said second wing and said second projection being adapted for insertion into the open end of said supporting member, said second projection being generally rectangular in shape, having a height about half the height of said second wing and being proportioned to occupy approximately one-half of the interior cross-section of said supporting member whereby the second projections from two of said brackets will lie in the same vertical plane when a pair of generally tubular members are assembled to the end of one supporting member.

9. A bracket according to claim 8 wherein said first projection is substantially rectangular in shape and is adapted to support a tubular member having a rectangular cross-section.

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