A locking system provides for locking over a continuous range of positions of two telescoping members (4, 7). A movable member (16) is carried on the inner member (7), and is urged into contact with a confronting interior wall surface of the outer tubular (4) member so that relative movement in one direction causes the locking member to bitingly engage the interior wall surface to prevent motion in that direction. As applied to a vertically extending display rack, the locking member is pivotally responsive to downward acceleration of the inner member to cause the locking member to be pivoted into the arresting engagement. As applied to ornamental sleeves (122) surrounding a wall-mounted strut (124) forming a display rack, the locking member (148) is mounted on the strut so that its weight urges it into continuous sliding engagement at an angle to the surface of the outer member (122). Motion of the sleeve towards the mounting wall (136) causes the locking member to slide along the confronting interior sleeve surface; however, attempted withdrawal of the sleeve causes the same bitingly arresting engagement to occur to prevent withdrawal of the sleeve.

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ADJUSTABLE MERCHANDISE DISPLAY RACK
LOCKING SYSTEM AND METHOD OF MAKING THE SAME

DESCRIPTION

Technical Field
This invention relates generally to hangrod and shelving systems of the type commonly found in the clothing sections of
retail, discount and wholesale stores. One application of the invention is in free-standing garment display racks which generally have one or more upstanding elongated, outer tubular members supported from a roller-carrying base and a corresponding number of depending elongated, hangrod-carrying inner members telescoping into the upstanding tubular members and adjustable in elevation therein. Another application of the invention is in hangrod or shelf-supporting brackets which comprises an inner bracket body which interlocks through projecting hooked extensions into slots in a wall-mounted upright and an outer tubular member which telescopes over the inner bracket body. The present invention provides a unique means for adjusting the relative positions of the telescoping members involved moving the inner members of the garment rack telescoping members upward, or the outer telescoping members of the bracket inward. The bracket telescoping member locks against the other member when movement thereof is accelerated or initiated in the opposite direction. In its broadest aspects, the invention is applicable to many products having telescoping members like canes, walkers, etc., when it is desired to adjust or vary the position of one telescoping member with respect to the other.
Background of the Invention

It is most common in the prior art to adjust the elevation of such a vertical rod extending into an outer tubular member by use of a horizontally extending locking pin which can be selectively passed between an aperture in the outer tubular member into any one of a number of vertically spaced apertures in the inner member. Adjustment is achieved by withdrawing the locking pin from the inner member, then adjusting the elevation of the inner member to a position where the pin can enter a new aligned aperture in the inner member. Such an elevation adjusting means is unattractive and therefore undesirable for garment display rack applications. Also, it is inconvenient to use because of the limited number of vertical positions of adjustment determined by the number of adjusting apertures provided in the inner member. Also, such a locking pin is an especially inconvenient adjusting means where the hangrod-carrying portion of a garment display rack includes a number of secured-together depending hangrod-carrying members fitting into a number of outer tubular members, where the vertical adjustment of all of the depending members must be simultaneously carried out.

Prior to the present invention, there was also developed a means for adjustably locking an inner member telescoping
by adjustable within an outer member by means including rollers spring-urged outwardly against the inner surface of the outer member. An adjusting member extended to the exterior of the inner member. Movement imparted to this adjusting member momentarily collapsed the position of the rollers so that the inner member could be moved to a desired elevation. Release of this adjusting member caused the rollers to expand outwardly to make contact against the inner wall of the outer member to hold the inner member in its new adjusted position. The mechanism involved was unduly complicated and did not always operate reliably due to the manner in which it was constructed.

Summary of the Invention

The present invention provides a unique reliable arrangement of inner and outer the movable telescoping member can be adjusted progressively rather than in steps relative to the other member, and preferably with locking hardware which is invisible from the exterior of the outer tubular member. This unique hardware is also useful as a replacement for the spring-urged roller hardware just described since it is a much simpler and more reliable design. More importantly, this unique hardware permits an adjustment of the telescoping members in a manner which does not need to use any special tools.
As will appear, the preferred locking hardware is constructed in a manner which can be easily and economically assembled, and in the case of the garment rack application, enables the user to adjust the elevation of all the inner members simultaneously quickly and easily. The uniqueness of the preferred locking hardware for the garment rack application requires that the locking hardware and the other elements involved be assembled in a particular sequence.

Mounting systems for wall-mounted display hardware typically include horizontally spaced vertical uprights or rails generally mounted within vertical recesses in a mounting wall. Horizontally extending brackets having a pair of vertically spaced hooked extensions at the rear thereof are mounted within selected pairs of short vertically spaced outwardly facing slots formed in the outer faces of these uprights. The brackets are inserted into the upright slots by angling the hooked extension-carrying ends of the brackets in a downward direction at the time of insertion into the upright slots. The outer ends of the brackets are then pivoted downward and dropped onto the uprights to cause the hooked extensions to interlock with the upright slots.

If the brackets are designed to support shelving, they are provided at the
front ends thereof with upwardly extending shelf engaging fingers to receive the forward ends of the shelving. These brackets are commonly plate-like brackets which are unattractive. To provide a more attractive bracket design, there has heretofore been developed a bracket design made in two pieces. One piece is an inner bracket body having an appearance very similar to that of the rear half of a conventional, thin, plate-like bracket, and thus includes a pair of such vertically spaced hooked extensions at the rear end thereof. The inner bracket body is covered by an outer ornamental sleeve, also sometimes referred to as an outer tubular member, having a rear portion telescoping over the inner bracket body and a front portion projecting forwardly thereof. At the front end of this outer sleeve are shelf-receiving fingers if the bracket is to support shelving.

The rear edge or face of this outer ornamental sleeve is desirably configured to be flush with the outer surface of the mounting wall to eliminate any unsightly gaps between the outer ornamental sleeve and the mounting wall. However, when the outer sleeve has this flush relationship to the mounting wall, the bracket cannot be pivoted for insertion or removal of the bracket from the slotted uprights. It was therefore necessary to design the outer sleeve so that it is initially movable along the inner bracket body
so it can be withdrawn from the rear end of the bracket body when the bracket body is inserted into or removed from the upright slots. After removal or re-insertion of the bracket inner body into the outer sleeve is pushed rearwardly where to bring it flush around the mounting wall surface. Some form of securing means, such as set screws or locking bolts, are then used to secure the sleeve against outward withdrawal of the sleeve.

While various locking systems have been provided to permit two telescoping members to be adjustable, one with respect to the other, and then locked in place in their adjustable positions, these locking systems have not been heretofore utilized in a bracket construction such as that described for a variety of reasons. In the first place, most of these locking systems do not permit a continuous progressive adjustment between the telescoping members, necessary to permit the outer sleeve in the bracket construction described to be mounted exactly flush with the mounting wall surface. A common locking system is one having an outwardly urged pin on the inner member which can be snapped into position in any one of a number of vertically spaced horizontal slots in the outer telescoping member. In the second place, these locking systems which did provide for a progressive continuous adjustment were
generally too complicated and expensive for incorporation into the bracket constructions described, or required use of set screws or locking bolts to fix the position of the outer member. Set screws or locking bolts are not desirable because they take a special tool, namely a screw driver or Allen wrench, to lock the sleeve in place, and the need to tighten or release a screw or nut is an inconvenient means for releasing and locking the outer sleeve to the inner bracket body.

There has thus been a need for a simple, inexpensive and reliable means for locking and unlocking the outer sleeve from the inner bracket body in the bracket construction described, which did not require the use of a special tool to lock and unlock the outer sleeve from the inner bracket body, and which permitted a continuous progressive adjustment of the position of the outer sleeve over the inner bracket body.

The broadest feature of the invention, applicable both to vertically upstanding display racks and wall-mounted display racks, is the use of locking means including a movable member carried on the inner member of the structure and movable so as to engage a confronting inner wall surface of the telescopingly emplaced outer member at an angle. Relative movement of the inner member in the locking direction forces the end of the locking member into a tight frictional,
angled or biting engagement with the 
aforementioned interior wall surface, 
arrestingly locking the motion. Movement of 
the outer member in the opposite direction, 
however, does not permit such locking 
engagement, as a result of which such movement 
is not impeded. As applied to vertically 
upstanding structures, such as the floor-
mounted display rack, the deployment of the 
locking member into such angled arresting 
engagement with the interior wall surface of 
the outer member is provided by inertial 
forces as the inner member is accelerated 
downward, whereas as applied to lockingly 
engaging an ornamental sleeve of a wall-
mounted display bracket the force urging the 
locking member into such engagement is 
preferably provided by gravity, as by an 
unequal disposition of the weight of a pivoted 
backing member on the opposite sides of its 
pivot point. In the preferred form of the 
invention as applied to the floor-mounted 
upright structure, a slight raising movement 
of the inner member causes automatic 
disengagement to permit upward extension of 
the inner member. As applied to the wall-
mounted bracket, the locking member remains in 
continuous sliding engagement, at a trailing 
angle with respect to the wall surface, so 
that the sleeve may be slid completely 
inwardly to its flush engagement with the wall 
mounting surface.
As applied to, for example, a floor mounted display rack preferred locking hardware of the invention includes a locking means preferably carried on the inside of the bottom end portion of each inner member. This locking means is supported preferably for movement in each inner member so that at least one end portion thereof is movable to an extreme locking position where it lockingly engages with the inner surface of the outer tubular member when the inner member is initially accelerated downwards. This end of the locking means is also movable by the force of gravity to an extreme release position where it is released from engagement with the inner surface of the outer tubular member upon upward movement of the outer tubular member, so that no locking action can then take place.

When the inner member is moved upwardly, the locking end of the locking means moves in a direction where it will assume a release position, where it leaves locking contact with the inner surface of the outer tubular member. The inner member may then be moved in an upward direction to any desirable position. At any time, when the inner member is accelerated sufficiently downward, the weight distribution of the inner member is such that the acceleration force will cause its locking means to suddenly move into its locking position.
In the most preferred form of the invention, the locking means is a narrow, elongated angular armature which has a head portion with a slightly over-sized hole loosely received by a pin depending from a support member anchored in place in the lower end of the inner tubular member. The armature member floats on the pin, so that it can rock or pivot and slide vertically on the pin. The support member also preferably carries on its bottom end a magnet which exerts an upward pulling force on the upper end of an opposite tail end portion of the armature, which is made of a magnet attracting material. While the invention is operable without the magnet, the reliability of its operation is greatly enhanced thereby.

The tail end of the preferred armature in its locking position angles downwardly so that it is forced more tightly into frictional engagement with the inner wall of the outer tubular member as the inner member is drawn downwardly by the force of gravity. The inner member is preferably provided with a portion which engages the top of the head portion of the armature, to pivot the armature in a direction which keeps the tail end of the armature engaged against the inner wall of the outer tubular member in its raised or locked position. The end of the head portion of the armature also then preferably makes a similar locking engagement
with the inner surface of the outer tubular member.

The inner member is preferably also provided with a portion which, when the inner member is moved upward, engages the bottom of the head portion of the armature to aid in pivoting the tail end portion of the armature down to its release position. The pivoting of the armature then also releases the end of the head portion from engagement with the inner surface of the outer tubular member.

Since the locking action takes place at the inner face between one or more ends of the armature member carried on the inside of each inner member and the inner surface of a wall of the outer member, the locking hardware is obscured from view. Therefore, it does not adversely affect the attractive appearance of the outer surfaces of the visible portions of the telescoping members, which can be plated or otherwise covered with an attractive coating applied over a continuous outer surface thereof. Also, because of the manner of operation of the invention described above, the present invention provides a quick and easy progressive adjustment of one or a number of connected inner members telescoping into one or more outer tubular members.

Other details of the preferred support member, armature, pin and magnet constituting other specific aspects of the invention will be described in the body of the
specification. The manner in which these parts are sequentially mounted in place in the inner member constitutes a method aspect of the invention.

According to a feature of the bracket application of the invention, the shelf or hanger mounting bracket preferably comprises an inner bracket body and an ornamental outer sleeve, sometimes referred to as an outer tubular member, with a unique means for enabling the sleeve to be continuously progressively adjustable over at least a limited range of positions, so that it can be telescopingly slid over the inner bracket body to an innermost position where the rear face of the outer sleeve lies flush with the mounting wall. To this end, the present invention provides a unique one-way releasable sliding latching member carried on the inner bracket body. The latching member can be an elongated member or bar which is pivotable on the inner bracket body. The latching member has a locking end edge portion inclined toward the inner surface of the sleeve and an opposite release end. The latching member is also preferably configured to be asymmetrically disposed about the pivot point of the member so that the weight of its release end portion will cause the locking edge portion of the latching member to be gravity-urged into contact with the interior surface of the sleeve. To this end, the
release end of the latching member, which is on one side of the pivot point of the latching member, is much heavier than the locking end portion so that gravity will cause the release end of the locking member to be urged towards the upwardly facing surface of the bottom of the outer sleeve. An optional weight may be affixed to the release end to augment this action. The locking end portion contains an edge angled in a direction to make locking engagement with the closely facing inner surface of the sleeve, so that this locking edge prevents the outer sleeve from being moved forwardly away from its innermost position where it is flush against the outer surface of the mounting wall.

The sleeve has a hole in the bottom thereof which is located opposite the position of the heavier release end of the latching member. The hole is sized to receive a pencil or other similarly thin article which can be pushed upwardly to raise the release end of the latching member. This drops the locking end of the release member from engagement with the outer sleeve, permitting the outer sleeve to be moved forwardly away from the mounting wall surface so that the inner bracket body can be removed from, or replaced back into engagement with, the wall-mounted upright involved.

The locking end of the latching member will engage the outer sleeve at an
angle such that it will not arrest the sleeve from movement to a rearward direction after it is brought into flush engagement with the mounting wall surface. It is therefore not necessary to utilize a pencil to maintain the release end of the latching member in a raised position when it is desired to move the outer sleeve into its rearwardmost flush position with the mounting wall surface involved.

According to a related feature of the invention, the inner bracket body is configured as a single plate-shaped member having a V-shaped cutout at the forward end thereof. The remainder of the forward end of the inner bracket body thus forms an upwardly extending finger. The latching member is configured as a generally strap-shaped element having a slot therealong intermediate the locking and release ends thereof configured to engagingly receive the aforementioned finger. The latching member is thus pivotally mounted about the apex of the V-shaped slot.

According to a further related feature of the invention, the inner bracket body is provided with outwardly extending protrusions on either major face thereof, the lengths of the protrusions being chosen so that they closely confront the major inner faces of the outer tubular member to serve as alignment guides. Similarly placed protrusions may optionally be provided on the outer tubular member of the inner end thereof and disposed to arrestingly
engage the protrusions on the inner body member to prevent accidental total withdrawal of the inner body member from the outer tubular member during handling. Similarly, the width of the generally strap-shaped latching member is preferably slightly less than the distance between the confronting major interior wall surfaces to provide a similar aligning effect of the latching member with respect to the inner body to insure that the latching member is freely pivotable thereon.

Thus, an inexpensive 3-piece assembly is provided which will allow the outer tubular member of a shelf bracket assembly to be easily and reliably retained in a flush position against the mounting surface, and which may easily be released for retraction to allow remounting without the use of special tools or fasteners.

It should be understood that the exemplary forms of the invention to be described can be modified substantially without deviating from the broader aspects of the invention. However, the specific, preferred forms of the invention constitute specific aspects of the invention. These will become apparent upon making reference to the specification to follow, the drawings and the claims.

Description of Drawings
Figure 1 is a perspective view of a garment display rack which has three depending hangrod-carrying members adjustably received in separate outer tubular members using the locking hardware of the present invention; Figure 2 is an enlarged, fragmentary, perspective view, partly broken away, showing the unique locking hardware of the present invention mounted in the bottom of one of the hangrod-carrying members shown in Figure 1 telescoping within the open upper end of one of the outer tubular members extending upwardly from a roller-carrying base of the rack shown; Figure 3 is a vertical sectional view, taken along section line 3-3 in Figure 2 showing the armature of the locking hardware in its locking position; Figure 4 is a horizontal section taken along section line 4-4 in Figure 3; Figure 5 is a view corresponding to Figure 3 and which illustrates the movement of the armature of the locking hardware to its unlocking or release portion when the hangrod-carrying member shown is moved upward from its position shown in Figure 3; Figure 6 is a view corresponding to Figure 5, showing the return of the armature to its locking position by inertial effects when the hangrod-carrying member is suddenly accelerated downward from its upper position; Figure 7 is a view corresponding to
Figure 3, and shows the armature of the locking hardware in its locking position, but drawn to a larger scale so that some of the important dimensions of the exemplary form of locking hardware can be identified by reference characters appearing therein;

Figure 8 is a view corresponding to Figure 8, and shows the armature in its release position and other important dimensions of the locking hardware;

Figure 9 is an exploded view of the various parts of the locking hardware;

Figure 10A shows one of the hangrod-carrying members in its finished plated form and prior to its assembly with the locking hardware of the invention and a hangrod;

Figure 10B shows the first step in assembly of the locking hardware with the hangrod-carrying member shown in Figure 10A before the hangrod is welded thereto, where an armature support member is being inserted into the top of the hangrod carrying member;

Figure 10C shows the next steps in the assembly of the locking hardware into the hangrod-carrying member shown in Figure 10B, where the armature support member shown in Figure 11B has been moved into the bottom end portion of the hangrod-carrying member and an anchoring pin, an armature-supporting pin and the armature are sequentially moved into position on the support member;

Figure 10D shows the completion of
the assembly of the parts shown in Figure 10C;

Figure 11 shows a hangrod being
attached to the hangrod-carrying member shown
in Figure 11D, prior to the assembly of that
member with two other similar members, to form
the upper hangrod-carrying assembly used in
the rack of Figure 1;

Figures 12 and 13 are horizontal
sectional views through respectively square
and cylindrical telescoping members, to which
the present invention has been applied as the
viewer looks upwardly in a section plane
including the apertures of the inner member
through which the armature extends; and

Figure 14 is a vertical sectional
view of a hangrod-carrying member which
includes a modified form of the locking
hardware of the invention, wherein the shape
of the armature support member and the end
face of the magnet supported thereby are
modified from that shown for the corresponding
elements of the hardware in Figure 9.

FIGURE 15 is a perspective view of a
shelf support bracket assembly for supporting
a shelf.

FIGURE 16 is a perspective exploded
view of one of the shelf support elements
shown in Figure 15.

FIGURES 17-19 are partly cut-away
side views of one of the support elements
shown in Figure 15 during insertion, when
locked, and during removal thereof.
respectively.

FIGURE 20 is a cross sectional view of an assembled support assembly.

FIGURE 21 is a partially cut-away detail view of the assembly showing a locking mechanism for securing the support assembly together.

FIGURE 22 is a partially cut-away view of one end of the bracket assembly.

FIGURE 23 is a perspective view of a hanger support bracket assembly.

Description of Preferred Forms of the Invention Shown in the Drawings

Referring now more particularly to Figure 1, the adjustable rack thereshown comprises a lower roller-carrying base assembly 2A and a upper hangrod-carrying assembly 2B which may be formed for the most part from finished plated rectangular aluminum tubular stock. The upper assembly has three curved hangrods 8, 8', and 8'' which occupy different segments of a circle and are located at three different elevations providing an unusually attractive rack. Garment-supporting hangers with hook necks are hung along these hangrods. The ends of each of these hangrods have stop shoulders for preventing the hangers from falling off the ends of the hangrods.

Each hangrod is carried on top of a depending tubular member, to be referred to as the inner tubular member 7, 7', or 7''. The
inner tubular members 7, 7', and 7" are interconnected by bracing arms 9, 9' and 9" which are welded together at the center of the rack and are suitably welded or otherwise secured to the inner sides of the inner tubular members 7, 7', and 7" before they are finish-plated. The upper assembly 2B is assembled to the bottom assembly 2A by inserting the bottom ends of the inner tubular members 7, 7', and 7" into the open upper ends of upstanding outer tubular members 4, 4', and 4" forming part of the bottom assembly 2A. The bottom ends of the outer tubular members 4, 4', and 4" are interconnected by bracing arms 5, 5', and 5", respectively, which are welded together at the center point of the rack and are also welded or otherwise suitably connected to the bottom ends of the outer tubular members before they are finish plated.

The bracing arms 5, 5', and 5" carry on the bottom faces thereof rollers 5a, 5a', and 5a", respectively, and a center roller 5a'" may be provided at the point where the bracing arms 5, 5', and 5" come together at the center of the rack.

The present invention comprises hardware like that shown in Figure 9 mounted at the bottom ends of each of the inner tubular members 7, 7', and 7". This unique hardware permits the simultaneous adjustment of the hangrod-carrying assembly 2B by the simple process of raising this assembly to any
desired elevation. When the upper assembly is accelerated downward by the operator, it will drop only a short distance. It is important that the inner tubular members 7, 7' and 7" are freely slidable within the outer tubular members 4, 4', and 4". After only this slight downward movement, the locking hardware to be described is moved by inertial effects into its locking condition, where the upper assembly 28 will remain in its substantially originally adjusted position, having dropped only about a sixteenth of an inch in the process.

It is believed that a rack which operates on the principle just described is unique. In the prior art racks of the type having two or more hangrod-carrying depending members, in order to be able to adjust the elevation of the hangrod-carrying assembly, it was necessary for one person first to individually remove locking pins passing through aligned apertures in the telescoping members while another person held the assembly in place. The person holding the assembly then moved it to a desired adjusted position, and the other person then inserted the pins into these a pair of aligned apertures in the telescoping members to hold the assembly in its adjusted position. The advantages of the present invention over this prior method of elevation adjustment is manifestly substantial, since only a single person is
needed to adjust the elevation of the hangrod-carrying members quickly and easily, unlike the prior method required to do so. In the prior art telescoping structures described previously where outwardly spring urged rollers are mounted in each inner tubular member, operation of manually operable members were needed to release the rollers from their locking position.

The unique locking hardware, similar to that shown in Figure 9 in exploded form, is usable in place of this roller hardware and could be operated between locking and release positions by such manually operable members. However, such manually operable members are not needed. This hardware is anchored in the bottom end of each of the inner tubular members 7, 7' and 7". Referring also to Figures 2 and 3, this hardware includes support member 10 having a horizontal cross section which permits it to be initially inserted into and slideable freely along the interior of an inner tubular member 7, 7', or 7" when it is assembled inside this tubular member from the top thereof, as illustrated in Figures 10A and 10B. The assembly procedure will be later described. The support member 10 is anchored in place at the bottom end of this tubular member by an anchoring pin 11 passing through aligned holes 7e-7e in the opposite side walls 7a-7a of this inner tubular member and a similar aperture 10e in
the support member 10. The support member 10 has a flat upper end and an irregularly-shaped bottom end including a short horizontal end surface 10c having a pin-receiving aperture 10f therein. The surface 10c merges with a downwardly inclining surface 10d having near the end portion thereof a cylindrical magnet-receiving recess 10g having an axis extending perpendicular to the inclined surface 10c so that the end face of a magnet to be supported therein will be generally parallel to the inclined surface 10c.

A cylindrical magnet 15 is friction-fitted or otherwise anchored within the recess 10g and the pin 14 is anchored in the aperture 10f with the pin depending a substantial distance below the surface 10c. The magnet 15 is shown projecting only a short distance from the inclined surface 10d. The support member 10 is preferably made of a non-magnetic material, such as a molded synthetic plastic material. Supported for a floating, rocking and sliding movement on the pin 14 is an armature member 16 also sometimes referred to as a locking means. This member is made of steel or other material which can be attracted toward the magnet 15. The armature has a short head portion 16a with a circular aperture 16b through which passes the depending pin 14. The pin 14 is also preferably of a cylindrical cross section, but of a smaller size than the aperture 16b.
One of the narrow, vertical end walls 7b of the inner tubular member 7 has near its bottom end a lower aperture 7c having an upwardly and inwardly extending tab 7e defining its bottom margin and a downwardly and inwardly extending tab 7e defining its upper margin. The other vertical narrow end wall 7b has an upper aperture 7c′ having an upwardly and inwardly extending tab 7d′ defining its bottom margin and a downwardly and inwardly extending tab 7d defining its upper margin. The head portion 16a of the armature 16 is adapted to project through the upper aperture 7c′.

The head portion 16a of the armature confronts the flat surface 10c at the bottom of the support member 10 and can move up and down, slightly right and left, and pivot over the pin 14 extending therethrough. The head portion 16a of the armature merges with a relatively long tail portion 16c which angles downwardly to project into the lower aperture 7c′ of the inner tubular member 7 and confronts the relatively long inclined surface 10d at the bottom of the support member 10.

The bottom end of the magnet 15 projecting from the surface 10d applies an attracting force on the upper surface of the heel portion 16c of the armature.

Reference should now be made more particularly to Figures 7 and 8 which are the most enlarged views showing respectively the
uppermost extreme position of the armature 16, which is the locking position thereof, where the head and heel ends 16a' and 16c' thereof frictionally lockingly engage with the inner surfaces of the end walls 4b-4b of the outer tubular member 4. The tab 7d at the top of the upper aperture 7c' of the inner tubular member is shown engaging the top surface of the head portion 16a of the armature, so that accelerating the inner tubular member 7 in a downward direction will accelerate this head portion downwardly so that the heel portion 16c is inertially pivoted upwardly into tight frictional engagement with the inner surface of the left end wall 4b of the outer tubular member 4. The magnet 15 also exerts a force on the heel portion 16c which tends to keep the armature in its raised, locking position as shown. (While this magnet makes the operation of the locking hardware described more reliable, it is not necessary in accordance with the broadest aspect of the invention.) In the locking position of the armature 16, it is still shown as spaced a small distance G1 from the bottom face of the magnet 15. The armature shown is prevented from touching this magnet by the upper tab 7c at the top of aperture 7c and because the armature becomes locked in place before it can touch it.

If the inner tubular member 7 is moved upwardly from its locking position shown
in Figure 6 the frictional forces coming into play will pivot the armature member in a direction to relieve this frictional force and to cause the armature member to pivot the pin 14 to assume the release position shown in Figures 5 and 8.

When the armature heel is in its lower release or unlocking position shown in Figures 5 and 8, the inner tubular member can then be raised any speed or slowly lowered to a desired elevation since this slow, downward movement will not shake the armature from its lowered release position. However, as soon as the user releases his grasp on the inner tubular member 7, since this tubular member is designed to freely move within the outer tubular member 4, the force of gravity will suddenly cause the inner tubular member to drop quickly, when the inertial forces involved will then cause the heel and head portions of the floating armature 16 to assume their locking positions shown in Figures 3 and 8. As previously indicated, this action generally occurs after the inner tubular member drops only approximately 1/16th of an inch from the point when the user releases his grasp on that member. The magnet 15 aids the upward movement of the armature and minimizes this dropping distance.

The reason that such immediate locking occurs merely upon simple release of the inner tubular member 7 when a magnet is
employed, as contrasted with the non-magnetic situation requiring positive downward acceleration of the inner tubular member 7 by the operator is that in the second case (i.e., the first embodiment discussed previously) a downward acceleration in excess of \( g \) (980 cm./sec.\(^2\)) is necessary so that the shoulder 7d catches up with the head portion 16a of the floating armature 16. In the moving system the effective force of gravity is then upward, causing clockwise rotation of the armature 16 into the locking position shown in Figure 7 whereupon downward motion is arrested. If the magnet 15 is employed, then a non-inertial force component is present, and a simple release of the inner tubular member by the operator, resulting in an automatic downward acceleration of \( g \), makes the entire system temporarily weightless. The slight force of the magnet 15, being non-inertial, immediately rotates the armature 16 into locking engagement. This is the preferred embodiment of the invention.

In one operable embodiment of the invention just described, the locking hardware parts had the following specifications and dimensions indicated in Figures 8 and 9:

- Armature material - 0-1 steel
- Armature tail length (L2) 1-1/8"
- Armature head length (L1) 9/16"
- Armature thickness (T1) .092"
- Armature width (W1) .365"
Armature to magnet spacing (G1) in locking condition .106"  
Armature to magnet spacing (G2) in released condition .200"  
Armature head aperture diameter (Dh) .206"  
Magnet material - Alnico 3/16" round x 3/4" long  
Magnet diameter (Dm) .187"  
Support pin diameter (Dp) .125"  

Reference should now be made to Figures 10A-10D which illustrates the sequence of assembly of the locking hardware in the inner tubular member 7. The same procedure is used to place the locking hardware into the other inner tubular members 7' and 7". This is done before these inner tubular members are interconnected by welding the inner ends of the bracing arms 9, 9', and 9" together, and before the attachment of the hangrods to the inner tubular member or the finish-plating thereof. The first step in the fabrication process is to weld a bracing arm 9, 9' or 9" to the inner tubular members 7, 7', or 7" and to form the apertures 7c and 7c' at the bottom end thereof. The bracing arms are the same size as the inner tubular members so that when they are welded and subsequently finish-plated the interconnections between each bracing arm and its inner tubular member is a smooth, unblemished plated surface. Upon the
completion of a finished-plating operation, a support member 10 oriented with its inclined bottom surface 10d facing toward what is to be the open top end of an inner tubular member 7 as illustrated. It is then moved toward what will be the bottom end thereof where it is at a point near the apertures 7c and 7c' and the anchoring aperture 10e thereof is aligned with aperture 7e-7e formed in the opposite sides of the inner tubular member. An anchor pin 11 is passed through the apertures 7e-7e in the inner tubular member and the anchoring aperture 10e of the support member 10 and in any way anchored therein, as by a friction fit therein.

Next, the pin 14 is inserted into the pin-receiving aperture 10f, the pin being anchored in place by a friction fit or a suitable adhesive. The next operation in the assembly is the insertion of the armature 16 into one of the apertures 7c or 7c' of the inner tubular member so that the aperture 16b in the head portion 16a of the armature is aligned with the pin-receiving recess 10f. Then the pin 14 is passed through aperture 16b into the recess 10f of the support member with which it makes a friction fit. This completes the assembly of the locking hardware of the invention as is shown in Figure 10D.

After all of the inner tubular members have the locking hardware mounted therein, the next step in the assembly
procedure of the rack is to weld or otherwise secure the curved hangrods 8, 8' and 8" to the inner faces of the inner tubular member 7, 7', and 7'', as illustrated in Figure 11. The bracing arms 9, 9', and 9" are then suitably connected together at their outer ends, as by welding or otherwise, as shown in Figure 1.

The invention is applicable to telescoping members having square and cylindrical cross sections, as illustrated respectively in Figures 12 and 13. Corresponding parts of these telescoping members and the locking hardware therein are shown using reference numerals corresponding to those used in the form of the invention just described by adding the alphabet characters A and B, respectively, and thus further description of their operation and construction need not be made. Suffice it to say, the shape of the support member and the armature are modified to suit the particular cross sectional areas of the tubular members involved.

Figure 14 shows an embodiment of the invention which modifies the stage of the support member 10 to enable it to be more economically molded of synthetic plastic material. Thus, the modified support member 10' has a horizontal flat bottom end 10d' with a cylindrical magnet-receiving recess 10g' formed therein which extends vertically. A generally cylindrical
magnet 15' is piece-fitted in the recess 10g'. The magnet has an inclined end face 15'' generally parallel to the inclination of the heel portion 16c of the armature 16 when it is in its upper locking position, as illustrated in Figure 15.

It is apparent from the description of the various forms of the present invention that the unique locking hardware of the present invention results in a garment rack or other product using vertically extending telescoping members whose overall length is adjustable by means which do not interfere with the exterior appearance of the product. Thus, all of this hardware is hidden within the confines of the telescoping members involved. More importantly, the inner tubular members are progressively adjustable simultaneously to practically any position within the outer tubular members in the quick and easy manner previously described.

Figure 15 shows an inexpensive shelf support assembly bracket 120 for supporting a shelf 122. A pair of such assemblies 120 are shown in Figure 15. The support bracket assemblies 120 shown in Figure 15 are configured for downwardly sloping orientation; however, they may equally well be configured as horizontally disposed shelf support assemblies.

Referring particularly to Figure 16, each support assembly 120 includes a generally
planar strap-shaped bracket inner body 124 having upper and lower shoulders 128 with an inner or locking end 130 thereon, and further having transversely extending notch 132 adjacent the lower shoulder 128. The shoulders 126, 128 and the notch 132 are configured for inserting locking engagement into a mounting rail 134 having slots 136 therein, the mounting rail 134 being adapted to mounting to a wall 136 and having preferably an ornamental molding 138 disposed on either side thereof.

An ornamental tubular outer member 140 configured as a sleeve having a generally rectangular central passage 142 extending axially therealong is configured in the embodiment shown with an inner sleeve end 144 configured for flush engagement with the wall 136, or alternatively the molding 138 when the sleeve is slid fully over the inner body 124. Centering is preferably accomplished by means of centering tabs 146 extending outwardly from the major faces of the inner body 134. End caps 145 (Figure 15) are provided at the outer ends 147 of the sleeve 140 to prevent the shelf 122 from sliding off the support assemblies 120. The sleeve 140 is automatically secured against withdrawal by a specially configured latching member 148 configured preferably from bent planar stock and having an extended portion forming a release end 150 (preferably augmented by an
attached strap-shaped weight 151) and a sharply angled portion at the other end thereof forming a locking end 152 having a blade edge 154 at the end thereof.

Intermediate the locking end 152 and the release end 150 there is a slot 156 provided running lengthwise along the arcuate region joining the locking end 152 and the release end 150. A V-shaped slot 158 is provided proximate to the outer end 160 of the inner body 124 by a forwardly angled slot face 159, joining and confronting perpendicular slot face 161 at a slot lengthwise extending wall face 163. The space between the outer end 160 and the slot 158 is thus configured as a finger 167 extending into the slot 156. As shown in Figures 17-19 the latching member 148 is thus pivotally secured to the outer end 160 of the inner body 124 when emplaced thereon by the engagement of the slot end face 165 of the latching member 148 with the joining wall portion 163. In particular it will be noted in Figures 17-19 that the length of the locking end 152 is chosen so that when engaged with the upper interior wall surface 162 of the sleeve 140 it is disposed at an angle thereto. Thus, as shown in Figure 17, the sleeve may readily slide past the blade edge 154 as it is moved toward the locking end 130 of the inner body 124 during assembly. Final engagement flush with the molding 138 is shown in Figure 18. To assist in alignment, the
width of the latching member 148 is preferably slightly less than the interior wall separations of the sleeve 140.

If one next attempts to withdraw the sleeve 140, it will be seen that the blade edge 154 will be pivotally driven into hard engagement with the interior wall surface 164, preventing such withdrawal. In the preferred form of the invention this effect is augmented by reducing the effective length of the blade edge 154 by providing an arcuate cut-out 164 therein to shorten the effective bearing surface of the blade edge.

A tool passage 166 is provided in a lower portion of the sleeve 140 to allow insertion of a tool such as a pencil 168 to urge the release end 150 upward to withdraw the blade edge 154 from contact, thus allowing the sleeve to be withdrawn (Figure 19). Only a slight retraction of the sleeve 140 is necessary to provide sufficient clearance between the sleeve end 144 and the molding 138 to allow the assembly 140 to be rotated to disengage the inner body 124 from the mounting rail 134.

Spring biasing means may equally well be employed to urge the blade edge 154 into similar engagement with the sleeve wall 162; however, this adds to the number of parts in the assembly. Optional inwardly extending tabs 145 may be provided extending from the major inner faces of the sleeve 140 to
confrontingly arrestingingly engage the centering tabs 146 to prevent accidental total withdrawal of inner body 124 from the sleeve 140 during handling of the assembly. Figure 23 shows a modified assembly 175 adapted for hanging garments on display, the modified sleeve 177 having a number of hooks 179 downwardly depending therefrom. The end cap 181 does not have the projecting edge of the previous embodiment, since shelf retention is not necessary. All other part numbers have been kept the same in the previous embodiment because their functions are identical.

Thus, a simple inexpensive assembly has been provided which will allow the sleeve to be locked in close flush engagement with the mounting surface without employing such customary alternatives as sliding ratchets, extra securing screws or similar fastening methods well known in the art.

While the invention has been described with reference to preferred embodiments thereof, it will be understood by those skilled in the art that various changes may be made and equivalents may be substituted for elements thereof without departing from the broader aspects of the invention. Also, it is intended that broad claims not specifying details of a particular embodiment disclosed herein as the best mode contemplated for carrying out the invention should not be limited to such details. Furthermore, while,
generally, specific claimed details of the invention constitute important specific aspects of the invention in appropriate instances even the specific claims involved should be construed in light of the doctrine of equivalents.
1. A bracket comprising an inner bracket body having an inner end configured for interlocking engagement with vertical upright means providing a vertical mounting surface, an outer tubular member forming a sleeve telescoping over said inner bracket body, said outer tubular member being continuously progressively moveable along said inner bracket body over a range of positions unless locked against such movement, the rear end of said tubular member being shaped to be moved flush against said mounting surface when pushed fully rearwardly toward the inner end of said inner bracket body, and locking means for locking said tubular member against forward movement on said bracket member, the improvement comprising:

   said locking means including a latching member having a locking end configured for locking engagement with an interior wall surface of said tubular member;

   pivot-forming means on said inner bracket body for supporting said latching member for pivotal movement thereon, wherein said locking portion is normally urged into locking engagement with the inner surface of said tubular member, said locking end of said latching member being configured to engage said interior wall surface at an angle thereto, wherein movement of said outer
tubular member toward the inner end of said inner bracket body causes said locking end to freely slide over said inner bracket body, so that the rear end of said tubular member can be brought flush against said mounting surface, said angle of said locking end of said latching member causing said locking end to lock against said interior wall surface unless released therefrom when a force is applied to said outer tubular member which tends to move it forwardly away from said inner end of said inner bracket body; and

manually operable release means for at least momentarily releasing said locking end of said latching member from engagement with said outer tubular member, to permit the outer tubular member to be moved forwardly upon said inner bracket body.

2. The bracket of claim 1 wherein said release means includes an opening in said outer tubular member, said opening being sized and positioned to receive an end of a pencil or the like and located to be opposite an end portion of said latching member when mounted on said inner bracket body, so that pressure from said pencil will pivot said latching member to bring said locking end thereof out of engagement with said interior wall surface, and permits at least a limited movement of said tubular member forwardly upon said inner bracket body so that the inner bracket body
may be vertically pivoted or otherwise moved to permit it to be engaged or disengaged from said vertical upright means.

3. The bracket of claim 1 wherein said latching member is mounted on said pivot-forming means so that it can pivot in an up and down direction and gravity urges said locking end of said latching member into engagement with said inner surface.

4. The bracket of claim 2 wherein said latching member is pivotally mounted between the ends thereof, the end of the latching member opposite said locking end being a release end positioned opposite said opening and said tubular member.

5. The bracket of claim 4 wherein said release end of the latching member is substantially heavier than the locking end of the latching member on the opposite side of said pivot point, so that the force of gravity will pull the release end of the latching member downwardly, and cause the locking end of said locking member to be urged upwardly into a locking engagement with the inner surface of said outer tubular member when a force is applied to the tubular member tending to move it in a forward direction.
6. The bracket of claim 1 wherein said locking end of said latching member has a thin edge which frictionally engages with the inner surface of said outer tubular member at an angle which locks the outer tubular member against such forward movement.

7. The bracket of claims 1 or 4 wherein said inner bracket body is a horizontally thin plate-like member.

8. The bracket of claim 7 wherein said latching member is a vertically thin member.

9. The bracket of claim 8 wherein there is a vertically extending finger at the forward end of said inner bracket body, said finger being spaced from the rest of the inner bracket body to define the forward margin of a V-shaped vertical slot formed in the upper edge of said body, and said latching member having a slot through which said finger projects, said V-shaped slot on said inner bracket body enabling the latching member to pivot over the inner bracket body at a corner of said V-shaped slot in front of said finger.
10. In a system having a pair of telescoping members, one such member being an outer tubular member having an inner surface and the other being an inner member fittable and slidable inside of said outer tubular member and lockable by locking means over a range of positions, so that the overall length of the telescoping members can be gradually progressively varied and locked into practically all adjustable positions, the improvement comprising:

said locking means including latching means having at least one edge portion thereon configured for engagement with an interior wall surface of said outer member;

pivot-forming means disposed on said inner member and about which said latching means is pivotable and wherein said edge portion of said latching means makes a frictional arresting engagement with said interior wall surface, said edge-forming portion being configured to engage said interior wall surface at an angle thereto so that relative movement of said members in one direction of movement urges said edge-forming portion into frictional or biting arresting engagement with said interior wall surface, and including means for operating said latching means slides freely along said interior wall surface.
11. The system of claim 10 for use in installations wherein said inner and outer members are disposed upwardly extending, and including means for pivoting said edge-forming portion to be rotated into said arresting locking engagement with said interior wall surface responsively to an accelerational downward urging of said inner member and to release said locking engagement responsively to upward urging of said inner member.

12. The system of claim 11 wherein said locking means includes first support means for supporting said latching means in a disengaged position under the force of gravity responsively to upward movement of said inner member after locking and second support means for supporting said latching means in a wall-engaging locking position responsively to said downward acceleration.

13. The system of claim 11 wherein said latching means include biasing means producing a biasing force generally independent of acceleration for assisting in urging said latching means into said arresting locking engagement, the strength of said biasing means being chosen sufficient to cause said engagement under downward acceleration of said inner member at accelerations greater than a given acceleration value less than the
free fall acceleration due to gravity and insufficient to cause said engagement at accelerations less than said given acceleration value.
14. In combination with a pair of telescoping members, one such member being an outer tubular member having an inner surface and the other being an inner member fittable and slidable inside of said outer tubular member and which is to be moved and locked in a position therein so it projects varying amounts from the outer member to vary the overall length thereof; the improvement in means carried on said inner member for releasably locking said inner member approximately in any adjusted position within said outer tubular member so that the overall length of the telescoping members can be gradually progressively varied and locked into practically all adjustable positions, said means comprising: locking means, and support means for said locking means for supporting at least a first portion of said locking means for movement to a released position responsively to movement of said inner member in a first direction, in which released position at least said first portion of said locking means is disengaged from said inner surface of said outer tubular member, and for supporting at least said first portion of said locking means for movement from said released position to a locking position responsively to accelerated movement of said inner member in the opposite direction, in which locking position at least said first portion of said locking means lockingly engages with said
inner surface of said outer tubular member, but disengages from said inner surface of said outer tubular member when said inner member is moved in said first direction.

15. The combination of Claim 14 wherein said inner member is a vertical member telescoping into the top of said outer tubular member which is also vertically oriented, and wherein said first direction is upward, the inner member falling under the force of gravity when the inner member is released by the user after being raised, the raising of said inner member in a locked condition causing said first portion of said locking means to move downward into said lowered released position, downward acceleration of said inner member causing said first portion of said locking means to be moved to said raised locking position.

16. The combination of Claim 15 wherein said locking means is supported on the bottom of the associated support means for movement between a lowered position, which is said released position, and an upper position, which is said locking position.

17. The combination of Claim 16 wherein said locking means is floatingly supported on said support means.
18. In combination with a pair of
upstanding telescoping members, one such
member being an outer upstanding elongated
tubular member having an inner surface and the
other being an inner upstanding elongated
member fittable into the top of and slidable
inside of said outer tubular member and which
is to be moved up and down and locked in a
position therein so it projects varying
amounts from the outer member to vary the
overall length thereof; the improvement in
means carried on said inner member for
releasably locking said inner member
approximately in any adjusted position within
said outer tubular member so that the overall
length of the telescoping members can be
gradually progressively varied and locked into
practically all adjustable positions, said
means comprising: locking means, and support
means for said locking means for supporting at
least a first portion of said locking means
for movement to a released position
responsively to upward movement of said inner
member in which released position at least
said first portion of said locking means is
disengaged from said inner surface of said
outer tubular member, and for supporting at
least said first portion of said locking means
for movement from said released position to a
locking position responsively to downward
acceleration of said inner member in which
locking position at least said first portion
of said locking means lockingly engages with said inner surface of said outer tubular member, but disengages from said inner surface of said outer tubular member to form a one-way clutch when moved upward.

19. The combination of Claim 18 wherein said locking means is an elongated member having a head portion which is supported for rocking movement on said support means, said first portion of said locking means being a tail portion on said locking means extending from said head portion at a downwardly extending angle, to engage the inner surface of said outer tubular member at an angle which prevents the downward movement of said inner member when said first portion of said locking means is in its upper position constituting the locking position thereof.

20. The combination of Claim 19 wherein each locking means is a member which is pivotally mounted on said support means, said first portion of each locking means is on one side of the pivotally mounted portion thereof, and said depending or inner member has a pair of shoulder-forming means which engage portions of said locking means on the opposite side of said pivotally mounted portion when said depending or inner member is moved in the desired direction, to aid in the
desired movement of said first portion between said positions.
21. A method of making and assembling a pair of telescoping members with an adjustable overall height, one of said members being an outer upstanding, elongated tubular member, the other of said members being an inner upstanding elongated tubular member fittable and fully slidable inside of said outer tubular member, the method comprising the steps of forming on the bottom end of said inner tubular member at least one aperture with inwardly projecting tab means at the bottom margin of said aperture, providing a support member which is slidable into said inner tubular member from the top thereof, placing said support member in the top of said inner tubular member and sliding the same to the bottom end thereof to a point above said aperture, anchoring the support member in place thereof, and inserting an elongated locking member into said inner tubular member through said aperture and mounting the same on the bottom of said support member so that a first portion of said elongated locking member is moved with the raising of said inner tubular member into a release position where said first portion is disengaged with the inner surfaces of said outer tubular member, and so that with the sudden downward acceleration of said inner tubular member, said first portion of said locking means assumes a locking position where it lockingly
engages with said inner surface of said outer tubular member.
11. In a system having a pair of
telescoping members, one such member being an
outer tubular member having an inner surface and
the other being an inner member fittable and
slidable inside of said outer tubular member and
lockable by locking means over a range of
positions, so that the overall length of the
telescoping members can be gradually progressively
varied and locked into practically all adjustable
positions, the improvement comprising:
said locking means including latching
means having at least one edge portion thereon
configured for engagement with an interior wall
surface of said outer member;
pivot-forming means disposed on said
inner member and about which said latching means
is pivotable and wherein said edge portion of said
latching means makes a frictional arresting
engagement with said interior wall surface, said
edge portion being configured to engage said
interior wall surface at an angle thereto so that
relative movement of said members in one direction
of movement urges said edge-forming portion into
frictional or biting arresting engagement with
said interior wall surface, and including means
for operating said latching means out of said
frictional arresting engagement so that said
locking means slides freely along said interior
wall surface, said system being adopted in here
for use in installations wherein said inner and
outer members are disposed upwardly extending, and
including means for pivoting said edge portion to
be rotated into said arresting locking engagement
with said interior wall surface responsively to an
accelerational downward urging of said inner member and to release said locking engagement responsively to upward urging of said inner member.

12. The system of claim 11 wherein said locking means includes first support means for supporting said latching means in a disengaged position under the force of gravity responsively to upward movement of said inner member after locking and second support means for supporting said latching means in a wall-engaging locking position responsively to said downward acceleration.

13. The system of claim 11 wherein said latching means include biasing means producing a biasing force generally independent of acceleration for assisting in urging said latching means into said arresting locking engagement, the strength of said biasing means being chosen sufficient to cause said engagement under downward acceleration of said inner member of accelerations greater than a given acceleration value less than the free fall acceleration due to gravity and insufficient to cause said engagement at accelerations less than said given acceleration value.
### INTERNATIONAL SEARCH REPORT

**International Application No**: PCT/US 89/03535

#### I. CLASSIFICATION OF SUBJECT MATTER
According to International Patent Classification (IPC) or to both National Classification and IPC

- **IPC**: A 47 F 5/10, F 16 B 7/16, A 47 B 96/06

#### II. FIELDS SEARCHED

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#### III. DOCUMENTS CONSIDERED TO BE RELEVANT

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<td>US, A, 3561714 (ZURAWSKI et al.) 9 February 1971 see column 2, lines 40-49; figure 1; column 3, line 39 - column 4, line 4; figure 8</td>
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#### IV. CERTIFICATION

- **Date of the Actual Completion of the International Search**: 12th April 1990
- **Date of Mailing of this International Search Report**: 21. 05. 90
- **International Searching Authority**: EUROPEAN PATENT OFFICE
- **Signature of Authorized Officer**: F.W. HECK
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ANNEX TO THE INTERNATIONAL SEARCH REPORT
ON INTERNATIONAL PATENT APPLICATION NO. US 8903535
SA 30622

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For more details about this annex: see Official Journal of the European Patent Office, No. 12/82