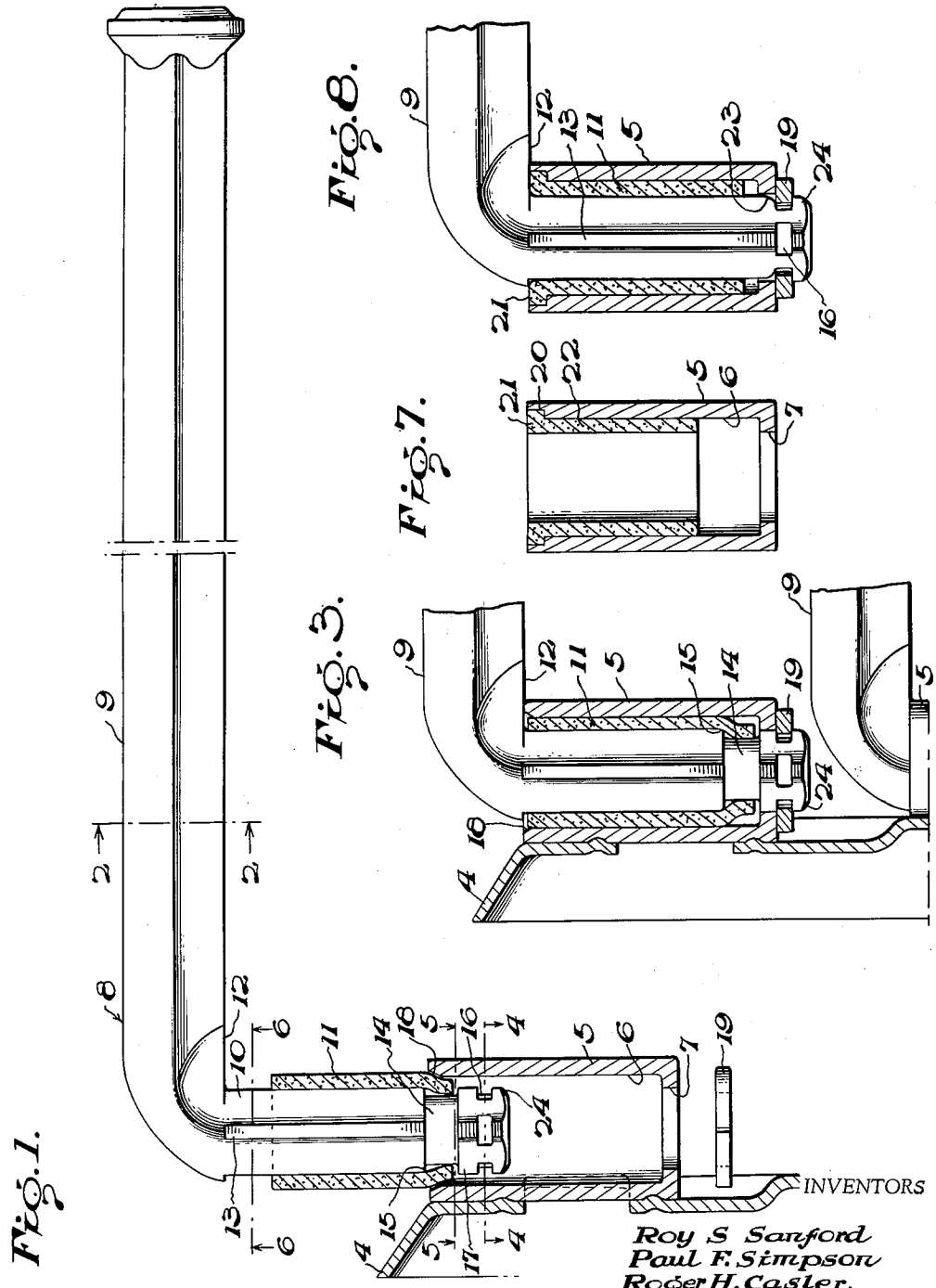
Nov. 29, 1955 R. S. SANFORD ET AL 2,725,148

RACK DEVICE

Filed April 2, 1951 2 Sheets-Sheet 1



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RACK DEVICE

Filed April 2, 1951 2 Sheets-Sheet 2

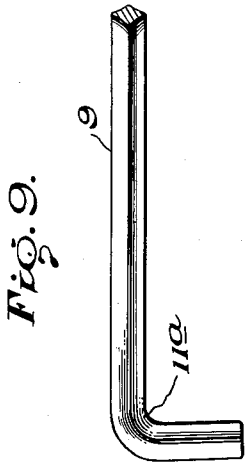


Fig. 9.

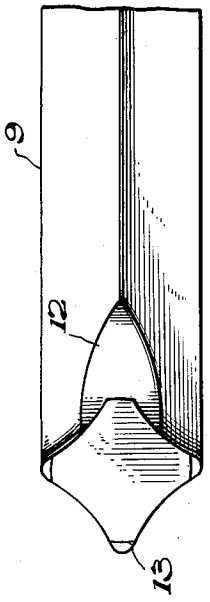


Fig. 6.

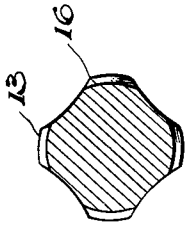


Fig. 4.

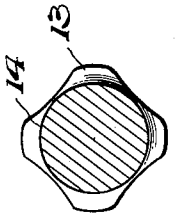


Fig. 5.

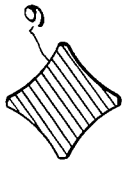


Fig. 2.

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RACK DEVICE

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4 Claims. (Cl. 211—96)

This invention relates to hinged connections and methods of assembly for such connections, and more particularly to hinged connections of the friction type adapted for use in connection with towel racks and the like of the type provided with a wall bracket and one or more outwardly extending towel supporting arms hingedly connected thereto and adapted to be swung about in a horizontal plane to suit the convenience of the user.

Numerous racks of the above general type proposed and marketed heretofore have not been fully satisfactory in view of the hinge construction used, this construction being in many cases so constituted, due to looseness in the hinge connection, as to permit the bar or bars to sag relative to the bracket rather than to extend outwardly in a horizontal plane, thus detracting from the appearance of the rack. In addition this looseness has made it more difficult for the user to hang towels or other articles on the bars, due to the tendency of the latter to swing away from the user at the slightest touch. Furthermore, such racks are often mounted on doors, and in the event the hinge connections are loose, the bars tend to swing relative to the door as the latter is opened or closed, resulting in an annoying noise as well as the possibility that the bars may change position on the door in such a way as to engage and damage the walls of the room or articles of furniture. It is accordingly an object of the present invention to provide a novel friction hinge construction for towel racks and the like which avoids the foregoing disadvantages and difficulties.

A further object of the invention is to provide a hinge construction of the above type of simple and economical construction.

Another object is to provide a towel rack of the swinging arm type so constituted that the arms will tend to remain in a position chosen by the user.

Yet another object is to provide an improved method of assembling a hinge connection of the above type.

Still another object is to provide a novel hinge pin assembly for the above hinge connection.

These and other objects of the invention will become more readily apparent when considered in the light of the following specification and the drawings, but these are not to be considered as defining the limits of the invention, reference being had for this purpose to the appended claims.

In the drawings, wherein similar reference characters refer to similar parts throughout the several views;

Fig. 1 is an exploded view, partially in section of the towel bar and hinge connection partially assembled;

Fig. 2 is a sectional view of the towel bar or rod of Fig. 1 taken along line 2—2 of the latter;

Fig. 3 is a fragmentary view, partially in section, showing the hinge connection with the parts in assembled position;

Fig. 4 is a sectional view of the bar taken along line 4—4 of Fig. 1;

Fig. 5 is a sectional view of another portion of the bar taken along line 5—5 in Fig. 1;

Fig. 6 is a sectional view of another portion of the bar taken along line 6—6 in Fig. 1;

Fig. 7 is a fragmentary sectional view of a modified form of the invention;

Fig. 8 is a fragmentary sectional view of the modification illustrated in Fig. 7 showing the parts in assembled position, and

Fig. 9 is a fragmentary view showing the shape of a portion of the rod of Fig. 1 prior to machining.

Referring more particularly to Fig. 1, the hinged towel rack includes in general a wall bracket 4, which may be a stamping, a hinge member or tube 5 attached to the wall bracket, preferably by welding, and having a relatively large diameter bore 6 in the upper portion thereof and a relatively small diameter bore 7 at the lower end thereof concentric with the large bore, a towel rod 8 having a horizontal towel supporting portion 9 and a pintle or hinge pin portion 10 disposed vertically at right angles thereto, and a bushing 11 of resilient plastic material, adapted on assembly of the device to be disposed between the outer surface of the pintle pin 10 and the wall of bore 6.

Although other bar shapes may be utilized, in the present instance the wire used to form bar 8 is of square cross section provided with concave walls as shown in Fig. 2. In bending the pintle portion 10 at right angles to the rod portion 9, the rod is held in the bending dies in such a manner as to form a bulge of metal 11*a* in the corner adjacent portion 9 as shown in Fig. 9, this metal later being machined off to form a flat bearing surface 12, to be described more fully hereinafter, and shown in Fig. 6.

The bar having been bent as shown in Fig. 1, the pintle pin portion is machined as shown to provide arcuate portions or bearing portions 13, a groove 14 adjacent the lower end thereof with a sharp shoulder 15 at its upper end, and a lock ring groove 16 directly adjacent the lower end of the pintle pin. Although the square shaped rod is used primarily for decorative purposes, it is to be understood that round rod can be used and that the pintle pin can be of round or other cross section and provided with the above described grooves.

The diameter of the tube bore 6 is appreciably greater than the diameter of the pintle pin between opposite arcuate surfaces 13, while the smaller bore 7 is only slightly larger than the pintle pin and is adapted to act as a bearing for portion 17 of the pintle pin located between grooves 14 and 16. The bore at the upper end of the tube is preferably provided with a flared or tapered portion 18 as shown, and the bushing 11, of suitable resilient plastic, normally has a bore less than the maximum diameter of the pintle pin, so that it must be stretched over the pintle pin during assembly thereon. Being of resilient material, the lower end of the bushing, when assembled on the pintle pin as shown in Fig. 1, contracts around shoulder 15 into groove 14 and is gripped on its inner surface by the sharp shoulder 15 at the upper end of the groove. If the bushing is forced onto the pin rapidly, the end of the bushing, being expanded by the lower end of the pin, passes over grooves 16 and 14 without catching therein. The lower end of the bushing, being contracted into groove 14 due to the resiliency of the bushing material, provides a tapered end portion or portion of reduced diameter which may be readily entered into bore 6, this action being assisted by the flared portion 18.

With the bushing assembled on the pintle pin as above described and as shown in Fig. 1, a sub-assembly comprising the rack arm and bushing is ready for assembly to the wall bracket 4 to form a complete towel rack assembly. This assembly is effected by forcing the pintle pin and the bushing thereon downward into the bore of tube 5 until the snap ring groove 16 clears the lower end of small bore 7, the parts being so dimensioned that

when this occurs the surface 12 on the under side of the bar portion 9 is substantially in engagement with the upper end of tube 5 and serves to support the bar against downward deflection in response to the weight of articles hung thereon. With the parts positioned as above described, a snap ring 19 is installed on the pintle pin 10 in groove 16 and engages the lower end of the tube 5 to prevent upward withdrawal of the pintle pin, whereupon the assembly is completed, it being apparent that if it is desired to have a plurality of arms hingedly connected to the wall bracket these may be assembled to additional tubes or hinge members carried thereon in the same manner.

In further explanation of the above assembly and the novel method by which such assembly is accomplished, it is pointed out that, as set forth in the example given hereinafter, the bushing 11, which is preferably cut from a piece of extruded plastic tubing to provide a bushing of uniform cross section throughout its length, is installed on the pintle pin 10 by stretching thereover and allowing the lower end portion to contract into the groove 14 with the inner surface in gripping engagement with the sharp shoulder 15. The bushing 11 and pintle pin 10 are so dimensioned that the bushing in this position has its upper end spaced downwardly appreciably, as shown, from the bearing surface 12 on the under side of bar 9 to allow room for elongation of the bushing 11 upward along the pin 10 during subsequent assembly, and has an outside diameter greater than the diameter of bore 6 of tube 5. On assembly of the pintle pin 10 downward into the tube 5 to the position shown in Fig. 3, the leading end of the plastic bushing is pulled into the bore 6 by virtue of its gripping engagement with the shoulder 15, the outside diameter of the trailing portion of the bushing 11 being progressively reduced by radial compression to conform to the diameter of bore 6 and the bushing at the same time elongating axially along the pintle pin 10 between the latter and the wall of the tube bore 6 to assume the position and shape shown in Fig. 3. It is also pointed out that with the bushing assembled on the pin, the portion of the bushing 11 overlying the groove 14 is of approximately the same or smaller diameter than the diameter of the tube bore 6 so that it may be entered therein. Thus on entrance of the pin and bushing into the bore, the bushing material is forced radially inward by engagement with the wall of the bore to effect a positive gripping engagement between the wall of the bushing bore and the shoulder 15 at the upper end of groove 14. Thus the bushing may be pulled into the bore by the pin by virtue of this gripping engagement, and after assembly, the bushing is positioned to prevent bodily movement thereof along the pin. The initial entrance of the bushing into the bore is facilitated by tapered portion 18 formed at the upper end of the bore 6, and since only the leading portion of the bushing is in firm gripping engagement with the pintle at shoulder 15, the remaining portion, being only in frictional sliding engagement with the pin and being resilient, elongates to compensate for the reduction in diameter, and assumes the shape shown in Fig. 3, the bushing thus being under radial compression between the pintle pin and the wall of bore 6 and in frictional engagement with both. If the bushing material is properly chosen and the parts properly dimensioned, a hinge structure results wherein the pintle pin is aligned with small bore 7 by the bushing and has a frictional resistance to turning sufficient to maintain the rack arm in any position selected by the user, while the support provided to the rack arm by the radially compressed bushing, the bearing portion 17 of the pintle pin in small bore 7, and the bearing surface 12 adapted to rest on the upper end of tube 5, serves to prevent angular deflection of the pintle pin relative to the axis of the tube when towels or other articles are hung on the arm 9 by the user.

Although various resilient organic resinous plastic materials may be utilized for the bushing, it has been found that extruded polyethylene tubing cut to the proper length and used without further preparation or machining is a very satisfactory material, its waxy nature resulting in a smooth and even frictional resistance to movement of the rack arm relative to the wall bracket which is maintained over long periods of service, and its resilient properties permitting the necessary elongation during insertion in the tube. As an example of the application of this substance in this structure, pintle pins having an outside diameter of .210" were fitted with bushings of extruded polyethylene tubing having an initial length of .500", an initial inside diameter of .163", and an initial outside diameter of .243", and the resulting assemblies were inserted as heretofore described in tubes having a bore diameter of .266", the resulting elongation of the bushings along the pintle pin being on the order of 1/16". These pintles turned smoothly with uniform friction and these characteristics were retained after repeated cycling of the pintles through an angle of 180° for several hundred times. There was no evidence of appreciable wear on the bushings and the devices were absolutely quiet in operation. The bushings were cut from long lengths of tubing, eliminating the necessity for using molded bushings and the accompanying expensive molds.

If desired, however, similar principles can be applied to the structure and method of assembly of a modified form of the invention as illustrated in Figs. 7 and 8. In this modification the tube 5 is again provided with large and small bores 6 and 7, but at the upper end the tube is provided with a counterbore 20 adapted to receive a flange portion 21 formed on a plastic bushing 22. The groove 14 on the pintle pin 10 is omitted, and the upper edge of the snap ring groove 16 may be broken or rounded as shown at 23 to facilitate the entry of the pintle pin into the bushing. The bushing 22 is a snug fit in the bore 6 and is initially shorter than the length of the bore 6 as shown, while the inside diameter is less than the outside diameter of the pintle pin.

Assuming that the bushing 22 has been assembled in the tube 5 with the flange 21 in recess 20, a sub-assembly is formed comprising the tube and bushing which is readily assembled with the pintle pin on the towel rod in accordance with the principles already set forth. A rounded or tapered portion 24 on the end of the pintle pin facilitates entry of the latter into the bushing, and as the bushing is forced onto the pintle pin, the flange 21 of the bushing 22 becomes the leading end and prevents that end from being forced into the tube 5, and since the bore of the bushing is smaller than the pintle pin, the trailing portion of the bushing elongates in the tube and is placed under radial compression between the pintle pin and the tube bore to provide a hinge joint having uniform frictional resistance to relative rotation of the parts. The assembly is completed by installing the snap ring 19 in groove 16. As stated, the broken or rounded edge at the upper end of this groove facilitates movement of the pintle pin through the bushing, and it is noted that if desired, the same construction can be incorporated in the structure shown in Figs. 1 and 2.

It will be readily apparent from the foregoing that an important feature of the invention is the method of assembly wherein the leading end of the resilient plastic bushing is gripped by one of the parts during assembly to pull the bushing into the annular space between the parts in telescoping relation therewith, thus allowing the bushing to elongate in said space during assembly, and resulting in placing the bushing under radial compression in said space, together with the provision of novel structure for effecting gripping engagement of the leading end of the bushing by either the pintle pin or tube without the use of additional parts, clamping devices or the like. In the forms of the invention shown, the plastic bushing serves to align the pintle pin with a metal to metal bearing which supplements the pintle pin support-

ing and aligning action of the bushing, while the aligning and supporting action is further supplemented by providing a bearing surface on the bar adapted to engage the end of the hinge tube, the bar being so bent as to provide an excess of metal at the bend which can be machined off to provide the above surface.

While the invention is particularly adapted to use in towel racks of the swinging arm type, it may also be utilized in other structures requiring a hinge connection having frictional resistance to relative rotation of the hinge parts, and the method of assembly and the structure are applicable to devices wherein, for purposes of insulation or otherwise, it is desirable to install and align a pin in a bore with a plastic sleeve separating the surface of the pin from the wall of the bore. Furthermore, in the event it is desired to provide an assembly of the above described type wherein the parts are separated by a plastic bushing and whrein the pin is prevented from turning in the tube while at the same time being firmly aligned therein, it will be apparent that the principles of structure and method of assembly herein described can be utilized in connection with tubes or sockets having square or other shaped holes and adapted to receive a pin of similar cross section carrying a plastic sleeve. It will therefore be understood by those skilled in the art that the invention is not limited to structures and methods of assembly using concave walled square shaped bars of the type described, and that round or other shape bars or pins may be used. If desired, the small bore 7 which acts as a journal for portion 17 of the pintle may be eliminated and the plastic bushing alone utilized to maintain the pin in alignment in the tube bore.

While the invention has been illustrated and described herein with considerable particularity, it will be understood by those skilled in the art that modifications may be made without departing from the spirit of the invention, and reference is accordingly made to the appended claims for a definition of the limits of the invention.

What is claimed is:

1. In combination with a bracket, a tubular hinge member on the bracket having a small bore at one end and a larger bore concentric with the small bore extending from the inner end of the small bore to the other end of the member, a swinging arm extending outwardly from the bracket having a pintle pin thereon substantially at right angles thereto and extending through the tubular member with an end portion journaled in the small bore and with a second portion in said larger bore, locking means on the outer end of the pin for preventing removal of the pin from the tubular member, a shoulder on said second portion of the pin adjacent the inner end of said small bore, and means for aligning said pin with said small bore and for frictionally resisting rotation of the pin in the tubular member comprising a tubular resilient plastic bushing interposed and radially compressed substantially uniformly along its length between said larger bore and the second portion of the pin and having its inner wall in gripping engagement with said shoulder for positioning the bushing axially on said pin.

2. In combination with a bar having a relatively long portion, an integral shorter portion bent at right angles thereto forming a pintle pin having a main portion and a portion of reduced diameter adjacent its outer end defining a sharp shoulder between the portion of reduced diameter and the main portion of the pin, a flat bearing surface formed on the underside of the long portion of the bar adjacent the pin, and a tubular bushing of resilient plastic material on said pin having a bore initially smaller than the diameter of the main portion of the pin and having an initially uniform cross section, said bushing being stretched over said main portion of the pin and being in frictional sliding engagement therewith and having an end portion thereof contracted over the portion of reduced diameter with the wall of the bushing bore in gripping engagement with said shoulder.

3. In combination with a bracket having a hinge tube thereon provided with a bore, an arm extending outwardly from the bracket having an integral hinge pin formed at right angles thereto extending downward into said bore and having locking means on the lower end engageable with the tube to prevent removal of the pin, a plane bearing surface formed on the underside of the arm at right angles to the pin axis and positioned to bear against the upper end of the tube to support the arm, means for supporting and concentrically aligning the pin in the bore and for frictionally resisting relative rotation of the pin and tube comprising a bushing of resilient plastic tubing interposed between the pin and the wall of the tube bore and radially compressed for frictional engagement therewith, and means for locking the lower end of the bushing to the pin comprising a sharp shoulder on the pin adjacent the lower end of the pin in gripping engagement with the wall of the bushing bore adjacent the lower end thereof.

4. The method of installing a pin provided with a sharp shoulder at one end thereof in a socket of substantially the same shape as the pin and having an appreciably greater cross-sectional area than that of the pin which comprises stretching a tubing of resilient organic resinous plastic material of uniform cross-section over the pin starting from the end of the pin having said sharp shoulder and moving the tubing along the pin until the trailing end is contracted over the edge of said sharp shoulder, whereby the tubing provides a portion of reduced diameter at said one end adjacent said shoulder and the remaining portion of said tubing overlying said pin beyond said shoulder provides a bushing of uniform cross-section throughout the length of said last named portion with the inner wall thereof being axially slidable on the surface of said pin, the outside diameter of said bushing portion being greater than the corresponding socket diameter, and thereafter moving the pin and tubing bodily into the socket with said one end of said tubing leading so that said end is forced radially inwardly by engagement thereof with the wall of the socket to effect firm gripping engagement between the shoulder of said pin and the inner wall of said one end of said tubing, and the bushing portion of said tubing being thereafter pulled into said socket by virtue of said gripping engagement and being slidably stretched and elongated along the surface of said pin as the greater diameter of said tubing encounters the lesser diameter of said socket.

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