July 31, 1956 J. KOPPEL 2,757,030

SWIVEL MOUNTING DEVICES

Filed Nov. 21, 1950

Fig. 1.

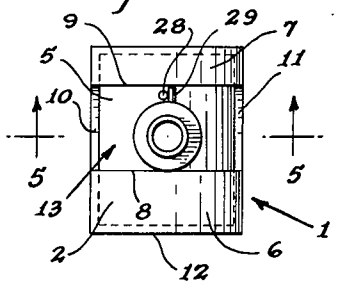


Fig. 2.

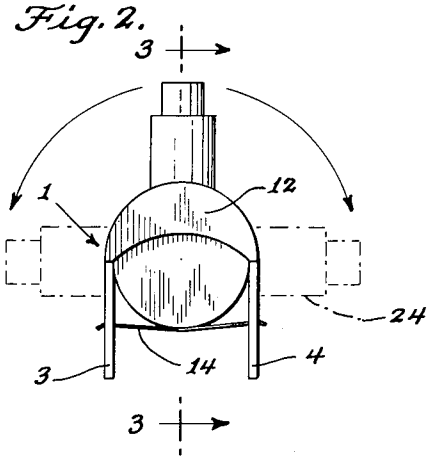


Fig. 3.

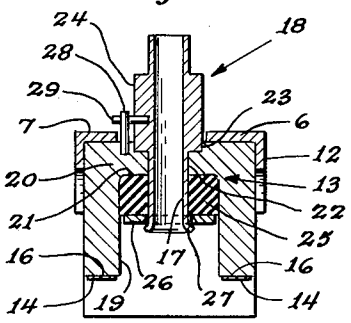


Fig. 4.

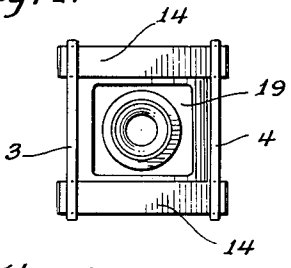


Fig. 5.

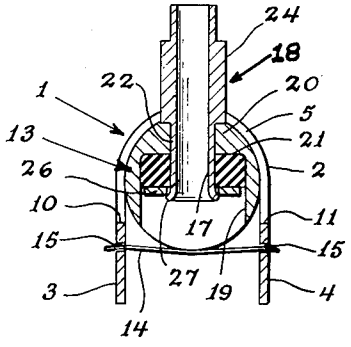


Fig. 6.

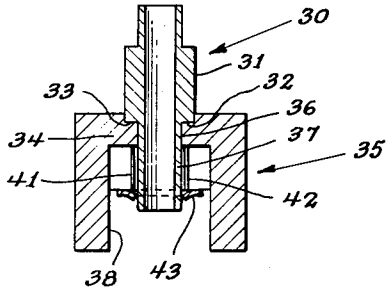
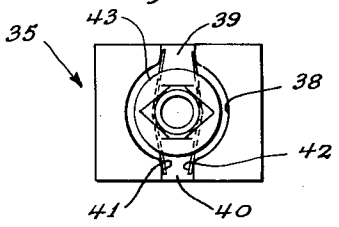


Fig. 7.



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SWIVEL MOUNTING DEVICES

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7 Claims. (Cl. 287—91)

This invention relates to swivel mounting devices and is particularly concerned with such devices which provide for the controlled adjustable positioning of objects mounted thereon throughout a wide range.

Swivel devices as heretofore employed have various drawbacks which it is the purpose of this invention to overcome. To mention a few of such drawbacks; some of the prior art devices are too complicated, others do not provide sufficient range of adjustment, still others bind and render the adjusting action difficult, while the latter and others become too loose, as the wear of the various elements sets in. Where the operation of such devices is under tension control, such tension may lose its effectiveness entirely over a period of time, while in other instances, the tension control is lost throughout the whole, or a substantial part, of the range as wear sets in. The construction of the instant invention eliminates these and other drawbacks of prior art constructions.

The swivel device of the invention is of a simple, economical construction, the few parts of which can be mass produced by following economical manufacturing procedures. Likewise the assembly of the parts is an extremely simple matter. The functioning of the device of the invention is highly effective for the purpose intended regardless of the fact that weight and simplicity are fostered by making certain elements of the device to perform more than one function. The construction enables change of position to be effected throughout the complete range of the device by application of a uniform force. In addition, the likelihood of the parts wearing and reducing the ability of the device to maintain a set position is kept to a minimum. Moreover, the limits of the adjustment are well indicated visually so as to show to the user why it is that adjustment beyond a particular position cannot be effected.

It is accordingly a principal object of the invention to provide a swivel mounting device of extreme simplicity and economy.

Another object is to provide such a device which has a minimum of parts.

Still another object is to provide such a device several of whose parts perform dual functions.

A further object is to provide such a device which is capable of a wide range of adjustment, with such adjustment being under uniform tension throughout that range.

A still further object is to provide visual indication of the limit of one of the adjustments of the device.

Further and more detailed objects will become apparent as the description of the invention, taken in conjunction with the accompanying drawing, proceeds.

In that drawing:

Figure 1 is a top plan view of the device in accordance with the invention.

Figure 2 is an end elevation thereof, looking up at Figure 1 from the bottom thereof.

Figure 3 is a vertical section taken on lines 3—3 of Figure 2.

Figure 4 is a bottom plan view of the Figure 1 device.

Figure 3 is a vertical section taken on lines 3—3 of Figure 2.

Figure 5 is a vertical section taken on lines 5—5 of Figure 1 and looking in the direction of the arrows.

Figure 6 is a view similar to Figure 3, with certain parts omitted, of a slightly modified form of the invention.

Figure 7 is a bottom plan view of the Figure 6 construction.

The outer member of the device of the invention comprises a U-shaped housing, generally indicated at **1**, having a half circular rounded top **2** and having downwardly extending arms **3** and **4**. The rounded top **2** has a removed section, or slot, **5**, separating that top into end portions **6** and **7** whose vertical edges **8** and **9** border that slot. The slot **5** extends throughout the whole of the 180° of turn of the top **2** as well as part way down the side arms **3** and **4** to terminate in end stop shoulders **10** and **11** whose purpose will appear hereinafter. The ends of the housing **1** are preferably partially closed by webs, such as shown at **12** in Figure 2, extending part way down from the curved top **2**. As will be apparent to one skilled in the art, the housing **1** can be economically formed out of metal, or other suitable material, by employing common economical manufacturing processes, such as pressing and stamping, pressure casting, or other molding, to produce the housing in finished form without the necessity of any machining.

The housing receives a cylindrical body member **13** within it, which body member is formed with an external curvature mating with the internal surface of the rounded top **2**. Thus, a substantial bearing surface is provided extending throughout 180° of arc between the housing and the cylindrical body member, where the latter lies against the portions **6** and **7**.

The cylindrical body member **13** is maintained in position within the housing **1** and is constantly urged into engagement with the interior surface thereof by a pair of resilient securing elements **14**. These elements, in the nature of flat springs, have portions thereof adjacent their ends received within suitable slots **15** in the arms **3** and **4** of the housing **1**. The main portions of these springs bridge across the space between those arms and engage spaced portions of the bottom surface **16** of the cylinder **13** under desired tension as determined by pre-selection of the spring. Accordingly, the springs **14** not only serve to secure the cylindrical body **13** in place in the housing **1**, but also, through the pre-selection of suitable spring strength, they control the frictional contact of the surface **16** of the body **13** with the interior surface of the housing **1** and hence the drag caused thereby. This drag or tension remains the same regardless of the position to which the cylindrical body is moved, as outlined in Figure 2, for the springs **14** always engage the same surface area, while the body **13** always engages the same area of the housing **1** beneath the portions **6** and **7** thereof. This is true in spite of the fact that the cylindrical body **13** is enabled to turn through an angle of 180°.

The cylindrical body **13** is preferably confined endwise of the housing **1** by the ends **12** thereof.

Another important feature of the cylindrical body **13** is the manner in which it receives the inner end **17** of the rotatable spindle, generally indicated at **18**. For this purpose, the cylindrical body is recessed at **19** in the form of a square extending up from its bottom, as shown in Figures 3, 4, and 5. The recess **19** terminates so as to leave a substantial portion **20** of the stock of the cylindrical body **13** between the base **21** of the recess and the opposite, or upper, side of that body. This preserves adequate strength to withstand hard usage.

The portion 20 is formed with a bore centrally located with respect to the recess 19, which bore has a reduced lower portion 22 and an enlarged recess 23 at its upper end. The portion 22 forms a bearing for the rotatable mounting of the reduced lower portion 17 of the spindle 18. The recess 23 serves as a seat for the lower end of the enlarged boss 24 formed on the spindle 18.

The compound tension, restricting the turning movement of the spindle 18, in directions at right angles to each other is effected by means of a rubber block, or other comparable resilient element 25. This block seats in the base of the recess 19, has a bore receiving the reduced portion 17 of the spindle 18 and is placed under compression. This compressed condition is effected and maintained by the pressing engagement of the outer surface of the block, by a suitable securing washer 26 and by the flaring over of the inner end 27 of the reduced portion 17 to keep the washer 26 tightly against the block. The compression under which the block 25 is put in the direction of the axis of the spindle will serve to exert a tension axially of the spindle and between the bottom shoulder of its boss 24, and the base of the seat 23 receiving that boss. In addition, the tendency of the rubber block to try to expand in a direction at right angles to that in which the pressure is applied will cause it to resiliently engage and act against the outside of the spindle portion 17. Since the rubber block is shaped to fit the square seat which receives it, it cannot turn. Hence, effective two way tension or, resilient drag effect, is applied between the spindle 17 and the body 13 to maintain the spindle in any position with respect to that body to which the spindle may have been turned by overcoming the drag effect.

From the construction shown it is apparent that the spindle 18, if not otherwise restricted, could be turned more than 360°. In most instances, however, this would be undesirable, as it would serve to twist and eventually break any electric conduit passing through the bore of the spindle. A turning of substantially 360° in one direction, and reverse, would however be acceptable, so long as effective stop means were present to prevent further rotation. Such stop means should not only be mechanically effective, but should also be readily visible to the workmen handling the device. Unless the stop is visible, workmen turning the spindle to the stop position would be inclined to consider the stop as an unintended obstruction, and, by attempting to force a greater degree of turn, destroy the device.

Such a possibility is guarded against here by making the stop device visible as well as mechanically effective. This is accomplished by seating a stop pin 28 in the portion 20 of the cylindrical body where the pin can swing with the spindle in the slot between the surfaces 8 and 9. An engaging pin 29 is secured in the boss 24 to meet up with the stop 28 at either end of substantially 360° of rotation. Such rotation of the spindle 18 can be effected regardless of the position of the spindle and the cylindrical body 13 with respect to the housing 1, since the stop pin 28 rides in the slot between the surfaces 8 and 9 along with the spindle 18. Finally, the stop pin 28 and engaging pin 29 extend up and out to where they are readily visible.

From the foregoing it is believed to be apparent that the construction described achieves all the objects of the invention. The parts of the device are of simple construction and are capable of being manufactured cheaply. The operation of the device is obvious from mere inspection of it. The tension on the various parts is adequate, uniform, and of such a nature that it would be long lasting. The spindle 18 can rotate substantially 360°, while it can swing 180°, inasmuch as the slot between the edges 8 and 9 extends sufficiently beyond the curve of the housing 1 to take care of one-half of the

thickness of the boss 24, as illustrated in Figure 2, before the boss 24 comes up against either of the shoulders 10 or 11.

While the recess 19 is shown as square, it is of course to be understood that any non-circular form to prevent rotation of the block 25 would be suitable. Further, the block 25 need not be of rubber, but may, of course, be of other similarly effective material.

In addition, the washer 26, though shown as circular, could of course be shaped to more closely fit the recess 19, should more effective confining of the block 25 be desired.

A modified manner of securing the spindle and cylindrical body member together, and for providing compound spring tension therebetween, is shown in Figures 6 and 7. Here, a spindle, similar to the spindle 18, is generally shown at 30. The spindle 30 has an enlarged boss 31 whose lower portion 32 is received in a seat 33 in the top portion 34 of the cylindrical body member, which body member is generally shown at 35. The seat 33 is concentric with the bore 36 through which the reduced portion 37 of the spindle 30 passes.

In this instance, the recess 38 extending upwardly from the bottom portion of the cylindrical body member, can suitably be made circular. The side wall of that recess is, however, interrupted by the diametrically opposed openings 39 and 40 which extend from the recess through the side wall of the cylindrical body member 35. These openings receive the ends of a pair of flat spring members 41 and 42 and the openings are substantially narrower than the outer diameter of the reduced portion 37 of the spindle 30. Thus when the springs 41 and 42 are seated in place with their ends in engagement with the side walls of the recesses, they will be bowed for engagement with the opposite sides of the spindle 37. In addition, as indicated in Figure 7, the ends of the springs 41 and 42 will lie within the body of the member 35, so as not to interfere with the sliding of its outer surface on the inner surface of a suitable housing as shown at 1 in Figure 1.

From this construction it will be apparent that the engagement of the flat faces of the springs 41 and 42 with the portion 37 will place the spindle 30 under effective tension acting at right angles to its axis. Tension axially of the spindle 30 is also provided for and this is achieved by the same means which secures the spindle in place in the cylindrical body 35. This means consists of a spring washer, or spring nut-type of device, 43, which is merely forced onto the portion 37 until it engages the bottom edges of the springs 41 and 42. The top edges of those springs engage the base of the recess 38.

Being resilient in nature, the device 43 not only holds the spindle in place in the cylindrical body member but at the same time it acts through the width of the springs 41 and 42 to impart a resilient tensioning action acting axially of the spindle 30. Devices such as the spring washer 43 are made by Shakeproof Inc. of Chicago, Ill. and are sold under the trademark "Speed Nuts." The resilient action of the device 43 serves to draw the bottom 32 of the boss 31 against the seat 33. Thus turning action of the spindle 30 will be placed under resilient tension both by the action of the springs 41 and 42 and the action of the spring washer 43 acting axially of the spindle 30 until a turning force of sufficient magnitude is imparted to that spindle.

From the foregoing illustrative embodiments of the invention it is believed to be apparent that the invention sets forth a substantial advance in the field to which it relates. The embodiments disclosed should, however, be interpreted in an illustrative, rather than in a limiting sense, since changes could be made in the construction disclosed and different embodiments of the invention could be made without, however, departing from the spirit and scope thereof.

Having described my invention, what I claim as new and desire to secure by Letters Patent is:

1. A swivel member of the character described comprising, a housing generally U-shaped in cross section with the interior surface at the base of said U forming a portion of a cylinder, a body member received within said housing, said body member being formed with a cylindrical exterior surface thereon mated to said cylindrical surface within said housing, said mated surfaces being in engagement, and said body member being formed with a recess extending thereinto from the side thereof opposite said mating cylindrical surface, a spindle seated in the wall of said body member opposite said recess and formed with a portion extending into and within said recess, a pair of flat spring members bridging said recess and in resilient engagement with the opposite sides of said spindle, said recess being formed with laterally extending pockets in the walls thereof, the ends of said spring members being received in said pockets.

2. A swivel member of the character described comprising, a housing generally U-shaped in cross section with the interior surface at the base of said U forming a portion of a cylinder, a body member received within said housing, said body member being formed with a cylindrical exterior surface thereon mated to said cylindrical surface within said housing, said mated surfaces being in engagement, and said body member being formed with a recess extending thereinto from the side thereof opposite said mating cylindrical surface, a spindle seated in the wall of said body member opposite said recess and formed with a portion extending into and within said recess, a pair of flat spring members bridging said recess and in resilient engagement with the opposite sides of said spindle, said recess being formed with laterally extending pockets in the walls thereof, the ends of said spring members being received in said pockets, and a resilient holding member within said recess in engagement with said spindle member adjacent the end thereof and with the adjacent edges of said spring members.

3. A swivel device of the character described comprising, a U-shaped housing with the base of the U formed as a semi-circle, and with legs extending therefrom, a cylindrical body member having a curvature to mate with the curvature of said housing received within said housing, a spindle rotatably mounted in the wall of said body member and extending radially outwardly with respect to the cylindrical surface thereof, a slot in said housing for the reception of said spindle, and means to maintain said cylindrical body in said housing and resiliently resist turning action of the same, said means comprising a spring element engaging the extending legs of said U-shaped element, bridging across between the same and resiliently engaging the cylindrical surface of said body member.

4. A swivel device of the character described comprising, a U-shaped housing with the base of the U formed as a semi-circle and with legs extending therefrom, a cylindrical body member having a curvature to mate with the curvature of said housing received within said housing, a spindle rotatably mounted in the wall of said body member and extending radially outwardly with respect to the cylindrical surface thereof, a slot in said housing for the reception of said spindle, and means to maintain said cylindrical body in said housing and resiliently resist turning action of the same, said means comprising a pair of spaced spring elements engaging the extending legs of said U-shaped element bridging across between the same and resiliently engaging the cylindrical surface of said body member at spaced positions thereon.

5. A swivel device of the character described comprising a U-shaped housing formed with a curved base and extending legs, a cylindrical body member received within said U-shaped housing and in rotatable engagement with the interior of said curved base, said curved base and portions of said legs extending therefrom being formed with a circumferential slot in the wall thereof, a spindle extending through in said slot and mounted in said cylindrical body for the rotatable movement with respect to said body and interengaging readily visible stop means extending from said cylindrical body and said spindle respectively to prevent more than 360° rotation of said spindle.

6. A swivel device of the character described comprising a U-shaped housing formed with a curved base and extending legs, a cylindrical body member received within said U-shaped housing and in rotatable engagement with the interior of said curved base, said curved base and portions of said legs extending therefrom being formed with a circumferential slot in the wall thereof, a spindle extending through in said slot and mounted in said cylindrical body for rotatable movement with respect to said body, a stop pin engaged with said body member within said slot and extending upwardly above said slot and an interengaging stop pin extending laterally with respect to said spindle for engagement with said stop pin to prevent rotation of said spindle beyond 360°.

7. A swivel device comprising a U-shaped housing formed with a curved base and a pair of legs extending therefrom, a cylindrical body member received within said housing and in rotatable engagement with the interior of said base, said body member being formed with a recess in the wall thereof extending thereinto, said body member being formed with a bore in the wall thereof opposite the base of said recess, said bore communicating with said recess, said cylindrical wall adjacent the mouth of said bore being formed with a depression concentric with said bore, a swivel member having a portion rotatably received within said bore and extending within said recess, an enlarged boss formed on the outer part of said swivel member and having its lower end seated in said depression, resilient means within said recess and engaging the portion of the swivel member therewithin for placing the same under radial and axial tension, a slot in said housing for the reception of the enlarged boss of said swivel member, said slot extending circumferentially of the curved base of said U-shaped housing and partially up the legs thereof so that said cylindrical body and said swivel element may swing substantially 180° and resilient means bridging the legs of said U-shaped housing and engaging the cylindrical surface of said body member to secure said body member in place in said housing.

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