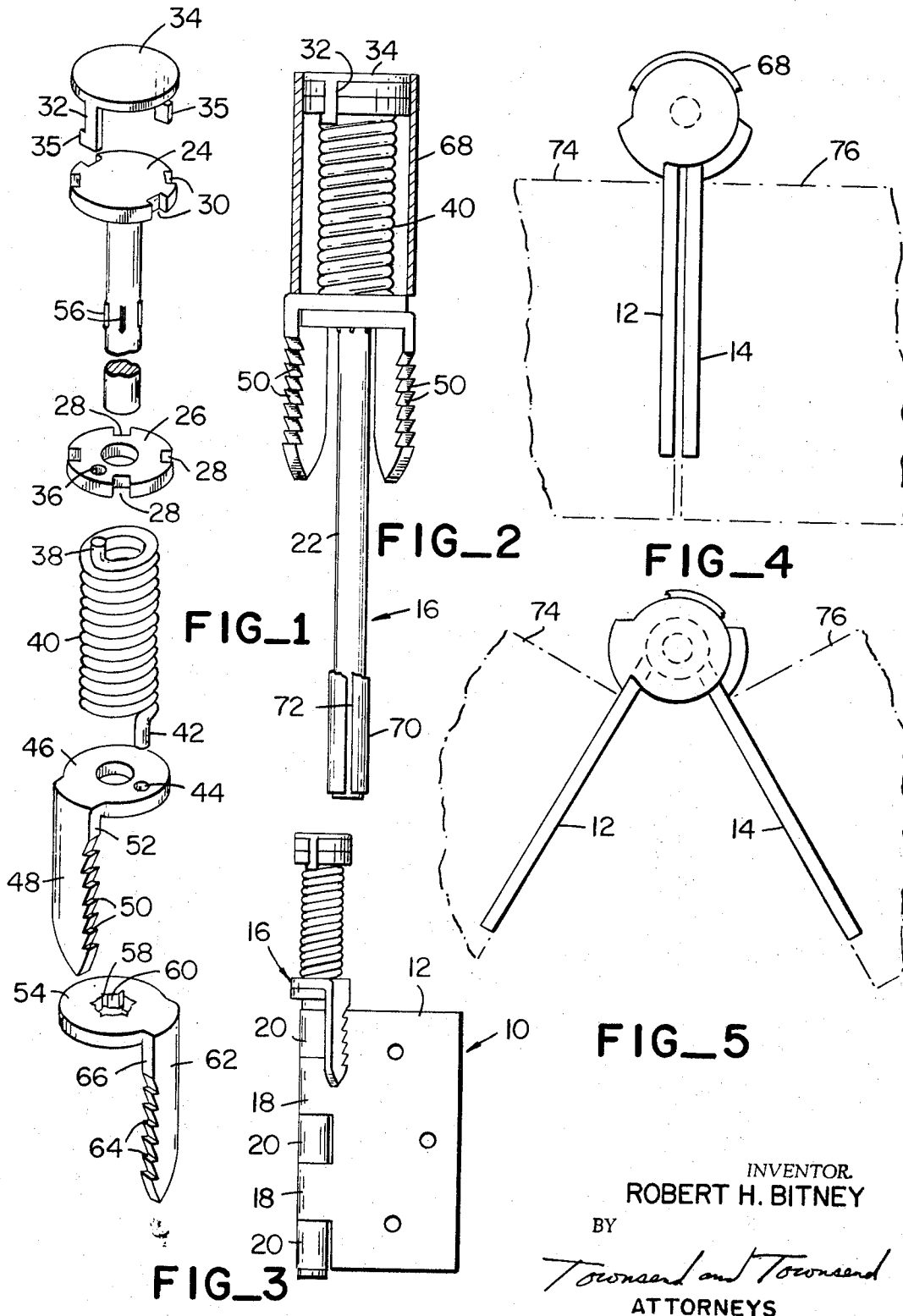


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 SPRING BIASED HINGE
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SPRING BIASED HINGE

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ABSTRACT OF THE DISCLOSURE

A hinge of the type having a pair of hinge leaves pivotally interconnected by a hinge pin. A spring carried on one end of the hinge pin is coupled to the hinge leaves to bias the same in predetermined directions about the hinge pin. Means is provided to vary the tension of the spring of the biased structure.

This invention relates to improvements in hinges and, more particularly, to a hinge having spring bias means on its hinge pin.

The use of springs on hinges for biasing purposes is not new, but prior spring hinges have generally been unattractive and complicated in construction. They have springs which are permanently coupled to corresponding hinge leaves, thus preventing replacement of the spring without replacing the entire hinge. Also, such a spring hinge generally has no means for varying the tension of its spring so as to allow for different bias forces. Such a hinge lacks the simplicity of a conventional hinge of the type having a pair of hinged leaves provided with spaced, alignable sleeves for receiving a hinge pin.

The present invention provides a spring biased hinge which is simple in construction and has the bias means on a hinge pin. Thus, the hinge can utilize conventional hinge leaves of the type described while providing an attractive and workmanlike appearance when installed inasmuch as the spring can be easily concealed and the overall hinge can blend with the structure which is hinged thereby. The hinge of this invention is suitable for substantially all applications where the aforesaid conventional hinged leaves are adapted for use. Moreover, the hinge pin of this invention which can be substituted for hinge pins of previously installed hinges.

It is a primary object of this invention to provide an improved hinge having spring biased means on the hinge pin externally of the hinge leaves so that conventional hinge leaves can be used while at the same time the finished hinge will have an attractive, workmanlike appearance.

Another object of this invention is to provide a hinge of the type described wherein a coil spring is disposed under tension on an outwardly projecting end of the hinge pin and is coupled to the hinge leaves so that the latter are biased in predetermined directions relative to each other about the hinge pin and the structural parts to which the hinge leaves are connected to be correspondingly biased.

A further object of this invention is to provide a hinge pin for hinge leaves of the type described wherein the hinge pin has spring bias means on one end thereof so that the hinge pin can be used as a replacement for the hinge pin of a hinge that is already installed to thereby convert the hinge to a spring biased type.

Still another object of this invention is the provision of an improved hinge of the aforesaid character wherein the tension of the spring on a hinge pin can be varied to thereby cause the bias force exerted on the hinge leaves of the hinge to be changed.

Another object of this invention is the provisions of a spring biased hinge of the type described wherein a

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tubular adapter may be disposed on the hinge pin as it is inserted in the sleeves of the hinge leaves so that the effective diameter of the hinge pin will be increased and thereby render the hinge pin usable with hinge leaves having different sleeve sizes.

Other objects of this invention will become apparent as the following specification progresses, reference being had to the accompanying drawing which includes figures illustrating the construction of the present invention.

In the drawing:

FIG. 1 is an exploded view of the hinge pin illustrating the spring bias structure thereof;

FIG. 2 is a side elevational view of the hinge pin when it is assembled;

FIG. 3 is a side elevational view of the hinge of the invention with the hinge pin pivotally interconnecting a pair of hinge leaves;

FIG. 4 is a top plan view of the hinge with the hinge leaves in face-to-face relationship; and

FIG. 5 is a view similar to FIG. 4 but illustrating the leaves spread apart.

A preferred embodiment of the hinge of this invention is denoted by the numeral 10 and includes a pair of relatively shiftable hinge leaves 12 and 14 and a hinge pin unit 16 pivotally interconnecting hinge leaves 12 and 14. Hinge leaves 12 and 14 are conventional in construction in that hinge leaf 12 has a pair of pin-receiving sleeves 18 and leaf 14 has three pin-receiving sleeves 20 alignable with sleeves 18 to form a passage for receiving pin unit 16 to thereby pivotally interconnect leaves 12 and 14 in the usual manner. Thus, leaves 12 and 14 can pivot relative to each other about the hinge pin unit.

Hinge pin unit 16 includes a hinge pin 22 having a substantially shaft-like body and provided with a head 24 at one end thereof. A ring 26 is carried by pin 22 adjacent to and in abutment with head 24 and is free to rotate about pin 22. Ring 26 has a number of notches 28 in the outer periphery thereof alignable with notches 30 in head 24. For purposes of illustration, there are two pairs of notches 28 and two pairs of notches 30. The notches of each pair are aligned with each other to receive the opposed legs 32 of a cap member 34 adjacent to the outer face of head 24. Legs 32 extend through aligned notches 28 and 30 and thereby hold ring 26 against rotation on hinge pin 22. Each leg 32 has a projection 35 which can underlie ring 26 in bayonet fashion to prevent the separation of cap member 34 from head 24. Notches 28 and 30 are sufficiently wide to accommodate projections 35.

Ring 26 has a hole 36 therethrough for receiving one end 38 of a coil spring 40 which surrounds hinge pin 22. The opposite end 42 of spring 40 is received within a hole 44 formed in a second ring 46 rotatably mounted on hinge pin 22. Ring 46 has a leg 48 provided with a number of spaced teeth 50 on one longitudinal edge 52 thereof. Ring 46 and its leg 48 define an extension which is used to couple spring 40 with hinge leaf 12.

A third ring 54 is mounted on hinge pin 22 and is coupled thereto so as to be held against rotation. One way of accomplishing this is to provide hinge pin 22 with a number of spaced, longitudinally extending ribs 56 and to provide ring 54 with inwardly extending recesses 58 complementary to ribs 56 on the inner periphery 60 of ring 54. Thus, ring 54 can be forced onto hinge pin 22 with ribs 56 press fitted into recesses 58. In this way, ring 54 is held against rotation about hinge pin 22.

Ring 54 has a leg 62 provided with spaced teeth 64 on one longitudinal edge 66 thereof. Ring 54 and leg 62 define an extension which is used to couple pin 22 to hinge leaf 14.

A tube 68 is removably placed about spring 40 so as to conceal the same when hinge pin unit 16 is in use. Tube

68 frictionally engages the outer peripheries of head 24, ring 26 and cap member 34.

It may be considered necessary to increase the effective diameter of hinge 22, such as when the inside dimensions of sleeves 18 and 20 are too great to prevent lateral movement of the hinge pin. In this case, a tubular adapter 70 is provided, the adapter having a cylindrical body of resilient material and provided with a longitudinally extending slit 72 therein. Adapter 70 will have a wall thickness sufficient to provide the added diameter for the hinge pin. A typical wall thickness for adapter 70 is $\frac{1}{16}$ inch. This would be suitable for a hinge pin having a diameter of $\frac{1}{2}$ inch and for hinge leaves whose sleeves have an inner diameter of $\frac{3}{8}$ inch.

To assemble hinge pin unit 16, ring 26 is first placed on the hinge pin, followed by spring 40 and then by ring 46. Ends 38 and 42 of spring 40 are placed in holes 36 and 44, respectively, and then ring 54 is press fitted on ribs 56, the ribs being disposed to assure that spring 44 will be partially compressed when unit 16 is properly assembled. The compression of the spring effectively holds ends 38 and 42 in holes 36 and 44. A suitable washer can be disposed on pin 22 between rings 46 and 54 to minimize friction therebetween.

Before placing hinge pin unit 16 in coupled relationship with hinge leaves 12 and 14, spring 40 is initially tensioned by positioning legs 32 of cap member 34 in certain pairs of notches 28 and 30. This is done by decreasing the diameters of the convolutions forming the coil spring. The resulting spring tension will bias legs 48 and 62 in predetermined directions about the hinge pin. For a coil spring having convolutions extending about the hinge pin in the manner shown in FIGS. 1-3, legs 48 and 62 will be biased so that toothed edges 52 and 66 will approach each other. To reverse the bias directions of legs 48 and 62, a coil spring having oppositely extending convolutions will be used.

To facilitate the tension adjustment step, a spanner wrench can be used to rotate ring 26 until a pair of its notches 28 are aligned with a corresponding pair of notches 30 on head 24. Legs 32 can then be inserted into the aligned notches and capped member 34 can then be rotated through a small arc to position projections 35 beneath ring 26.

When assembled as shown in FIG. 2, hinge pin unit 16 will be ready for insertion into the passage formed by aligned sleeves 18 and 20. It will be assumed that the hinge leaves will have been connected to suitable structure, such as a door 74 and a jamb 76. When pin 22 is inserted into the sleeves, legs 48 and 62 will be held apart until pin 22 has been fully inserted. The legs are then released and teeth 50 and 64 will move into engagement with and thereby grip the proximal surfaces of leaves 12 and 14, respectively, as shown in FIG. 3. The gripping action of the teeth eliminates the tendency for hinge pin 22 to work itself out of sleeves 18 and 20 during opening and closing of the hinge.

Tube 68 can be put into place either before or after hinge pin 22 has been inserted. As soon as the hinge pin and tube 68 are in place, the installation is complete.

Hinge pin unit 16 can be used on existing hinges of the type having alignable sleeves such as sleeves 18 and 20. For this use, the conventional hinge pin is removed from the sleeves and hinge pin 22 is inserted in its place. Extensions 48 and 62 automatically move into position adjacent to respective hinge leaves for biasing the same in predetermined directions. It may be necessary to utilize adapter 70 to increase the diameter of the hinge pin inasmuch as there are variations in the diameters of the sleeves of the various hinge plates now commercially available. Adapter 70 can be made in a number of different sizes so that variations in the diameter of hinge pin 22 can be obtained.

To change the tension of spring 40, cap member 34 is rotated slightly to permit removal of projection 35 through

slots 28 and 30. After the cap is removed, a spanner wrench can be used to rotate ring 26 to a new position, thus, aligning a new pair of notches 28 with corresponding notches 30. Cap member 34 is then replaced and rotated to again position projections 35 beneath ring 26.

FIGS. 4 and 5 show how hinge pin unit 16 biases hinge plates 12 and 14 toward each other. When it is found necessary or desirable to bias these hinge leaves away from each other, spring 40 will be replaced by a spring having oppositely directed convolutions. Also, rings 46 and 54 and their extensions 48 and 62 will be replaced by similar structures having teeth on the opposite longitudinal edges of the extensions inasmuch as the teeth will now be required to engage the opposite faces of the hinge leaves from that shown in FIGS. 4 and 5. The substitution of these new parts can be made on hinge pin 22 if it is possible to separate ring 54 from the ribs 56 of the hinge pin.

Other ways of coupling legs 48 and 62 to hinge plates 12 and 14 can be used. For instance, each hinge leaf can be provided with a hole and each extension may be provided with a lateral projection receivable within the hole to prevent outward movement of hinge pin 22 from sleeves 18 and 20. Also, the extensions could be welded or otherwise permanently secured to the hinge leaves if desired and this can be done when the hinge itself is made, such as at a factory or the like.

While one embodiment of this invention has been shown and described, it will be apparent that other adaptations and modifications can be made without departing from the true spirit and scope of the invention.

What is claimed is:

1. A hinge comprising: a pair of hinge leaves, each hinge leaf having a number of pin receiving sleeves, the sleeves being alignable to present a pin receiving passage; a hinge pin received within said passage and having a portion extending outwardly from the hinge leaves, said hinge pin permitting the hinge leaves to pivot thereon and to move toward and away from each other; elongated spring structure carried by said hinge pin on the outwardly extending portion thereof; means connecting one end of the spring structure to said hinge pin adjacent to the outer end thereof; a first rotatable extension connected to the opposite end of the spring structure and normally engaging one of said hinge leaves; a second extension non-rotatably coupled to said portion of the pin and normally engaging the other hinge leaf, the spring structure having an initial restoring force to bias said extension and thereby the hinge leaves in a predetermined direction relative to the hinge pin.

2. A hinge as set forth in claim 1 wherein is provided means on said hinge pin for adjusting the initial restoring force of the spring structure.

3. A hinge as set forth in claim 1 wherein said spring structure includes a coiled spring surrounding said portion of the pin, said spring being disposed for movement into greater coiled relationship when the hinge leaves are moved in one sense relative to each other and into lesser coiled relationship when the hinge leaves are moved in the opposite sense relative to each other.

4. A hinge as set forth in claim 1 wherein each extension has means coupling the same to the corresponding hinge leaf to prevent substantial movement of the hinge pin longitudinally of said passage as said hinge leaves move toward and away from each other.

5. A hinge as set forth in claim 4 wherein each extension has an edge provided with spaced teeth defining said coupling means.

6. A hinge comprising: a pair of hinge leaves, each leaf having a number of spaced sleeves on one edge thereof, the sleeves of said leaves being alignable to present a pin-receiving passage; a hinge pin removably received within said passage to pivotally interconnect the hinge leaves, said pin projecting outwardly from said leaves and having a head spaced from the leaves; a ring rotatably

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mounted on the pin adjacent to the head; means releasably holding the ring in any one of a number of operative positions; a coil spring surrounding the pin between the head and said hinge leaves, said coil being movable relative to the pin and having one end coupled to said ring; a first extension rotatably mounted on the pin and normally engaging one of said leaves, the opposite end of said spring being coupled with the first extension to cause the spring to move into greater coiled relationship when the first extension rotates in one direction relative to the hinge pin and to move into lesser coiled relationship when the first extension rotates in the opposite direction; a second extension rigidly mounted on said pin adjacent to said leaves and normally engaging the other of said leaves, said spring having a tension to bias said extensions and thereby said hinge leaves in predetermined directions relative to said hinge pin.

7. A hinge as set forth in claim 6 wherein said ring has a number of circumferentially spaced notches therein, said connecting means including a cap member carried by said head and having a projection for insertion into a notch aligned therewith.

8. A hinge as set forth in claim 6 wherein said second extension includes a second ring rotatably mounted on the pin and a leg rigid to and extending axially from the outer periphery of the second ring.

9. A hinge as set forth in claim 6 wherein is provided a tube releasably disposed about said spring in covering relationship thereto.

10. A hinge pin for a hinge of the type having a pair of relatively shiftable hinge leaves adapted to be connected together by the hinge pin comprising: a shaft; an elongated spring capable of having an initial restoring

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force; means coupling one end of the spring to one end of the shaft; a first rotatable extension mounted on said shaft, the opposite end of the spring being coupled to said first extension and being disposed to cause an increase in its restoring force when the first extension rotates in one direction and to cause a decrease in its restoring force as the first extension rotates in the opposite direction; a second extension non-rotatably coupled to said shaft, said extensions being disposed for engaging said hinge leaves to bias the same in predetermined directions relative to each other when the leaves are interconnected by said hinge pin.

11. A hinge pin as set forth in claim 10, wherein said spring is coiled about the portion of said shaft adjacent to said one end thereof.

12. A hinge pin as set forth in claim 10, wherein is provided means on said one end of the shaft for varying the initial restoring force of said spring.

13. A hinge pin as set forth in claim 10, wherein is provided a tubular adapter removably disposed on said shaft to increase the effective diameter thereof, said adapter having a longitudinally extending slit and being formed from resilient material.

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