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[54] **FRICTION SUPPORT FOR LIDS**

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[52] **U.S. Cl.** ..... **16/49,** 16/82, 16/86 C, 292/275, 292/338, 248/414

[51] **Int. Cl.** **E05f 3/00**

[58] **Field of Search** ..... 16/49, 82, 86 A, 16/86 B, 86 C, 190; 292/262, 275, 305, 338; 248/414; 312/8, 138 R, 139, 326–329; 108/2, 1, 6, 9

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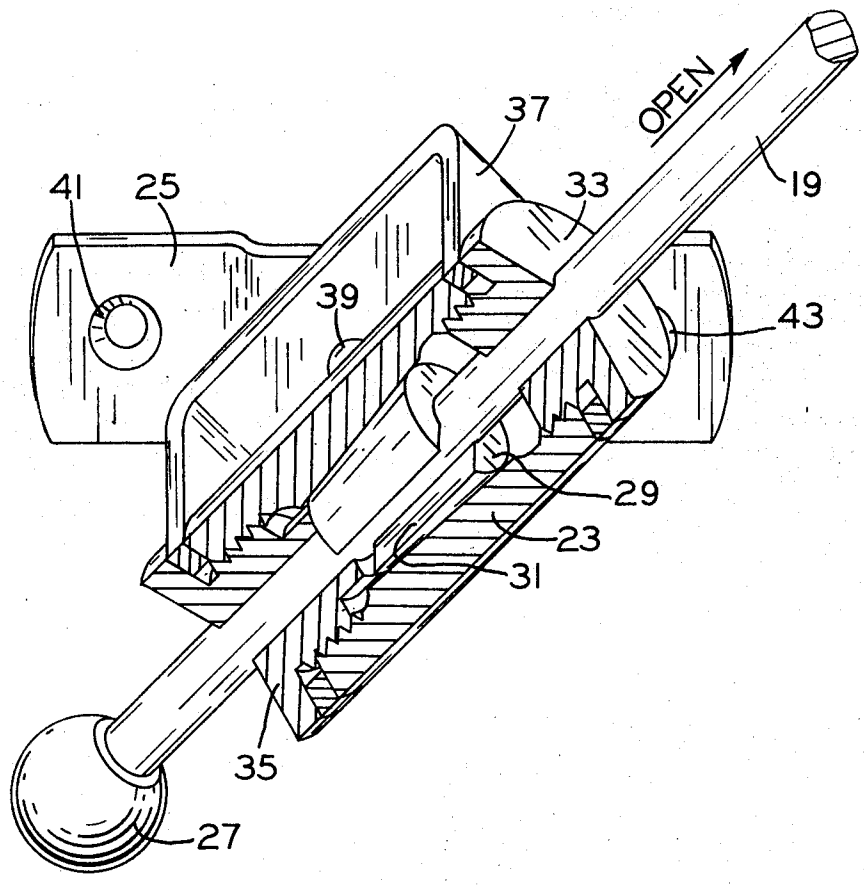
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Attorney—Richard T. Seeger et al.

[57] **ABSTRACT**

A device for interconnecting a cabinet-like structure and a hingedly attached cover to frictionally support the cover in an open position is disclosed comprising a housing for attachment to the cabinet and an arm for attachment to the cover, which arm passes at least part way through the housing and also through a deformable bushing which is confined within the housing for limited movement therein. Relative movement of the arm and housing in a preselected direction deforms the bushing thereby increasing the frictional force opposing that relative motion. Relative motion in the opposite direction expands the bushing whereby it grips the arm less tightly so that during the limited movement of the bushing within the housing the frictional force drops to a second level, and when the bushing reaches one extreme of its permitted travel the arm and bushing execute a sliding motion causing the friction to increase somewhat to a third level which is less than its original level.

12 Claims, 2 Drawing Figures



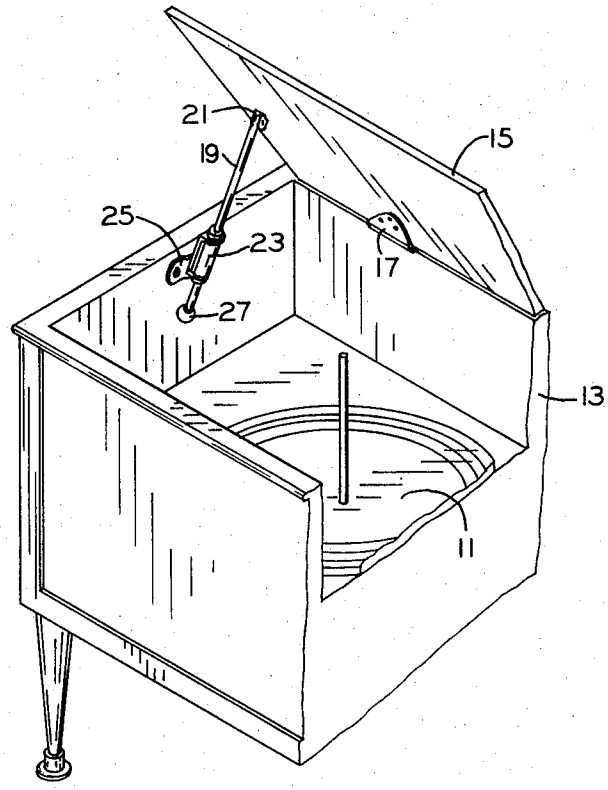


FIG. 1

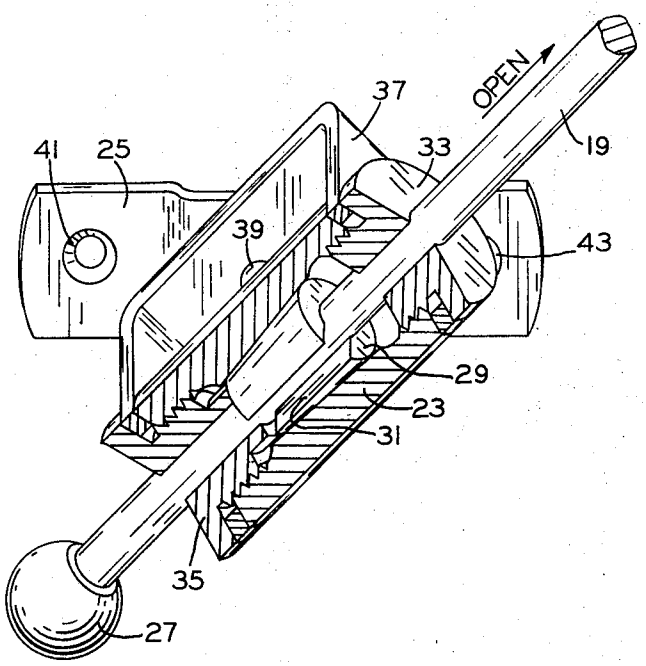


FIG. 2

FRICTION SUPPORT FOR LIDS

BACKGROUND OF THE INVENTION

The present invention relates to a friction support for a lid, that is, a device for holding a lid or cover in its open position, and while the present invention is applicable to a wide variety of situations, it will be described in the preferred environment of a record changer cabinet. There are, of course, a number of devices for holding the lid or cover of a record changer cabinet in its open position including such things as a pair of pivotably joined arms with a stop "beyond center", hydraulic devices, spring loading or urging of the lid toward its open position, an arm frictionally engaged with and slidable in a track or movable relative to other friction creating elements which may be adjustable by the user, as well as various other catches and latching mechanisms. Of these systems only a few of the more expensive and complicated schemes allow for holding the lid in any desired open position, and of these only a very limited number and the most complex allow the lid to be opened by exerting a relatively small force and yet hold that lid at any position to which it is opened.

It is accordingly a primary object of the present invention to provide an economical device for holding a lid in the position to which it is opened.

It is another object of the present invention to provide a relatively simple device having asymmetrical friction characteristics.

A further object of the present invention is to provide a cover or lid support structure which allows the cover to be opened with relative ease yet impedes closing of that cover.

A still further object of the present invention is to provide a cover support which is effective in any position to which the cover may be moved.

Yet another object of the present invention is to provide a support structure in accordance with the previous object which is effective regardless of the direction from which that position is approached.

SUMMARY OF THE INVENTION

The foregoing as well as numerous other objects and advantages are achieved in accordance with the present invention by providing a housing which may be pivotably attached to the cabinet and an arm which may be pivotably attached to the lid and which passes at least part way through the housing and is in frictional engagement with a deformable member within the housing, which member is deformed by relative motion in one direction to change the frictional forces retarding motion of the arm relative to the housing. The extent of allowable deformation may be made adjustable thus allowing a user to set the maximum level of friction retarding the closing of the cover. In its preferred form the deformable member comprises a bushing which is movable within the housing between limits and which at least partially surrounds the arm with the housing interior being of a frustroconical configuration and the bushing exterior being generally conically configured to mate therewith so that upon closing of the lid the bushing is compressed by the housing interior to grip the arm more tightly and thus prevent the lid from dropping shut.

BRIEF DESCRIPTION OF THE DRAWING

The aforementioned and other objects, features and advantages of the present invention will become more apparent from the following detailed description thereof when considered in conjunction with the drawings wherein:

FIG. 1 is a partial perspective view of an exemplary record changer cabinet and lid with the support device positioned therein; and

FIG. 2 is a perspective view of the support device with the housing thereof partially cut away to show the relationship of the housing, bushing and arm.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Considering first FIG. 1 which illustrates the present invention in a preferred environment of a record changer enclosure, a record changer **11** lies within a cabinet-like enclosure **13** having a cover or lid **15** hingeably attached thereto by means of a hinge such as **17.** The mechanical coupling device of the present invention has an arm **19** attached at one end by means of a pivotable bracket **21** to the lid and slidably passes through a housing **23,** which housing is pivotably attached to the side wall of the cabinet by another bracket **25.** The arm may also be provided with a stop **27** which prevents the lid from being opened beyond a desired amount.

In FIG. 2 wherein a portion of the housing **23** has been cut away, the interaction of the arm and housing may be readily seen. The arm **19** passes slidably through the housing **23** and also passes slidably through a deformable bushing **29** which is in frictional engagement with the arm **19** and has an exterior surface of a generally conical configuration. The bushing **29** may be provided with a slot **31** to allow it to be readily deformed, or the slot **31** may be omitted if the bushing is made of a material which is easily deformable. The ends of the housing are partially closed by, for example, threaded plugs **33** and **35** which confine the bushing **29** therein while allowing motion of the arm **19** relative to the housing **23.** These two plugs **33** and **35** function as stops to define the extreme limits of travel of the bushing **29** within the housing, and the plug **35** may be made adjustable so as to vary the one end limit of the bushing's travel within the housing. The housing **23** may be attached to a first bracket **37,** and this bracket **37** pivotably attached to a mounting bracket**25** such as by a simple rivet **39.** The mounting bracket **25,** of course, attaches to a side wall of the cabinet, for example, by way of mounting apertures **41** and **43.** The housing interior is provided with a frustroconical aperture or aperture of diminishing girth which is configured generally to mate with the bushing **29** in the position illustrated.

As is well-known, the frictional force retarding motion between two contacting surfaces is a function of the specific materials and is directly proportional to the force with which the two surfaces are pressed together. With the bushing and housing in the relative positions shown in FIG. **2,** closing the lid will move the bushing **29** to the left compressing it about the rod **19** thus increasing the friction between the rod **19** and the bushing **29** and allowing movement of the rod to force the bushing further to the left which still further compresses the bushing and increases the force with which it is pressed to the rod thus giving a still further increase in the friction retarding motion of the rod in the lid closing direction. This process continues until the rod

19 slips relative to the bushing 29, and this slippage may be due to the bushing 29 having contacted the adjustable stop 35. If the lid is now opened the rod 19 will pull the bushing 29 somewhat to the right thus releasing the compression exerted on the bushing by the housing, and the bushing 29 will move freely with the rod 19 until that bushing contacts the plug 33 which limits its motion within the housing. At this point the friction retarding further opening of the lid will increase somewhat due to the sliding of the rod 19 within the uncompressed bushing 29 to a level which is less than the frictional force which previously impeded closing of the lid. Motion in this lid opening direction may, of course, continue until the stop 27 contacts the adjustment plug 35.

In a specific preferred embodiment constructed in accordance with the teachings of the present invention, the bushing 29 was made of "nylon" and had a taper of between three and five degrees. The interior of the housing 23 was made of "Teflon" with a corresponding taper, and the arm which passes through the bushing had a somewhat rough, not polished finish to prevnet its slipping too readily through the bushing.

Thus while the present invention has been described with respect to a specific preferred embodiment, numerous modifications will suggest themselves to those of ordinary skill in the art. Thus, for example, while the present invention has been described in the environment of a record changer cabinet, it may clearly be employed for supporting virtually any lid structure, for example, it could be employed to hold open an automobile hood or trunk lid. Numerous modifications in addition to the selection of an environment will suggest themselves to persons of ordinary skill in this art, and accordingly the scope of th present invention is to be measured only by that of the appended claims. What is claimed is:

1. A device for coupling two members together for limited movement of one member relative to the other and for providing an asymmetrical frictional force retarding relative movement therebetween comprising:

a housing for attachment to one of the members;

an arm for attachment to the other of the members, said arm passing at least part way through said housing and, at least in the vicinity of the housing, comprising a substantially straight rod of circular cross section;

a bushing movable within the housing and at least partially surrounding said arm, said bushing having a circular aperture therein whereby said arm may pass through said bushin g in frictional engagement therewith; and

means responsive to relative movement of said arm and said housing in a preselected direction for deforming said bushing to thereby increase the frictional force opposing relative motion in the said preselected direction.

2. The device of claim 1 wherein one of the members is a cabinet and the other a lid hingedly attached thereto, said housing being provided with means for pivotably attaching the housing to an interior wall of the cabinet and said arm being provided with means for pivotably attaching the arm to the lid.

3. The device of claim 1 wherein the housing interior is of a fructroconical configuration and the exterior surface of said bushing is generally conically configured to mate therewith, said arm at least in the vicinity of the housing lying generally along an axis common to the housing interior and the bushing surface.

4. The device of claim 1 wherein said housing is provided with means at opposite ends thereof for passing said arm while obstructing the passage of said bushing.

5. The device of claim 3 wherein one of the members is a cabinet and the other a lid hingedly attached thereto, said housing being provided with means for pivotably attaching the housing to an interior wall of the cabinet and said arm being provided with means for pivotably attaching the arm to the lid.

6. A device for coupling a cabinet and a lid hingedly attached thereto together for limited movement of the lid relative to the cabinet comprising:

an axially extending housing the interior of which is of a frustroconical configuration;

means for pivotably attaching the housing to an interior wall of the cabinet;

an arm for attachment to the lid, said arm passing at least part way through said housing and, at least in the vicinity of the housing, being in the form of a cylindrical rod extending generally along the housing axis;

means for pivotably attaching the arm to the lid;

a generally conically configured bushing movable within the housing to mate with the frustroconical housing interior and at least partially surrounding said arm, said bushing having a circular aperture therein whereby said arm may pass through said bushing in frictional engagement therewith whereby relative movement of said arm and said housing in a preselected direction deforms said bushing to thereby increase the frictional force opposing relative motion in the said preselected direction; and

means at the opposite ends of said housing for passing said arm while obstructing the passage of said bushing.

7. The device of claim 6 wherein one of the opposite end means is adjustably movable in said preselected direction to selectively vary the distance which said bushing may move in the said preselected direction and thereby to selectively vary the extent which said bushing may be deformed.

8. The device of claim 4 wherein one of the opposite end means is adjustably movable along the common axis to selectively vary the distance which said bushing may move in the preselected direction and thereby to selectively vary the extent which said bushing may be deformed.

9. A device for mechanically coupling a cabinet-like enclosure to a hingedly attached cover therefor to selectively retard relative motion of the cover comprising:

an apertured housing having an interior of progressively diminishing girth;

an arm movably passing through said housing; and

a deformable bushing within the housing interior, said bushing frictionally engaging said arm and being positioned and dimensioned so as to be movable with said arm to a point where the bushing engages said housing interior whereupon further movement in the same direction results in an increase of the frictional force opposing motion of said arm relative to said bushing.

10. The device of claim 9 further comprising means for adjustably limiting the distance said bushing may move in the said same direction.

11. A device for mechanically coupling a cabinet-like enclosure to a hingedly attached cover therefor to selectively retard relative motion of the cover comprising:

a housing having a progressively more restrictive aperture therein;

an arm movably passing through said housing; and

a deformable bushing within the housing aperture, said bushing frictionally engaging said arm and being positioned and dimensioned so as to be movable with said arm to a point where the bushing engages the housing aperture whereupon further movement in that same direction results in an increase of the frictional force opposing motion of said arm relative to said bushing.

12. The device of claim 11 further comprising means for adjustably limiting the distance said bushing may move in the said same direction.

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