April 26, 1938. E. O. THOMPSON 2,115,656

MOTION RETARDING DEVICE

Filed June 17, 1936

Fig. 2.

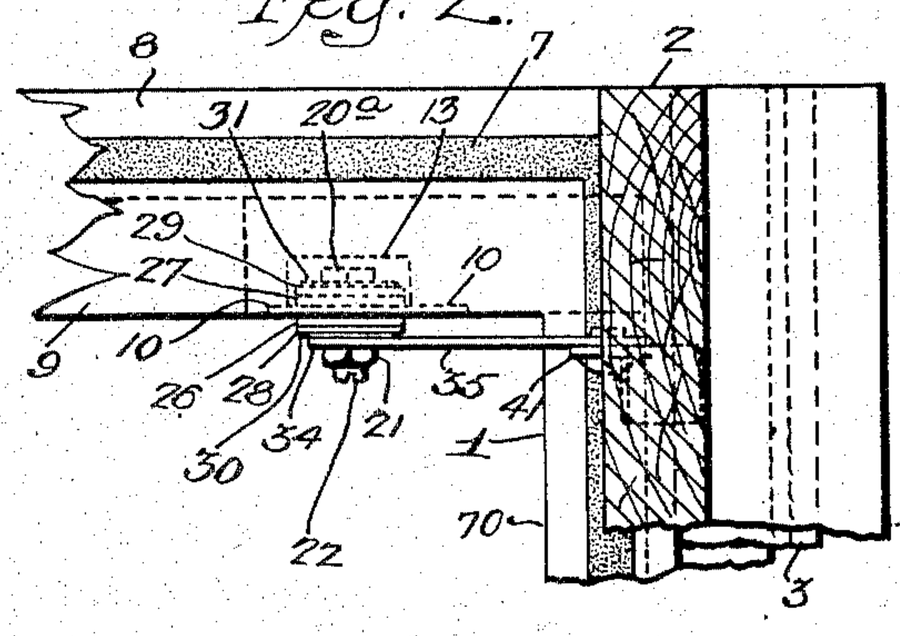


Fig. 5.

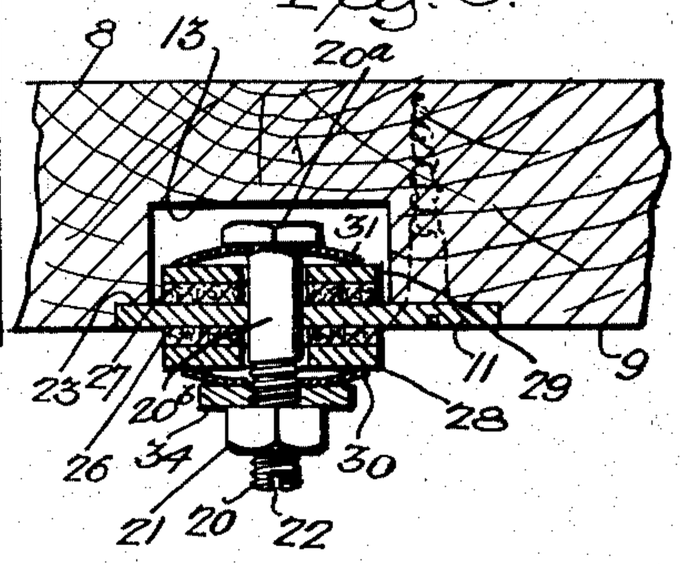


Fig. 1.

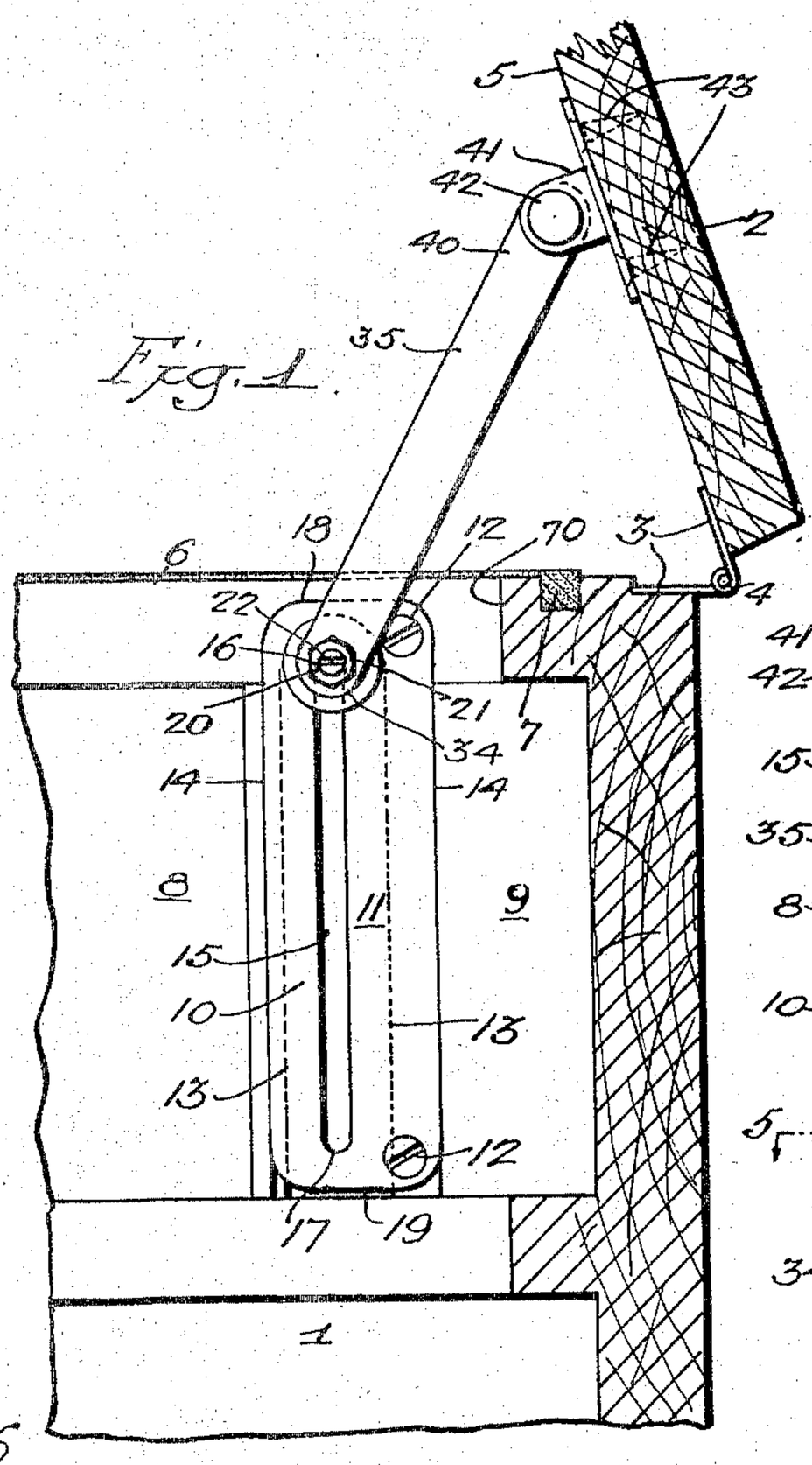


Fig. 3

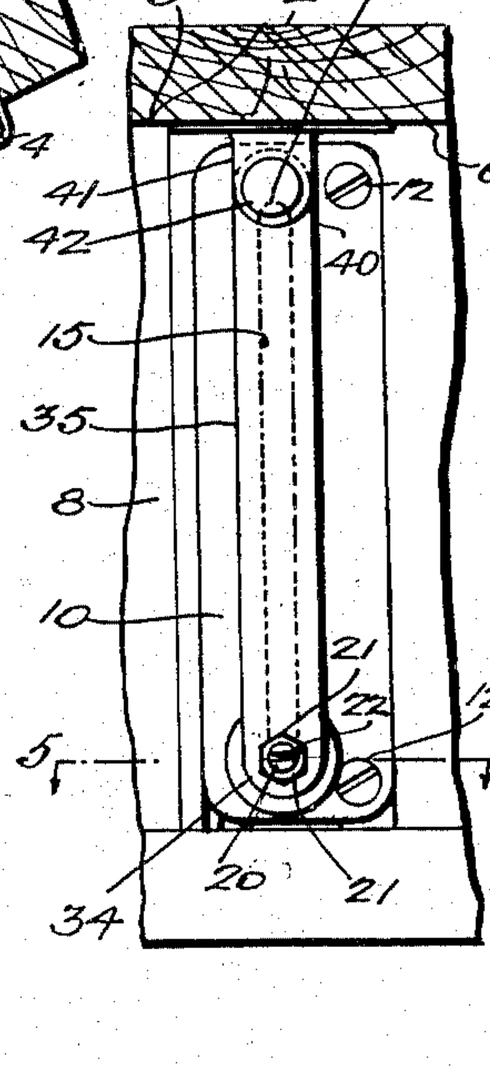


Fig. 4.

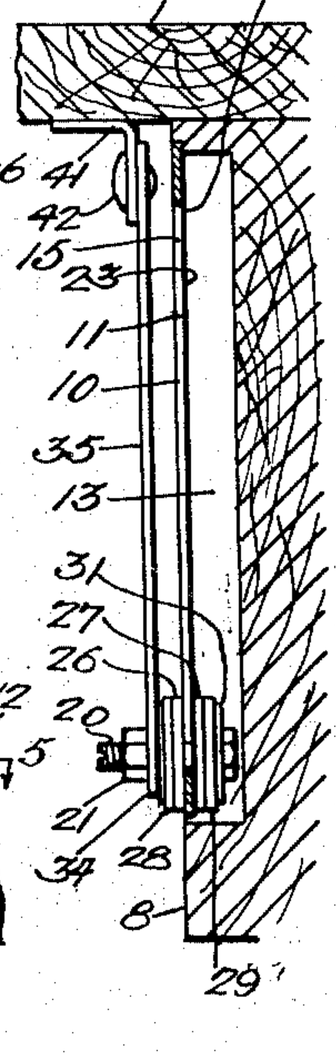
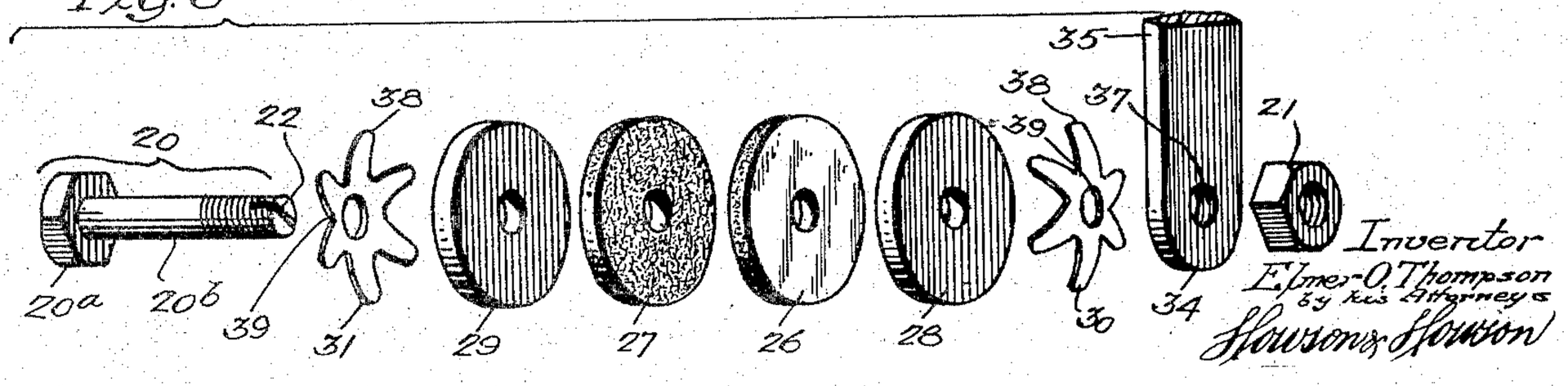


Fig. 6



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UNITED STATES PATENT OFFICE

2,115,656

MOTION RETARDING DEVICE

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Application June 17, 1936, Serial No. 85,772

11 Claims. (Cl. 217—60)

This invention relates to frictional lid supporting and closing devices and the one forming the subject matter of the present invention is adapted particularly for controlling the closing of the lids or tops of chests, cabinets, etc. Specifically, the device of the present invention is designed for controlling the closing of the lid of a phonograph or similar cabinet, wherein such lid, in closing, is arranged to swing about a horizontal pivot, by gravity, solely under its own weight.

One object of the present invention is to provide a control device for cabinet lids which will function as a safety support for the lid, to maintain the lid in a full open position for as long a time as may be desired; and which will permit the closing motion to be inaugurated by a slight downward pressure on the lid; and which, from the time the closing of the lid begins, will control the motion of the lid in such a manner as to permit it to coast noiselessly into its fully closed position.

Another object of the invention is to provide a control device, which, in addition to its being efficient and noiseless in operation, may be inexpensively manufactured and installed and which will require a minimum amount of attention to maintain in proper working condition.

The construction and operation of the device will be fully disclosed hereinafter, reference being had to the accompanying drawing, of which:

Fig. 1 is a vertical sectional elevation of a sufficient portion of a cabinet and the lid thereof, in open position, to illustrate the application and functioning of the device of the present invention as applied thereto;

Fig. 2 is a plan view of the cabinet parts and mechanism shown in Fig. 1;

Fig. 3 is a side elevation of the device showing the relation of the elements thereof when the cabinet lid is in its fully closed position;

Fig. 4 is an edge elevation of the mechanism shown in Fig. 3;

Fig. 5 is a sectional plan view taken on the line 5—5, Fig. 3; and

Fig. 6 is a detached perspective view of the elements of the device.

As shown in Figs. 1 and 2, the main body portion of the cabinet is shown generally at 1 and the lid or top of the cabinet is shown at 2. The lid 2 is pivoted to the body 1, as by a hinge 3, the axis of the pin 4 of which is disposed horizontally.

When the lid 2 is in its fully closed position, as shown in Figs. 3 and 4, the under side 5 thereof rests upon the upper edge 6 of the body 1 of the cabinet. Normally the upper edge 6 of the body or the marginal area of the under side 5 of the lid 2 is lined with a strip of felt or otherwise padded or equipped, as indicated at 7, to deaden noise occurring as a result of the operation of the phonograph mechanism within the cabinet. While not essential to the invention, the use of this pad will assist in effecting noiseless closing of the lid in accordance with the invention.

The upper portion of the body 1 of the cabinet, in the present instance a phonograph cabinet, is open over the greater portion of the area of the cabinet top, as indicated at 10 to permit access to the phonograph mechanism, i. e. turntable and pick-up, etc., which may be mounted within the cabinet.

The retarding device of the present invention includes a substantially flat plate, bar, or other slide element 10 which is secured in a fixed position within the open top of the cabinet 1, for example as against one of the side walls 8 of the cabinet and preferably with the outer surface 11 of the plate 10 in the same plane as and flush with the inner surface 9 of the cabinet wall 8. As shown in Fig. 1, the plate 10 is secured to the wall 8 by screws 12, 12.

Under or behind the plate 10 the wall 8 is recessed, as indicated at 13, for purposes which will be disclosed hereinafter. The recess 13 extends substantially parallel to and is disposed between the vertical side edges 14, 14 of the plate 10.

The plate 10 is slotted longitudinally thereof, between the side edges 14, 14 and substantially in alignment with the center of the underlying recess 13 in the wall 8, as indicated at 15, the upper and lower ends 16 and 17 of the slot 15 being spaced inwardly from the upper and lower ends 18 and 19 respectively of the plate 10.

Passing through the slot 15 in the plate 10 is a tie element which in the present instance comprises a bolt 20. The bolt 20 has a head 20*a* located in spaced relation to the inner face 23 of the plate 10, within the recess 13 in the cabinet wall 8, and a nut 21 which is threaded onto the shank 20*b* of the bolt beyond and in spaced relation to the outer face 11 of the plate 10. The threaded end of the bolt 20 is transversely slotted as indicated at 22 for purposes to be described.

Surrounding the bolt 20 and in contact with the opposite faces 11 and 23 respectively of the plate 10 is a pair of friction members in the form of a pair of discs 26 and 27. These discs, while they may be composed of any suitable friction material are preferably cut from a sheet of

leather and are mounted on the bolt 20 preferably with the rough or flesh side of the leather in contact with the opposite smooth faces of the plate 10. If split leather is used the split should be made in such a manner as to provide a more or less rough plate-contacting surface on the discs 26 and 27.

Surrounding the bolt 20 and disposed against the second side of each of the discs 26 and 27 respectively are backing elements for said friction discs and which preferably take the form of metallic washers 28 and 29.

Between the washer 29 and the head 20*a* of the bolt 20, and between the washer 28 and the nut 21 on said bolt are resilient elements in the form of springs 31 and 30 respectively and between the spring 30 and the nut 21 is one end 34 of a link 35.

The end 34 of the link 35 is bored and threaded as indicated at 37 in Fig. 6 for the reception of the threaded end of the bolt 20 and by turning the bolt 20 in one direction the springs 30 and 31 may be placed under compression between the head 20*a* of the bolt 20 and the washer 29 in one instance and between the link 35 and the washer 28 in the other instance.

The pressure of the springs 30 and 31 is transmitted through the washers 28 and 29 to the friction discs 26 and 27 respectively to draw the rough sides of the two friction discs into contact with the opposite faces 11 and 23 respectively of the plate 10.

The pressure exerted by the springs 30 and 31 determines the intensity of the frictional contact between the discs 26 and 27 and the plate 10.

The pressure of the springs 30 and 31 may be regulated before or after the plate 10 is secured in place in the wall 8 of the cabinet body 1, in the first case by a wrench applied to the head 20*a* of the bolt 20 and in the second case by a screw driver in the slot 22 in the outer end of the shank of the bolt 20. Therefore, during assembly of the parts prior to installation of the plate 10 in the cabinet the head 20*a* may be used to obtain a rough or approximate setting of the spring pressure and after installation the slot 22 may be used to obtain the final accurate setting of the spring pressure.

After final setting of the spring pressure the nut 21 is tightened against the link 35 to lock the bolt 20 against relative rotation with respect to the link 35.

The springs 30 and 31 should preferably have a concavo-convex star shape, as clearly indicated in Fig. 6. The springs are arranged with the star points 38, 38 in contact with the washers 28 and 29 respectively and with the central portion 39 of one in contact with the inner surface of the nut 21 and the corresponding portion of the other in contact with the inside surface of the end 34 of the link 35.

The opposite end 40 of the link 35 is pivotally connected to a bracket 41 as by a rivet or bolt 42. The bracket 41 is secured to the under side 5 of the cabinet lid 2 by screws 43.

As shown in the drawing the length of the slot 15 between its ends 16 and 17 is sufficient to permit the bolt 20 to slide therein during the swinging of the lid 2 from its fully closed to its fully open position and vice versa.

When fully open the lid assumes an angle of approximately 70° with respect to the plane of the top surface 6 of the cabinet body 1. When the top 2 is in said fully open position the bolt 20 is in the upper end of the slot 15 in the plate 10 which functions as a stop to prevent greater opening of the lid 2 and the pressure of the friction discs 28 and 29 against the opposite faces of the plate 10 as applied by the springs 30 and 31 is sufficient to maintain the lid in such position indefinitely, against the gravitational pull produced by the overhanging weight of the lid and which tends to swing the lid to its closed position about the axis of the hinge pintle 4.

As will be apparent the vertical downward force exerted by the lid against the lid support will depend upon the lid position or the angle between the lid and a horizontal line perpendicular to the hinge axis. The downward force will vary as the cosine of the angle and thus will be a maximum for a very small angle of opening, will decrease gradually as the opening is increased to say about 30 degrees and from then on will fall off more and more rapidly being zero if the lid were opened to 90°, i. e. were the lid permitted to open to a vertical position. On the other hand, the force required to move the support with respect to the slide should preferably be constant for different slide positions which obtains when the piece 10 is of uniform thickness and has a smooth surface. The lid support will hold the lid open indefinitely in any position such that the angle of opening is greater than the critical angle at which the downward force exerted by the lid is just equal to the force required to move the pads 26, 27 with respect to the slide support 10. As previously indicated the force required to move the friction discs is determined by the force with which they are held against the plate 10 and thus the critical angle may be adjusted to any desired value.

It has further been found that the static friction between the leather and metal is greater than the dynamic or moving friction. Thus a larger force is required to start the friction pad moving than is necessary to keep it moving. In the present instance where the lid opening is limited to about 70° the force with which the friction discs are held against the plate 10 may be so adjusted that the critical angle will be around 50°, if the lid is moving. If the lid is manually closed to this position, it will continue to closely slowly and will come to rest quietly in its closed position. Due to the fact that the static friction is greater than the dynamic, the lid will remain indefinitely in any position at rest such that the opening is greater than about 30°. Thus the lid may be opened to any angle greater than about 30° and if stopped in this open position will remain open indefinitely. To close the lid it is only necessary to manually close it to angle of less than 50° or if the opening is less than this to start the lid moving and it will then close itself without bumping or jarring the cabinet.

Due to the fact that the device contains no loose joints, latches or other elements that could possibly strike one against another during raising and lowering of the lid the device is substantially noiseless in operation at all times, and the retarding action of the device slows down the motion of the lid so that it will not bang on the cabinet.

I claim:

1. A supporting and lowering device for a cabinet lid and the like normally disposed on and pivoted to said cabinet in a substantially horizontal plane, said device comprising a substantially vertically extending slide element fixed to said cabinet with a longitudinal slot disposed at a predetermined distance from the lid pivot,

a friction device comprising a pair of friction members engaging opposite faces of and slidable vertically on said slide element, a tie element for said friction elements extending through said slot, means for resiliently pressing said friction members into frictional contact with opposite faces respectively of said slide element, and a link having one end pivoted to said friction device and its opposite end pivoted to said lid at a distance from said lid pivot substantially equal to the spacing of said slide element from said pivot.

2. A supporting and lowering device for a cabinet lid and the like normally disposed on and pivoted to said cabinet in a substantially horizontal plane, said device comprising a substantially vertically extending slide element fixed to said cabinet with a longitudinal slot disposed at a predetermined distance from the lid pivot, a friction device comprising a pair of friction members engaging opposite faces of and slidable vertically on said slide element, a tie element for said friction elements extending through said slot, means carried by said tie element for resiliently pressing said friction members into frictional contact with opposite faces respectively of said slide element, and a link having one end pivoted to said friction device and its opposite end pivoted to said lid at a distance from said lid pivot substantially equal to the spacing of said slide element from said pivot.

3. A lid supporting and lowering device for phonograph cabinets and the like comprising a longitudinally slotted plate fixed to said cabinet, a pair of friction elements slidably mounted on and engaging opposite faces respectively of said plate, a tie bolt passing through said slot, a spring carried by said bolt and resiliently pressing said friction elements into contact with said faces of said plate, and means connecting said bolt to said cabinet lid for controlling relative motion between the lid and the cabinet.

4. A lid supporting and lowering device for phonograph cabinets and the like comprising a longitudinally slotted plate fixed to said cabinet, a pair of friction elements slidably mounted on and engaging opposite faces respectively of said plate, a tie bolt passing through said slot and said friction elements, a spring carried by said bolt and resiliently pressing said friction elements into contact with said faces of said plate, and means connecting said bolt to said cabinet lid for controlling relative motion between said lid and said cabinet.

5. A lid supporting and lowering device for phonograph cabinets and the like comprising a longitudinally slotted plate fixed to said cabinet, a pair of friction elements slidably mounted on and engaging opposite faces respectively of said plate, a pair of backing elements for said friction elements respectively, a tie bolt passing through said slot and through said friction and backing elements, a pair of springs carried by said bolt and resiliently pressing against said backing elements to press said friction elements respectively into contact with said faces of said plate, and means connecting said bolt to said cabinet lid for controlling relative motion between said lid and said cabinet.

6. A lid supporting and lowering device for phonograph cabinets and the like comprising a longitudinally slotted plate fixed to said cabinet, a pair of friction elements slidably mounted on and engaging opposite faces respectively of said plate, a pair of backing elements for said friction elements respectively, a tie bolt passing through said slot and through said friction and backing elements, a pair of concavo-convex star-shaped spring elements carried by said bolt and resiliently pressing against said backing elements to press said friction elements respectively into contact with said faces of said plate, and means connecting said bolt to said cabinet lid for controlling relative motion between said lid and said cabinet.

7. A lid supporting and lowering device for phonograph cabinets and the like comprising a longitudinally slotted plate fixed to said cabinet, a pair of friction elements slidably mounted on said plate and composed of leather with rough sides thereof engaging opposite faces respectively of said plate, a pair of backing elements for said friction elements respectively, a tie bolt passing through said slot and through said friction and backing elements, a pair of springs carried by said bolt and resiliently pressing against said backing elements to press said friction elements respectively into contact with said faces of said plate, and means connecting said bolt to said cabinet lid for controlling relative motion between said lid and said cabinet.

8. In a cabinet comprising a vertically walled body portion and a lid pivoted to one of the walls of said body portion, a longitudinally slotted plate carried by and disposed vertically on a second wall of said cabinet, a pair of friction elements slidably mounted on and resiliently engaging opposite faces respectively of said plate, a tie bolt passing through said slot and said friction elements, a link connected at one of its ends to said bolt, and means pivotally connecting the opposite end of said link to said cabinet lid.

9. In a cabinet comprising a vertically walled body portion and a lid pivoted to one of the walls of said body portion, a longitudinally slotted plate carried by and disposed vertically on a second wall of said cabinet and set into said wall substantially flush with the surface of said wall, said wall being recessed under said plate in a direction longitudinally of the slot in said plate, a pair of friction elements slidably mounted on and resiliently engaging opposite faces respectively of said plate with one of said friction elements disposed within said wall recess, a tie bolt passing through said slot and said friction elements, a link connected at one of its ends to said bolt, and means pivotally connecting the opposite end of said link to said cabinet lid.

10. In a cabinet comprising a vertically walled body portion and a lid pivoted to one of the walls of said body portion, a longitudinally slotted plate carried by and disposed vertically on a second wall of said cabinet, a pair of friction elements slidably mounted on and resiliently engaging opposite faces respectively of said plate, a tie bolt passing through said slot and said friction elements and adapted to control the pressure of said friction elements on said plate, a link connected at one of its ends to and threaded for reception of a correspondingly threaded end of said bolt, locking means carried by said link and said bolt to maintain said friction pressure and to prevent loosening of the bolt in the link, and means pivotally connecting the opposite end of said link to said cabinet lid.

11. In a cabinet comprising a vertically walled body portion and a lid pivoted to one of the walls of said body portion, a longitudinally slotted plate carried by a second wall of said cabinet

with the slot thereof disposed substantially vertical and set into said wall substantially flush with the surface of said wall, said wall being recessed under said plate in a direction longitudinally of the slot in said plate, a pair of friction elements slidably mounted on and engaging opposite faces respectively of said plate with one of said friction elements disposed within said wall recess, resilient means pressing said friction elements into contact with the opposite faces of said plate, a tie bolt passing through said slot and said friction elements and said resilient means, a link connected at one of its ends to and threaded for reception of a correspondingly threaded end of said bolt, locking means carried by said link and said bolt to prevent loosening of the bolt in the link, and means pivotally connecting the opposite end of said link to said cabinet lid, the threaded end of said bolt projecting beyond said locking means and slotted to receive a tool for turning said bolt to set the pressure exerted by said resilient means against said friction elements.

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