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PULL OUT MECHANISM

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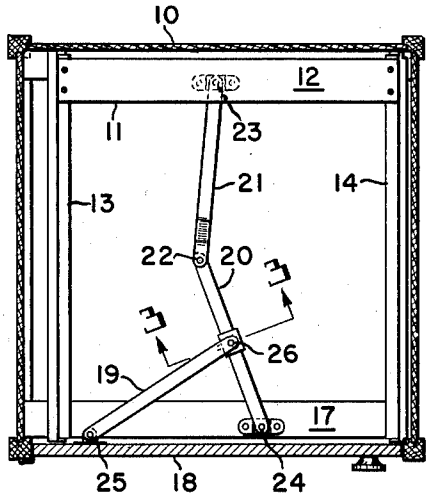


FIG. 1

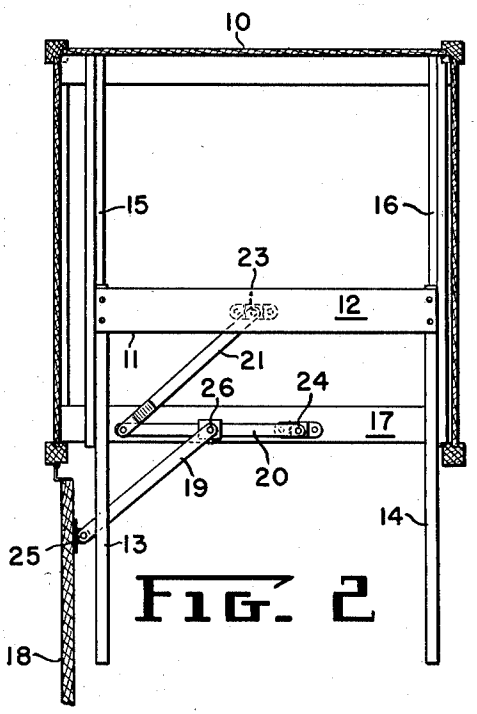


FIG. 2

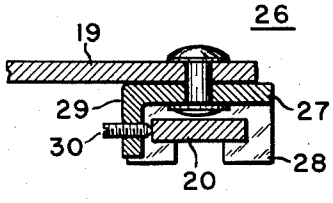


FIG. 3

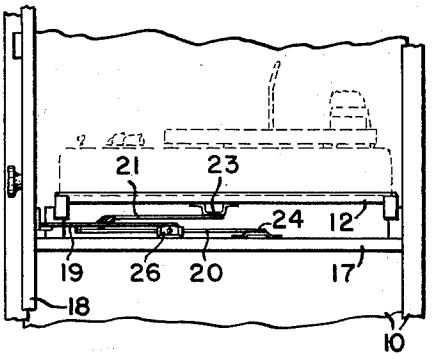


FIG. 4

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PULL-OUT MECHANISM

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3 Claims. (Cl. 312—274)

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This invention relates to a mechanism adapted to be connected to the door of an article of furniture to retract and re-insert a drawer, shelf, carriage or similar object coincident with the opening and closing of the door.

Devices previously developed for this purpose suffer from a number of defects growing out of the difficulty of converting the angular movement of a swinging door into the linear translation of an object which in some cases is of considerable size and weight. Such difficulty is experienced in providing for the smooth retraction and reinsertion of an automatic record changer mechanism from a radio phonograph cabinet as a cabinet door is opened and closed.

Such difficulties include sticking or binding of the object, wide variation in the amount of force required at different parts of the cycle, the requirement of an excessive amount of force, excessive cost and complication of the mechanism and the unsightly appearance of the portions of the mechanism which are visible when the door is open.

It is an object of this invention to provide a pull-out mechanism which overcomes the defects mentioned above.

It is another object of the invention to provide a pull-out mechanism which is simple and inexpensive of construction.

It is a further object to provide a pull-out mechanism which operates to withdraw and reinsert a heavy object without binding or sticking and with little variation of the force necessary to actuate it throughout the cycle.

It is still another object to provide a pull-out mechanism which operates in such a manner that the ratio of door movement to movement of the actuated object decreases as the limits of the object's motion are approached, thus avoiding jerking in starting and stopping the object.

It is a still further object of the invention to provide a pull-out mechanism the major portion of the working parts of which are concealed, at all times during the cycle of operations.

It is another object of the invention to provide a pull-out mechanism which is easily adjustable to accommodate it to various conditions of operation and to use in furniture of different dimensions.

Other objects and advantages of the invention will become apparent from a consideration of the following specification when taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a cross-sectional view of an article of furniture showing in top plan view one embodiment of the invention, the actuated object being fully housed;

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Fig. 2 is a view similar to Fig. 1 showing the door open and the actuated object fully withdrawn;

Fig. 3 is a cross-sectional view of a fragment of the mechanism of Fig. 1, the section being taken along line 3—3 of that figure; and,

Fig. 4 is a front elevational view of the embodiment of Fig. 1 showing a record player and its supporting carriage as the actuated object.

Referring now more particularly to the drawing there is shown in Figs. 1, 2, and 4 an article of furniture 10, such as a cabinet, of square cross-sectional configuration in which is housed a withdrawable tray or carriage 11, shown as composed of a cross member 12 and two side members 13 and 14. The members 13 and 14 are mounted to slide on rails 15 and 16. A shelf 17 extends across the front of the cabinet, being secured to the side walls thereof beneath the rails. A door 18 is hinged along one side and closes the front of the cabinet.

The pull-out mechanism comprises three main elements 19, 20, and 21 which are preferably flat metal strips or rods. The elements 20 and 21 are pivotally joined at 22 to form a two-arm articulated linkage. The remaining end of arm 21 is pivotally attached to the cross member 12 of the carriage as shown at 23. The remaining end of arm 20 is pivotally attached to the shelf 17 at 24. The element 19 has one end pivotally attached to the inside of the door 18 near the hinged edge thereof, as shown at 25. The remaining end of the element 19 is secured to the arm 20 by means of an adjustable joining means 26 which is shown in detail in Fig. 3.

The joining means 26 may take any of many forms known to the art, the one shown here comprising a member 27 of rectangular shape having its main portion extending horizontally and pivotally joined to the end of element 19. The ends of the main portion terminate in downwardly extending tabs 28 which are cut out to a C-shape, the cut out portion being shaped to loosely accommodate the member 20. A tab 29 extends downwardly from the front of the main portion and is provided with a set screw 30 for securing the joining means to the element 20.

The use of an adjustable joint at 26 is of great advantage to a manufacturer of a line of cabinets or other articles of furniture of different dimensions and configurations. By shifting this joint along the arm 20, the position of the door relative to the carriage at each point of the cycle can

be varied, thus providing proper clearance between door and carriage for different dimensional relationships of the two. The degree of final opening of the door can also be adjusted by this means. A single mechanism can thus be utilized on any one of a number of cabinets of differing dimensions.

The manner of operation of the mechanism is clearly shown in Figs. 1 and 2. In the former, the carriage is fully housed and in the latter, fully retracted. Stops may be provided in a manner known to the art to limit the forward movement of the carriage.

In Fig. 4 there is shown a front view of a phonograph cabinet of the type wherein the record player is withdrawable for access during the playing of records. The record player is shown in dotted lines.

It will be noted that the pull-out mechanism is substantially completely removed from view during the whole cycle of operations. The mechanism has handled heavy objects smoothly and effectively.

What is claimed is:

1. Means to cause angular movement of an element to effect rectilinear movement of an object in a direction lying in a plane normal to the axis of said angular movement, comprising; two arms hinged to form an articulated linkage joining a point on said object remote from said element and a point of fixed location adjacent said element, and a link pivotally joining said element and an intermediate point of the one of said arms connected to said fixed point, the sum of the lengths of said arms being greater than the maximum distance between said points and the hinge of said linkage lying between said axis and a line joining said points.

2. A mechanism for converting the angular movement of a door into rectilinear movement of an object in a plane normal to the axis of rotation of said door, comprising; a pair of arms, one end of one of said arms being pivotally joined to one end of the other, means pivotally joining the remaining end of one of said arms to said object at a point on the underside and toward the rear thereof, means pivotally joining the remaining end of the other of said arms to a point of fixed location near the front of and beneath said object and an arm having one end pivotally secured to said door and its other end pivotally secured to a point intermediate the ends of said other of said pair of arms, the sum of the lengths of said arms being greater than the maximum distance between the first two of said points and the junction of said pair of arms lying between the axis of rotation of said door and a line joining said first two points.

3. In an article of furniture having a door hinged along one of its edges and an object normally housed within it and withdrawable therefrom by rectilinear motion in a direction lying in a plane normal to the axis of rotation of said door, means causing withdrawal of said object upon the opening of said door, said means comprising; a pair of arms joined together at their ends for pivotal movement, means joining the remaining end of one of said arms to said object for pivotal movement about a point near the rear thereof, means joining the remaining end of the other of said arms to said article of furniture for movement about a point near the front of said object, and an arm having one end pivotally secured to said door and its remaining end pivotally secured to a point intermediate the ends of said other arm of said pair, the sum of the lengths of said arms being greater than the maximum distance between the first two of said points and the junction of said pair of arms lying between the axis of rotation of said door and a line joining said first two points.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,062,263	Sundquist	May 20, 1913
1,885,404	Bamberg	Nov. 1, 1932
1,936,124	Wilson	Nov. 21, 1933
2,319,651	Wilkinson	May 18, 1943
2,411,221	McGuire	Nov. 19, 1946