Nov. 26, 1929. J. E. GLOEKLER 1,736,784

COUNTER WEIGHT MECHANISM

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Fig. 2.

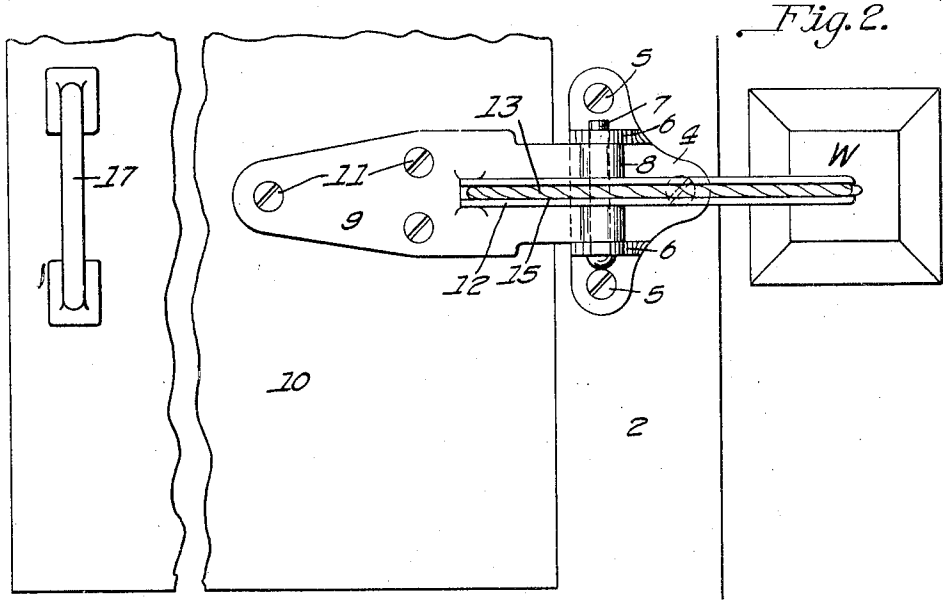

Fig. 1.

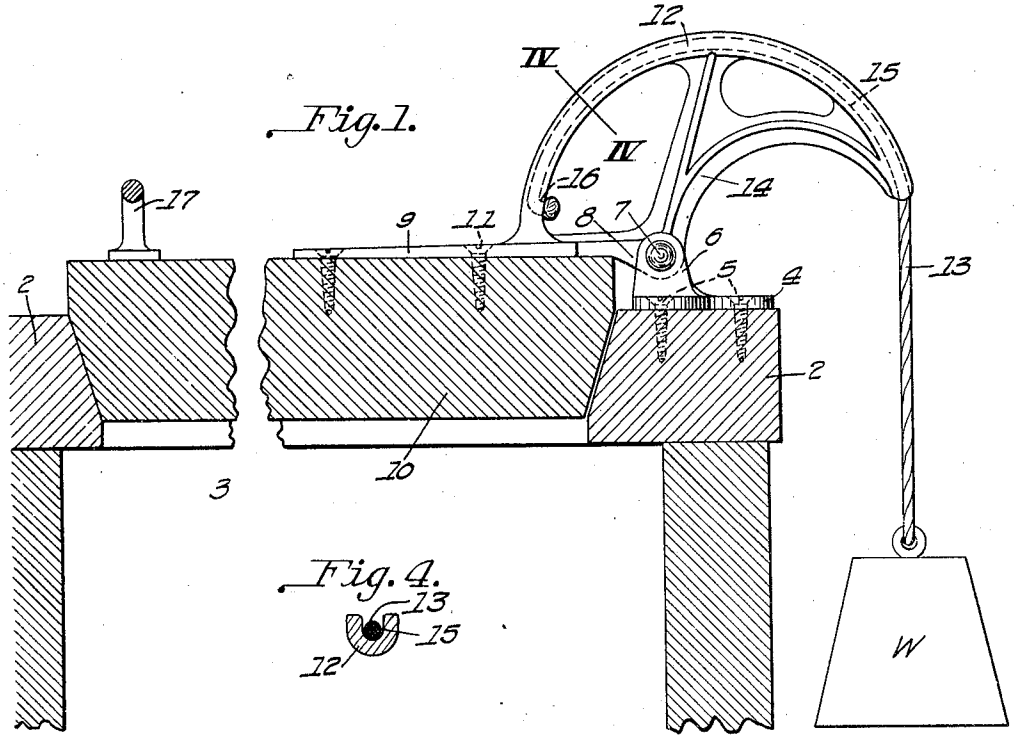

Fig. 4.

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Fig. 3.

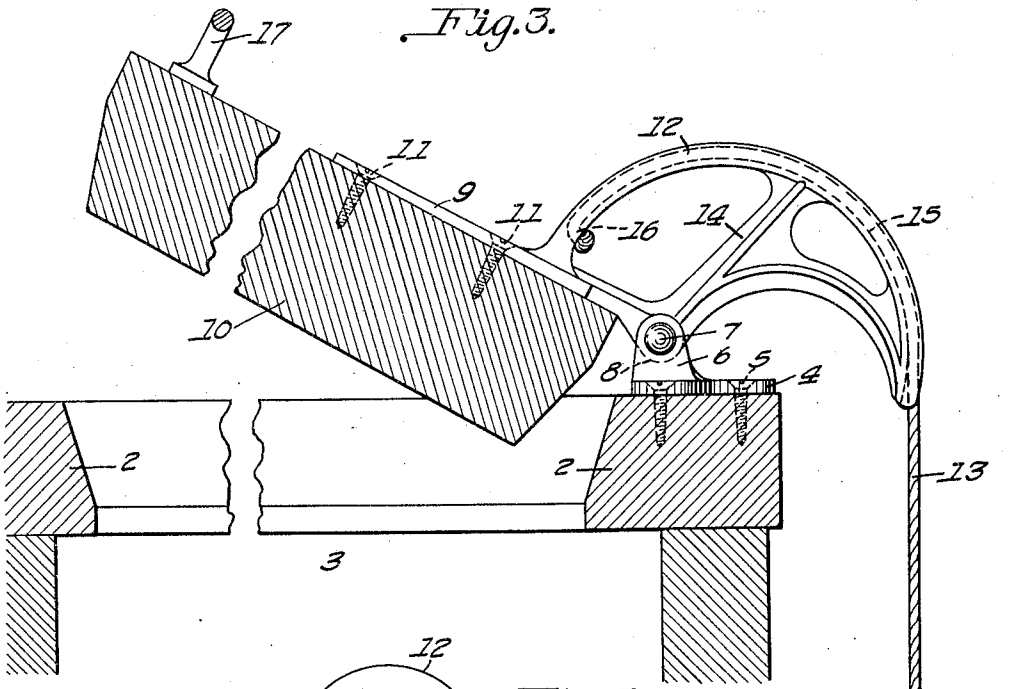


Fig. 5.

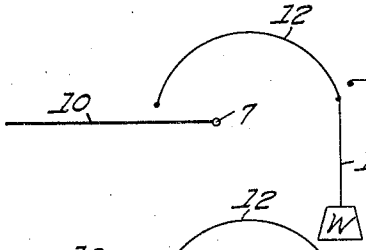


Fig. 6.

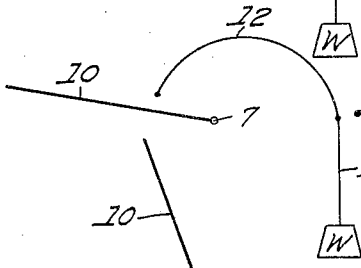
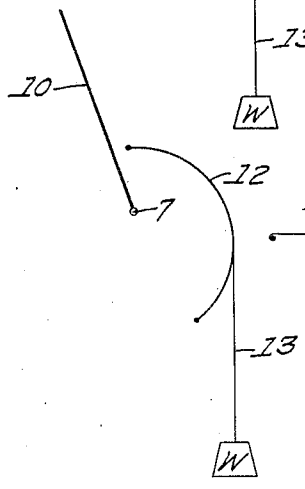


Fig. 7.



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UNITED STATES PATENT OFFICE

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COUNTER-WEIGHT MECHANISM

Application filed November 16, 1928. Serial No. 319,975.

My invention consists of a balancing counterweighted lever mechanism for upwardly swinging doors of the trap door type.

It is especially designed for use in connection with the upwardly opening door of a refrigerator or cabinet where the door is hinged at one side, closes downwardly to a horizontal position, and is swung upwardly on hinges at the back or one side. Ordinarily, such doors are of considerable weight, requiring the exertion of considerable manual effort to lift, and with liability to fall unless propped up or otherwise supported.

The improvement of my invention is designed to exert an overbalancing lifting assistance at the beginning of movement, maintaining its leverage against the gravitating tendency of the door, and with sufficient downward pull to hold the door in position when erected, as hereinafter described.

Referring to the drawings showing one preferred embodiment of the invention:

Fig. 1 is a cross sectional view through the upper portion of a refrigerator casing or the like showing the invention as applied, the door being closed;

Fig. 2 is a plan view of Fig. 1;

Fig. 3 is a view similar to Fig. 1 showing the door partly raised;

Fig. 4 is a cross section on the line IV—IV of Fig. 1;

Figs. 5, 6 and 7 are diagrammatic views showing successive positions of the device, illustrating the leverage action.

In the drawings, 2 represents the upper framing around the main walls of the box or other construction, surrounding the interior cavity or opening 3 to be covered.

Mounted on the framing 2 at one side is a supporting base 4 secured by screws 5 and provided with the hinge lugs 6 for the transverse hinging bolt or pintle 7.

Pivoted thereon, between the lugs, is the fulcrum bearing or hinge terminal 8 of the strap hinge extension or arm 9, secured to the upper face of the cover or top 10. The latter which may be of wood or other suitable material, is adapted to make a tight closing engagement with the frame, as in Fig. 1.

Arm 9 is securely attached to the top 10 by screws 11 or otherwise for upward and downward swinging movement around the pivoting hinge 7. For the purpose of exerting a counterbalancing and lifting leverage on the top 10, arm 9 is provided with an arcuate or elliptical shaped arm 12 subject to the constant tension of a counterweight W through a connecting cable or cord 13.

Arm 12 as shown, is preferably integral with strap 9, and is also connected with hub 8 by one or more spoke arms 14 for strength and rigid mounting. The arm 12 is provided with an outer open groove 15 for reception of the cable 13 which is secured to the inner end of the arm through an opening 16 therein, or in any other suitable way.

The arm 12 and its conforming groove are developed around the pivoting or hinge center 7 in an elliptical path, by a curve of gradually increasing radius, as shown.

By such construction, the leverage action of weight W is greatest at the horizontal or closed position of cover 10, tending to almost but not quite balance its weight when closed.

At the commencement of the rise, Figs. 1 and 5, under lifting action by the operator as by handle or grip 17, the leverage action of the weight will continue at its maximum until the cover is at or about the position shown in Fig. 6, with the outer end of arm 12 lowered to about the same level as the hinge center 7. Thereafter the closing or downward leverage of the top reduces in approximate conformity with the reduced leverage action of the weight and cable, as the point of contact of the cable with the groove recedes inwardly in the direction of the diminishing radius of the arm 12. Thus when the top is thrown upwardly to its fully open position, as in Fig. 7, with spoke arm 14 resting against the rear edge of base 4, the gravitating action of the top is materially reduced, while the leverage action of the cable is relatively greater.

The weight W in such position is quite sufficient to hold the top erected without further assistance, and it may then be lowered to closed position against the pull of the weight with but slight effort.

Arm 12 may be made integral with the

cover attaching hinge as shown, or may be separate and secured in any suitable way, but in either construction will function as described to assist in raising or lowering the heavy cover 10.

The device is extremely simple, very durable and cheap, and is continually efficient. It may be changed or varied in detail construction, made in any suitable size to suit the requirements of use, or otherwise varied by the skilled mechanic, but all such changes are to be understood as within the province of the skilled mechanic and the scope of the following claims.

What I claim is:

1. A counterbalancing hinge support for an opening and closing cover provided with an elliptical arm and a counterweight connected therewith, and a strap hinge extension arm integrally connected with the elliptical arm.

2. A counterbalancing hinge support for an opening and closing cover provided with an elliptical arm and a counterweight having a flexible tension-exerting element passing over the arm and secured thereto, and a strap hinge extension arm integrally connected with the elliptical arm.

3. A counterbalancing hinge support for an opening and closing cover provided with an elliptical arm of increasing radius developed around the hinge thereof, a flexible element secured to the arm adjacent the cover and laid over the arm and depending from its outer end, a counterweight secured to the flexible element, and a strap hinge extension arm connected with the elliptical arm and having an inner pivoting terminal.

4. A counterbalancing hinge support for an opening and closing cover provided with an elliptical arm having a peripheral groove, a cable or the like secured to the inner end of the arm and laid in said groove, a counterweight secured to and exerting tension on the cable, and a strap hinge extension arm connected with the elliptical arm and having an inner pivoting terminal.

5. A counterbalancing hinge support for an opening and closing cover consisting of a pivoting supporting base, a hinging arm pivoted on the base provided with an integral curved lever arm arching over the pivotal mounting thereof, a cable or the like secured to the inner portion of the lever arm and laid outwardly over the face thereof, and a counterweight secured to and exerting tension on the cable.

6. A counterbalancing hinge support for an opening and closing cover consisting of a pivoting supporting base, a hinging arm pivoted on the base provided with an integral curved lever arm developed outwardly over the pivotal mounting thereof with an increasing radius, a flexible tension member secured to the inner portion of the lever arm and laid outwardly over the face thereof, and a counterweight secured to and exerting tension on the flexible member.

In testimony whereof I hereunto affix my signature.

JOHN EDWARD GLOEKLER.