Oct. 14, 1924. 1,511,841

W. A. RANKIN

DOOR MECHANISM

Filed Aug. 30, 1921

Fig.1.

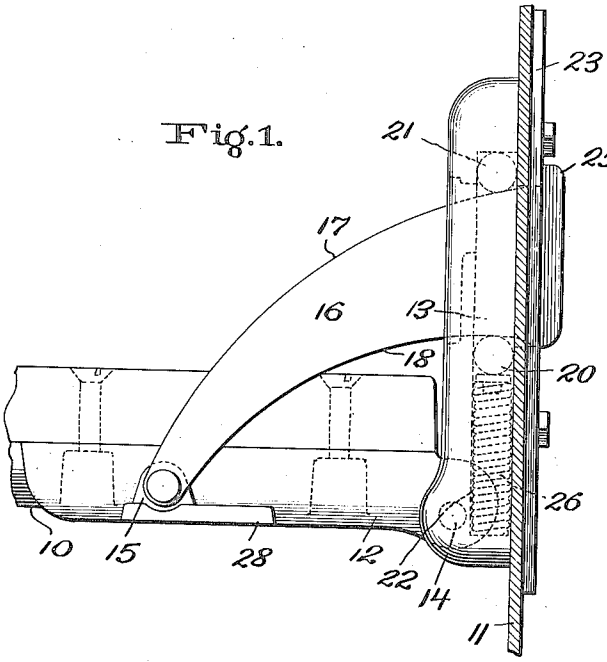


Fig.2.

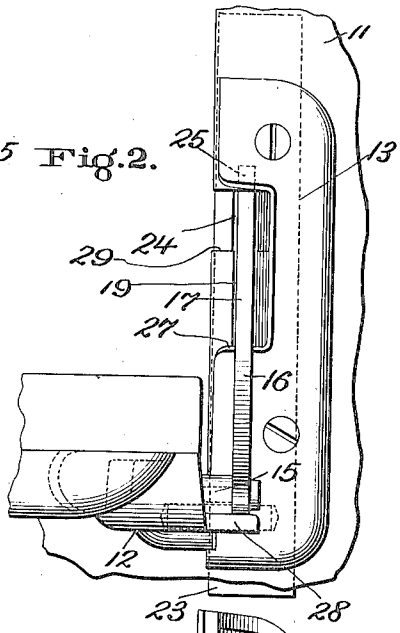


Fig.5.

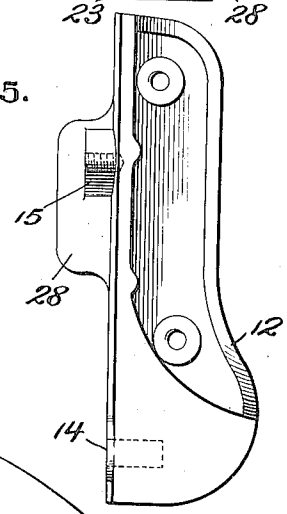


Fig.4.

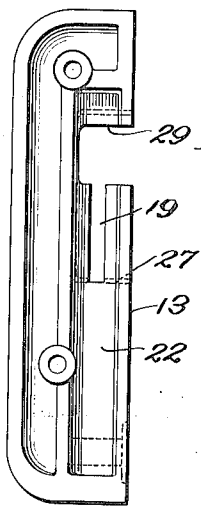


Fig.3.

Inventor:
William A. Rankin,
by Albert G. Davis
His Attorney,

Patented Oct. 14, 1924. 1,511,841

UNITED STATES PATENT OFFICE.

WILLIAM A. RANKIN, OF OAK PARK, ILLINOIS, ASSIGNOR TO EDISON ELECTRIC APPLIANCE COMPANY, INC., A CORPORATION OF NEW YORK.

DOOR MECHANISM.

Application filed August 30, 1921. Serial No. 496,853.

To all whom it may concern:

Be it known that I, WILLIAM A. RANKIN, a citizen of the United States, residing at Oak Park, in the county of Cook, State of Illinois, have invented certain new and useful Improvements in Door Mechanism, of which the following is a specification.

My invention relates to door mechanisms and has for its object the provision of means whereby the door is counterbalanced in all positions.

More specifically my invention relates to counterbalancing mechanisms for drop doors on ranges. It is very desirable to mount doors of this type on the range so that they are counterbalanced in all positions. When mounted in this way, the door can be opened with a minimum of effort on the part of the operator since the weight of the door is taken care of by the counterbalancing mechanism. In the usual application of the spring counterbalance to drop doors, no consideration is taken of the increasing leverage of the weight of the door about its pivot point as a fulcrum when the door is opened. The result is that the spring is too weak at certain points and too strong at others.

In carrying out my invention, I employ a curved cam member having two diverging cam faces which is pivotally mounted on one half of the door hinge. On the other half of the hinge is a fixed member and a yieldable member between which the cam member is moved. The cam faces are so generated with respect to the varying pressure of the yieldable member as it is acted upon by the cam member that the resultant force on the cam member in opposition to the opening of the door varies with the position of the door so as to compensate for the variations in leverage of the weight of the door about its pivot point as a fulcrum. By means of my invention I am thus enabled to counterbalance the door in all positions.

In the accompanying drawing, Fig. 1 is a side elevation of a range equipped with my invention showing portions only of the range, and with the door in open position; Fig. 2 is a front elevation of the same; Fig. 3 is a side elevation showing the door closed; Fig. 4 is a view of the half of the hinge applied to the range body with the counterbalancing means removed; while Fig. 5 shows the half of the hinge which is attached to the door.

Referring to the drawing, the lower right hand corner of the range door 10 is mounted on the body 11 of the range by means of a hinge member 12 on the door and a hinge member 13 on the body of the range pivotally attached to member 12 at point 14. Pivotally secured to a support 15 on a projection 28 of hinge member 12 is a curved cam member 16 having opposite diverging cam faces 17 and 18. The cam member 16 moves in a slot 19 in hinge member 13 between two rollers 20 and 21. Rollers 20 and 21 are held between hinge member 13 and the side of the range in a raceway or channel 22 in the hinge member. A reinforcing plate 23 attached to the inner side of the range wall opposite hinge member 13 is provided with a slot 24 through which the cam member extends. On the inner end of the cam member is a projection 25 which rests against plate 23 when the door is in full open position, preventing further opening movement of the door and forming a support for the door when open.

Roller 21 normally is held tightly between the upper end of channel 22 and cam face 17 due to the action of a spiral spring 26 between roller 20 and the lower end of the channel. A recess 27 in hinge member 13 is provided for projection 28 when the door is closed, an opening 29 being cut in hinge member 13 at the upper end of recess 27 for support 15, the two hinge members thus fitting together adjacent each other when the door is closed, as shown in Fig. 3. The lower left hand corner of the door may be hinged either with or without the counterbalancing mechanism.

The operation of my invention is as follows: When the operator opens the door, the cam member moves between rollers 20 and 21. Roller 21 exerts an unyielding force against cam face 17 so that cam face 18 is caused to force roller 20 downward depressing spring 26 which exerts a gradually increasing pressure on cam face 18. The cam member is thus acted upon by an increasing resultant force in opposition to outward movement. The cam faces are so generated that this resultant force is just sufficient to compensate for the increasing leverage of the weight of the door about its fulcrum 14 and counterbalance the door in all positions. When

the operator closes the door, the effect of spring 26 on the cam member gradually decreases as will be understood from the previous description.

Obviously, the cam member 16 and roller members cooperating therewith may be attached at any suitable point between the door and the body of the range; their application is not limited to the hinge itself. Also, the cam member may be pivoted with relation to the range and slidable with relation to the door.

In accordance with the provisions of the patent statutes, I have described the principle of operation of my invention, together with the apparatus which I now consider to represent the best embodiment thereof, but I desire to have it understood that the apparatus shown is only illustrative and that the invention can be carried out by other means.

What I claim as new and desire to secure by Letters Patent of the United States, is:

1. A door mechanism comprising a resilient member, and means in engagement therewith and movable with relation thereto in response to movement of the door so as to produce a force opposing the weight of the door varying to counterbalance the door in all positions.

2. A door mechanism comprising a resilient member, and a cam member in engagement therewith and movable with relation thereto in response to movement of the door so as to produce a force opposing the weight of the door varying to counterbalance the door in all positions.

3. A door mechanism comprising a fixed member, a resilient member, and a cam member having cam faces movable between said fixed and resilient members in response to movement of the door and generated so as to act upon the resilient member to counterbalance the door in all positions.

4. A door mechanism comprising a fixed member, a resilient member, and a cam member having diverging cam faces movable between said fixed and resilient members in response to movement of the door whereby the force exerted by the resilient member is dependent on the position of the door so as to counterbalance the door in all positions.

5. A range door mechanism comprising oppositely arranged fixed and resilient members on the range, and a curved cam member pivotally attached to the door having opposite diverging cam faces in engagement with said fixed and movable members whereby the pressure of the resilient member is dependent on the position of the door so as to counterbalance the door in all positions.

6. A range door mechanism comprising a curved arm cooperating with the door and the range and having a projection for supporting the door in open position, a cam face on said arm, and a resilient member in engagement with said cam face whereby the pressure of the resilient member is dependent on the position of the door so as to counterbalance the door in all positions.

7. A range door mechanism comprising a curved arm having opposite diverging edges pivotally attached at one end to the door and in slidable relation with the oven, a projection on the other end for supporting the door in open position, a fixed member on the oven engaging one edge of the arm, and a resilient member on the oven engaging the opposite edge of said arm, whereby the pressure of the resilient member is dependent on the position of the door so as to counterbalance the door in all positions.

8. The combination with a hinge for drop doors, of a curved arm on one half of the hinge, and a resilient member in engagement therewith on the other half of the hinge, whereby the pressure of the resilient member is dependent on the position of the door so as to counterbalance the door in all positions.

9. The combination with a hinge for drop doors, of a curved arm having opposite diverging edges pivotally attached to one half of the hinge, a fixed member on the other half of the hinge engaging one edge of said arm, and a resilient member on the other half of the hinge engaging the other edge of said arm, whereby the pressure of the resilient member is dependent on the position of the door so as to counterbalance the door in all positions, and a projection on said arm for limiting the opening movement of the door.

In witness whereof, I have hereunto set my hand this 24th day of August, 1921.

WILLIAM A. RANKIN.