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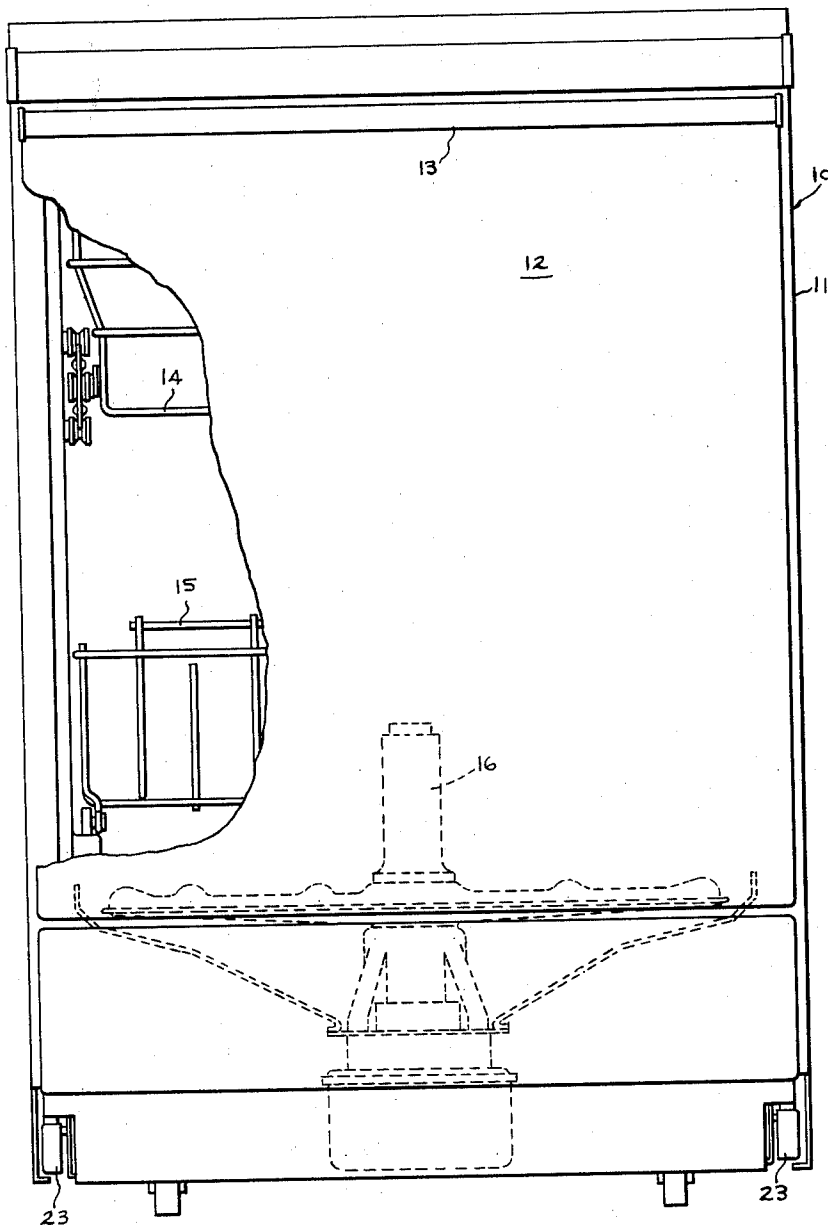
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ANTI-TIP DEVICE

3,150,904

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2 Sheets-Sheet 1

FIG. 1



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FIG. 2

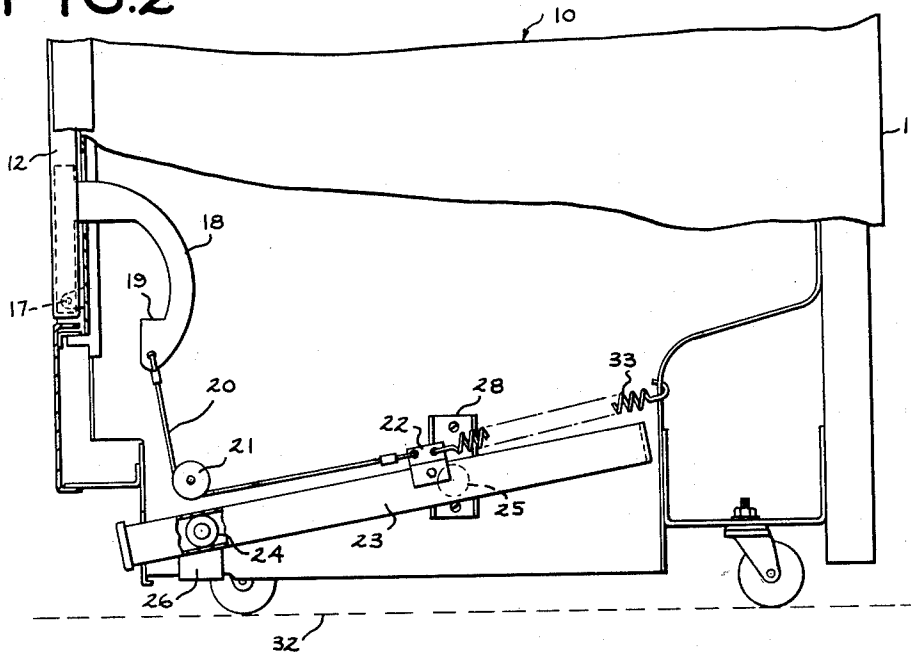


FIG. 3

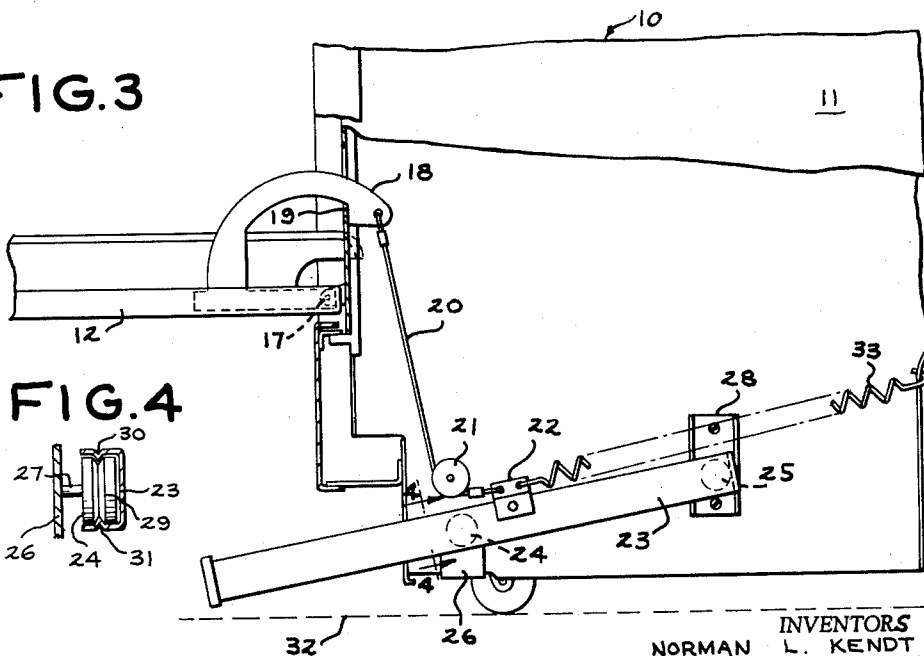
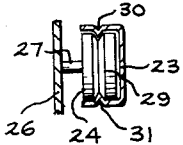


FIG. 4



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ANTI-TIP DEVICE

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7 Claims. (Cl. 312—276)

This invention relates to a means for preventing accidental tip-over of a free-standing structure such as, for example, a portable home appliance.

Many free-standing structures, particularly in the field of home appliances, are provided with access openings in a side wall and a closure member, or door, for the access opening. Most often the door is hinged at its bottom edge and pivots substantially 90° to an essentially horizontal open position. When in the open position, the door may be at a height from several inches to a foot above the floor level. This height makes it possible for even a small child to climb or sit upon the door. The weight of the child may be sufficient to shift the center of gravity of the appliance to a degree whereupon the structure will tip over. This obviously could result in damage to the appliance and, more importantly, serious injury to the child. Tip-over may also be caused by setting upon the open door objects which are to be eventually inserted into the appliance. The problem of tip-over is not limited to an arrangement wherein the door opens to a horizontal position since a child may attempt to swing on a vertically-hinged door. The problem of tip-over could be overcome by securing the appliance to the floor or other solid structure; however, there are many occasions when it is either impossible or undesirable to secure the appliance in such a manner. For example, one would not want to secure a portable appliance in such a manner since this would defeat its portability. Tip-over could also be minimized by extending outriggering from the cabinet; however, this would result in excessive consumption of floor space when the appliance is not in use and would present an unattractive appearance. It therefore would be desirable to provide, in a free-standing or portable structure having a door in its side wall, anti-tip means to prevent tip-over of the structure without excessive consumption of floor space when the machine is not in use.

Accordingly, it is an object of this invention to provide an anti-tip device for a free-standing structure.

It is another object of this invention to provide an anti-tip device for a free-standing structure which does not consume unnecessary floor space when not in use.

It is another object of this invention to provide an anti-tip device particularly adapted for use with a free-standing structure having a closure member.

It is still another object of this invention to provide an anti-tip device for a free-standing structure having a closure member which operates automatically upon opening of the closure member.

Briefly stated, in accordance with one aspect of the invention, we provide, in a cabinet structure having a door pivotal from a closed position to an open position, an anti-tip arm supported within the cabinet for slidable movement out of the cabinet to a tip-preventing position. The tip arm is interconnected with the door so that it is slid into its tip-preventing position when the door is opened and is retracted when the door is closed.

In a specific embodiment of this invention the cabinet door has a hinge arm extending into the cabinet and adapted to move in response to movement of the door. A cable is used to connect the anti-tip arm with the door through its hinge arm and for this purpose one end of the cable is attached to the hinge arm and the other end of the cable is attached to the extendable anti-tip

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arm. The anti-tip arm is slidably mounted within the cabinet near the floor level. As the door is pivoted to its open position, the hinge arm pulls the cable which in turn pulls the anti-tip arm. The cable, hinge arm, and anti-tip arm are arranged such that when the door reaches its full open position the anti-tip arm is projected from the cabinet to a point immediately above the floor and several inches beyond the cabinet wall. If an external load is applied to the open door tending to tip the cabinet, the arm will contact the floor and terminate the tipping movement. In this embodiment of the invention a spring may be provided to serve both as a counterbalance for ease in closing the door and as a retraction means for the anti-tip arm.

While the specification concludes with claims particularly pointing out and distinctly claiming the subject matter which is regarded as the invention, it is believed the invention will be better understood from the following description taken in connection with the accompanying drawings, in which:

FIGURE 1 is a front elevational view of a free-standing cabinet structure incorporating the present invention;

FIGURE 2 is a partial side elevational view of the cabinet shown in FIGURE 1, partially cut away to show details of the present invention, with the anti-tip arm in the retracted position;

FIGURE 3 is a view similar to FIGURE 2 showing the anti-tip arm in the extended position; and

FIGURE 4 is a partial sectional view taken along lines 4—4 of FIGURE 3.

Referring now to the drawings, and particularly to FIGURE 1, there is illustrated a portable dishwasher 10 having an outer cabinet 11 provided with a closure member or door 12 in one side wall thereof. It should be noted at the outset that the present invention is not limited in its application to a dishwasher but, as pointed out above, may be employed with any free-standing or portable cabinet structure. The application of the present invention in a portable dishwasher is for purposes of illustration only. A handle 13 is provided to facilitate opening of the door 12. Disposed within the cabinet 11 are dish racks 14 and 15 and water spray apparatus 16. The dish racks 14 and 15 and the water spray apparatus 16 may be conventional in form and, since they do not form a material part of the present invention, their structure and function will not be discussed in detail.

Referring now to FIGURES 2 and 3, it can be seen that door 12 pivots about a hinge mechanism 17 near its bottom edge. A hinge arm 18 is secured to the door 12 and also pivots about hinge mechanism 17 with the door 12. The hinge arm 18 is generally arcuate in shape and is provided with a stop surface 19 near its free end. As best shown in FIGURE 3, the stop surface 19 engages a stationary portion of the cabinet structure to limit the pivoting movement of the door 12 as the door reaches its full open position.

A cable 20 is attached to the hinge arm 18 near its free end. The cable 20 threads over a pulley 21 rotatably mounted to a stationary portion of the cabinet structure. The terminal end of the cable is secured to a bracket 22.

In accordance with the present invention, an anti-tip arm 23 is supported for longitudinal rectilinear movement within cabinet 11. As shown in section in FIGURE 4, arm 23 is generally channel-shaped in cross section and is carried by a pair of rollers 24 and 25. Roller 24 is rotatably supported by bracket 26 through shaft 27. Roller 25 is similarly supported by bracket 28. With this arrangement, the anti-tip arm 23 is free for longitudinal movement relative to the cabinet 11; however, since two rollers are provided in spaced relation, the anti-tip arm 23 is prevented from rotating about either roller 24 or 25 when a lateral force is applied to the arm. Again

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referring to FIGURE 4, the rollers are provided with a peripheral groove 29 which cooperates with protrusions 30 and 31 in arm 23 to prevent lateral movement between the arm and the rollers.

With the above-described arrangement, as the door 12 is opened the hinge arm 18 pivots about hinge mechanism 17 with the door. As a result, cable 20 is pulled over pulley 21 which forces the anti-tip arm 23 to extend out from the cabinet 11 as shown in FIGURE 3. With the device in the position shown in FIGURE 3, any tendency of the cabinet 11 to tip forward, due to an external load placed upon the open door 12, will be overcome by the engagement of anti-tip arm 23 with the floor as represented by the dotted line 32. As the door is closed, the above-described operation reverses and a spring 33 biases the anti-tip arm 23 toward its retracted position. Spring 33 also serves, through the tension exerted on cable 20, as a counterbalance to make the closing of door 12 easier.

The above description has covered only one anti-tip arm; however, the cabinet could be provided with a plurality of such arms and, in fact, FIGURE 1 shows two such arms 23 in the illustrated application of the present invention.

Although our preferred embodiment does not include such an arrangement, it may be desirable under certain circumstances to include an adjustable screw or foot at the free end of the anti-tip arm 23 to assure positive engagement of the anti-tip arm 23 with the floor 32 when the arm is in tip-preventing position.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the example illustrated, and it is contemplated that various and other modifications or applications will occur to those skilled in the art. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What is claimed and desired to be secured by Letters Patent of the United States is:

1. A free-standing structure comprising:
 - (a) a cabinet,
 - (b) a closure member for said cabinet movable from a substantially vertical closed position to a substantially horizontal open position,
 - (c) an anti-tip arm supported within said cabinet for slidable movement out through a side wall of said cabinet to a tip-preventing position, and
 - (d) means interconnecting said arm with said closure member to slide said arm into tip-preventing position as said closure member is opened.
2. A free-standing structure comprising:
 - (a) a cabinet,
 - (b) a closure member for said cabinet movable from a closed position to an open position,
 - (c) an anti-tip arm supported within said cabinet for slidable movement out through a side wall of said cabinet to a tip-preventing position, and
 - (d) a cable interconnecting said arm with said closure member to slide said arm into tip-preventing position as said closure member is opened.
3. A free-standing structure comprising:
 - (a) a cabinet,

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- (b) a closure member for said cabinet movable from a closed position to an open position,
- (c) an anti-tip arm supported by said cabinet for rectilinear movement from a retracted position within said cabinet out through a side wall of said cabinet to a tip-preventing position,
- (d) a cable interconnecting said anti-tip arm with said closure member to move said arm into tip-preventing position as the closure member is opened, and
- (e) spring means biasing said anti-tip arm toward its retracted position within said cabinet.

4. The combination comprising:

- (a) a cabinet,
- (b) a pivotal door for said cabinet movable from a closed position to an open position,
- (c) a hinge arm secured to said door,
- (d) an anti-tip arm supported by said cabinet for slidable movement from a retracted position within said cabinet out through a side wall of said cabinet to a tip-preventing position, and
- (e) a cable interconnecting said anti-tip arm and said hinge arm to move said anti-tip arm into tip-preventing position upon opening of said door.

5. The invention defined by claim 4 further comprising a spring interconnecting said anti-tip arm and said cabinet to bias said anti-tip arm toward its retracted position within said cabinet.

6. A portable dishwasher comprising:

- (a) a cabinet,
- (b) a door for said cabinet pivotal from a vertical closed position to an essentially horizontal open position,
- (c) a hinge arm secured to said door,
- (d) an anti-tip arm supported by said cabinet below said door for slidable movement from a retracted position within said cabinet out through a side wall of said cabinet to a tip-preventing position,
- (e) a cable interconnecting said anti-tip arm and said hinge arm to move said anti-tip arm into tip-preventing position upon opening of said door, and
- (f) a spring interconnecting said anti-tip arm and said cabinet to bias said anti-tip arm toward its retracted position within said cabinet.

7. A free-standing structure comprising:

- (a) a cabinet,
- (b) a closure member in a substantially vertically disposed side wall of said cabinet movable from a closed position to an open position,
- (c) an anti-tip arm supported within said cabinet for slidable movement out through a side wall of said cabinet to a tip-preventing position, and
- (d) means interconnecting said arm with said closure member to slide said arm into tip-preventing position as said closure member is opened.

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