

[54] **PRESSURE COMPENSATING DOOR CATCH ASSEMBLY**

[75] Inventor: **Charles O. Stanford, Herrin, Ill.**
[73] Assignee: **Fedders Corporation, Edison, N.J.**
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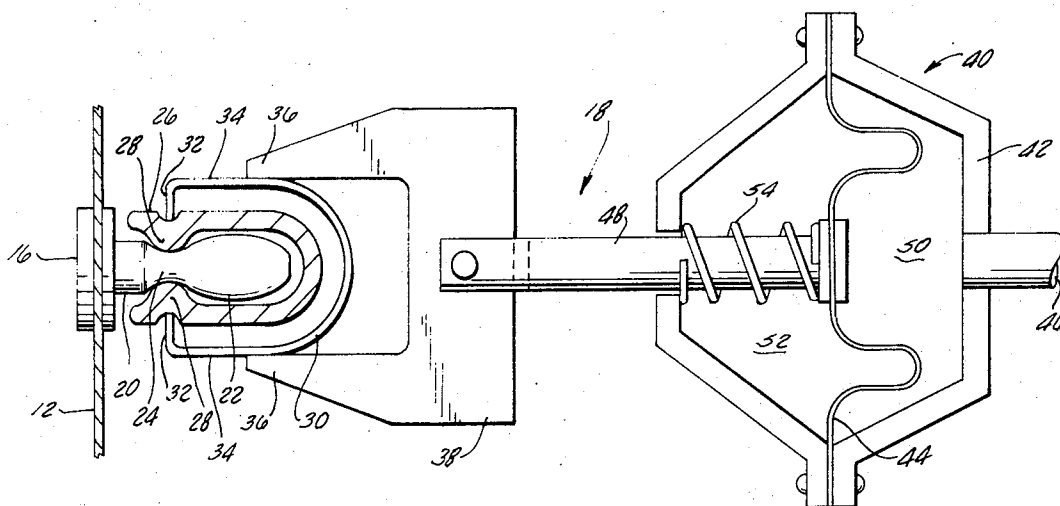
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Primary Examiner—William T. Dixon, Jr.
Assistant Examiner—Steven M. Pollard
Attorney—Martin E. Goldstein, Esq.

[57] **ABSTRACT**

A pressure compensating door catch assembly for the door to a pressurized enclosure is provided. The assembly includes a strike affixed to the door, a catch affixed to the enclosure and a catch spring which exerts a biasing force on the catch. The force of the catch spring is determined by the bending moment arm of the spring which, in turn, is determined by the position of a shiftable fulcrum. The position of the fulcrum is governed by the pressure within the enclosure through a diaphragm and connecting rod.

6 Claims, 4 Drawing Figures



PRESSURE COMPENSATING DOOR CATCH ASSEMBLY

BACKGROUND OF THE INVENTION

The present invention relates to a door catch assembly for an enclosure which is designed to compensate the force required to open the enclosure door for variations in the pressure within the enclosure.

In certain applications, as for example, a positive pressure clothes drying machine, an enclosure is provided with a door and a catch assembly for retaining the door in the closed position whether the dryer is or is not in use. When in use, the pressure within the clothes dryer increases so that an outward force is exerted on the door. As a result, the force required to open the dryer door is less when the dryer is in operation than when the dryer is not in operation. To insure against the door of such a dryer flying open while the dryer is in use, it is necessary to provide a catch assembly which can hold the door closed against the increased pressure. Thus, when the dryer was not in use, such prior art catch assemblies would hold the dryer door closed exceptionally hard since there was no internal pressure aiding the opening of the door.

SUMMARY OF THE INVENTION

It is the principal object of the present invention to provide an improved door catch assembly for a pressurized enclosure that is capable of exerting a variable retaining force on the door determined by the pressure within the enclosure.

A further object of the present invention is to provide such a door catch assembly which may readily and inexpensively be adapted to existing equipment.

The above and other beneficial objects and advantages are attained in accordance with the present invention by providing an improved catch assembly for the door to a pressurized enclosure. The present catch assembly includes a strike mounted to the enclosure door, a catch mounted to the enclosure and adapted to engage the strike, and pressure responsive means engaging the catch and adapted to exert a variable biasing force on the catch, the biasing force being determined by the pressure within the enclosure.

In the preferred embodiment of this invention, the biasing force is applied by a leaf spring, one end of which bears against the catch. The bending moment arm of the spring is determined by a fulcrum which rides along the leaf spring. The fulcrum is connected to a pressure sensing device so that the position of the fulcrum is determined by the pressure within the enclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

In the accompanying drawings:

FIG. 1 is a schematic representation of a pressurized enclosure, such as a positive pressure dryer provided with a catch assembly in accordance with the present invention;

FIG. 2 is a simplified, schematic sectional view of the present catch assembly;

FIG. 3 is a fragmentary sectional view illustrating the position of the catch assembly elements during non-pressurized operation; and,

FIG. 4 is a view similar to FIG. 3 illustrating the catch assembly elements during pressurized operation.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made to the drawing wherein similar components bear the same reference numerals throughout the several views. In FIG. 1, an enclosure 10 which is adapted to be pressurized during use is illustrated. The enclosure 10, may, for example, comprise a positive pressure type dryer.

The enclosure 10 is provided with a door 12 providing access to the enclosure interior. The door 12 is hinged at one side 14 and is provided with a knob or handle 16 at the opposite side. The catch assembly 18 of the present invention, which is illustrated in FIG. 2, has elements disposed on the door 12 and on the enclosure 10 in the area of handle 16.

Referring now to FIG. 2, it is noted that the catch assembly 18 includes a strike 20 affixed to the door 12 and extending toward the enclosure interior. The strike 20 comprises a bulbous member having an enlarged forward portion 22 and a flange 24 of reduced diameter spaced rearward of the enlarged portion.

The assembly 18 further comprises a catch 26 mounted on the enclosure. The catch 26 is generally U-shaped in section and provided with detents 28 extending inwardly toward each other from the opposite ends of the U. In operation, when the door 12 is closed, the detents 28 override the enlarged portion 22 of strike 20 to engage the reduced portion 24 thereby capturing the strike and retaining the door in the closed position. When a sufficient opening force is exerted on the door, the enlarged portion 22 of the strike serves as a cam upon which the detents 28 ride to spread apart the sides of the U and enable release of the strike. A similar action occurs when the door is closed from the open position.

It should be obvious that the force with which the strike 20 is retained by catch 26 is determined by the force biasing detents 28 toward each other. In the present embodiment, this biasing force is exerted by catch spring 30. Spring 30 which is also U-shaped surrounds catch 26. The free ends 32 of spring 30 are turned inwardly toward each other and bear against catch 26 opposite the detents 28 thereby applying the biasing force to catch 26. In effect, the sides of U-shaped spring 30 may be considered as two elongated, leaf springs each having one end 32 engaging the catch and urging it toward the strike.

The force which each spring end 32 exerts against the catch is determined by the effective length of each side of the U since this determines the bending moment arm of the spring. It should be apparent that the shorter the bending moment arm, the greater will be the force exerted by the sides 34 of spring 30 on the catch 26 and conversely, the greater the bending moment arm, the less the force exerted.

The bending moment arm of each side 34 of spring 30 is determined by the position of a fulcrum 36 which is disposed along each side. Fulcrums 36 comprise the free ends of a U-shaped fulcrum member 38 disposed about spring 30 with its free ends longitudinally shiftable along the sides 34 of the spring.

A pressure sensing element 40 is disposed within the interior of enclosure 10. Sensing element 40 comprises a housing 42 containing a diaphragm 44. An inlet opening 46 is provided in the housing so that the diaphragm 44 is exposed to the pressure within enclosure 10. An

elongated rod 48 interconnects the diaphragm 44 and fulcrum member 38. The longitudinal axis of rod 48 is aligned with the sides 34 of spring 30.

Diaphragm 44 is so disposed within housing 40 as to divide the same into two compartments, a forward compartment 50 and a rearward compartment 52. The forward compartment 50 is exposed to the pressure within enclosure 10 through inlet 46. Rearward compartment 52 is exposed to ambient pressure. The pressure differential between the compartments causes a deflection of diaphragm 44 and a resultant longitudinal shifting of rod 48. The extent of the deflection of diaphragm 44 and hence the movement of rod 48 may be controlled by means of a damping spring 54 bearing against the rear of diaphragm 44.

As previously discussed, the force exerted by catch 26 on strike 20 is determined by the position of fulcrum member 38 which is determined by the pressure within enclosure 10 as determined by the deflection of diaphragm 44. FIG. 3 illustrates the position of fulcrum member 38 when the dryer is not in operation, that is, when the enclosure is not pressurized. As shown, in this position the fulcrums 36 of member 38 are to the extreme right of sides 34 of spring 30. In this position, the bending moment arms of spring 30 are maximized so that the biasing force exerted by the spring on catch 26 is minimized.

FIG. 4 shows the position of fulcrum member 38 when the dryer is in operation and the enclosure pressurized. As shown, the fulcrum member is shifted to the left by virtue of a displacement of diaphragm 44. This results in the fulcrum being shifted to the left thereby reducing the bending moment arms 34 of the spring and increasing the force exerted by the spring on the catch. This increased force serves to hold the door closed against the increased air pressure within the enclosure by more securely retaining the strike.

With proper choice of the several components, the present catch assembly can be designed so that it does not require any more or less force to open the dryer door while the dryer is in operation than when it is not in operation. Alternatively, the components for the catch assembly may be chosen to modify the force necessary to open the dryer during operation or inoperation, as desired.

Similarly, by relocating spring 54 to the forward compartment 50 of element 40, the present device may be modified to operate on a negative pressure device such as a negative pressure dryer. With such a device, the problem is that the door to the dryer tends to open easily when the dryer is not in use. During operation ambient pressure tends to hold the door closed due to the negative pressure within the dryer. By relocating spring 54 as suggested above, the action of the present pressure compensating device is reversed. This provides a holding force on the door when the dryer is not in operation and removes the holding force in proportion to the negative pressure within the dryer.

Having thus described the invention, what is claimed is:

1. An improved catch assembly for the door to a pressurized enclosure comprising: a diaphragm mounted within said enclosure, said diaphragm having one surface exposed to the pressure within said en-

sure and an opposite surface exposed to ambient pressure, a strike mounted to said door, a catch mounted to said enclosure and adapted to capture said strike, and pressure responsive means engaging said catch and adapted to exert a variable biasing force on said catch, said pressure responsive means including an elongated spring element having one end engaging said catch and biasing said catch toward said strike; a fulcrum shiftable along the length of said spring element, the position of said fulcrum determining the biasing force exerted by said spring element on said catch; and a rod interconnecting said diaphragm and said fulcrum wherein said fulcrum is shifted by said rod in response to deflections of said diaphragm caused by variations of the pressure differential on the surfaces of said diaphragm.

2. The catch assembly in accordance with claim 1 wherein said elongated spring element is longitudinally aligned with said rod, said spring element one end being furthest from said diaphragm, and said diaphragm is positioned within said enclosure so that an increase in pressure within said enclosure deflects said diaphragm toward said spring element whereby said increase in pressure will shift said fulcrum toward said spring element one end thereby reducing the effective length of said spring element.

3. The invention in accordance with claim 1 wherein said enclosure comprises a positive pressure clothes drying machine.

4. In combination, an enclosure adapted to be pressurized, a door providing access to the interior of said enclosure, a diaphragm mounted within said enclosure, said diaphragm having one surface exposed to the pressure within said enclosure and an opposite surface exposed to ambient pressure, a strike mounted to said door, a catch mounted to said enclosure and adapted to capture said strike, and pressure responsive means engaging said catch and adapted to exert a variable biasing force on said catch, said pressure responsive means including an elongated spring element having one end engaging said catch and biasing said catch toward said strike; a fulcrum shiftable along the length of said spring element, the position of said fulcrum determining the biasing force exerted by said spring element on said catch; and a rod interconnecting said diaphragm and said fulcrum wherein said fulcrum is shifted by said rod in response to deflections of said diaphragm caused by variations of the pressure differential on the surfaces of said diaphragm.

5. The catch in accordance with claim 4 wherein said elongated spring element is longitudinally aligned with said rod, said spring element one end being furthest from said diaphragm and said diaphragm is positioned within said enclosure so that an increase in pressure within said enclosure deflects said diaphragm toward said spring element whereby said increase in pressure will shift said fulcrum toward said spring element one end thereby reducing the effective length of said spring element.

6. The invention in accordance with claim 4 wherein said enclosure comprises a positive pressure clothes drying machine.

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