

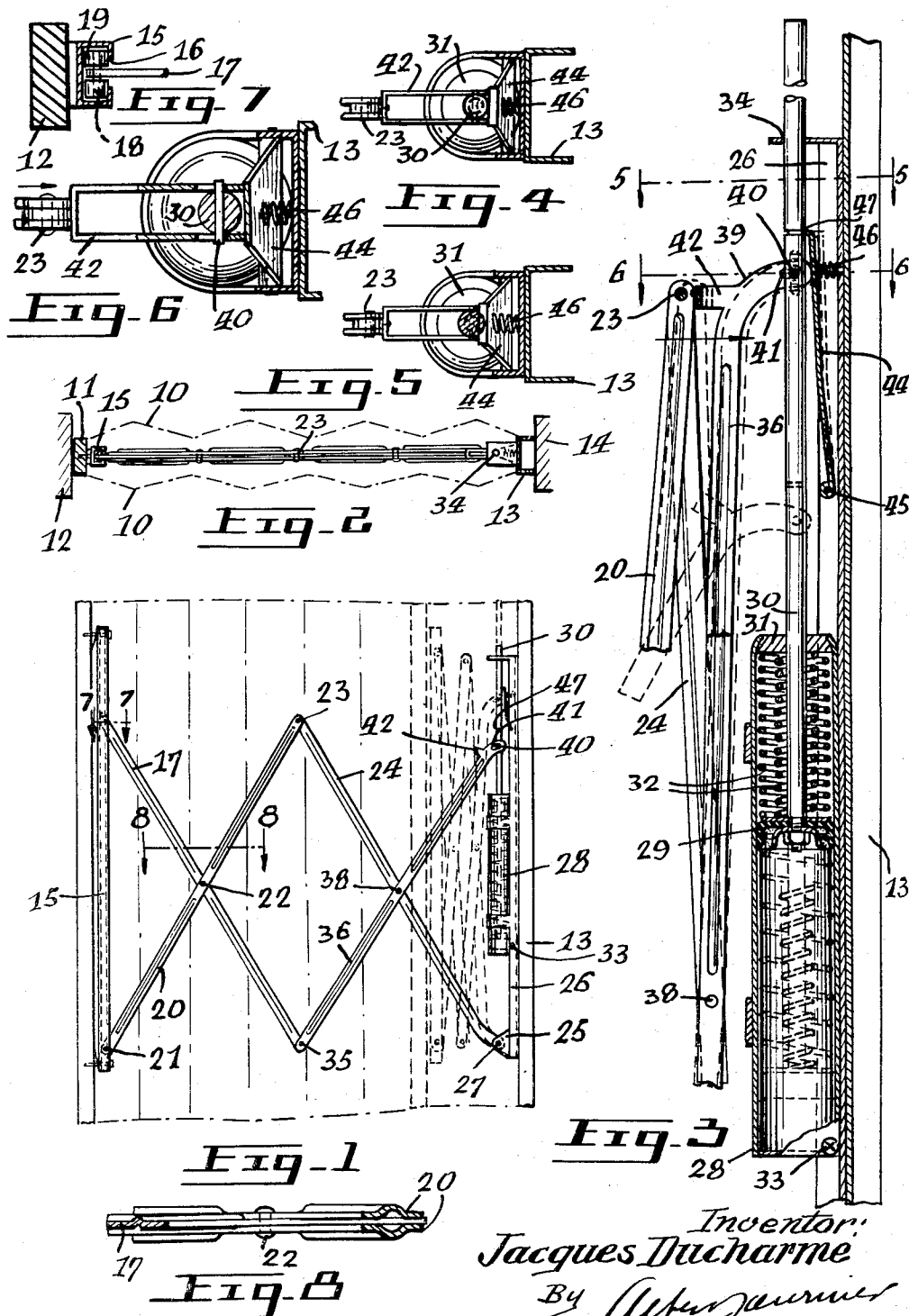
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FOLDING DOOR

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1

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FOLDING DOOR

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The present invention relates to folding doors of the accordion type in which the door is suspended from an overhead track and has flexible coverings which are adapted to fold into pleats when the door is opened. Particularly the present invention relates to means for automatically closing such folding doors.

Conventional accordion type folding doors have to be manually moved for both closing and opening movements. Large size folding doors are sometimes provided with electric power means for opening and closing the same. But said last named means are expensive and are impractical for folding doors of a size for use in ordinary door openings.

The main object of the present invention is the provision of means which can be incorporated within an accordion type folding door and which is wholly concealable therein, said means acting to automatically close the door whenever desired.

Another important object of the present invention is the provision of means of the character described which are so arranged that the door can be blocked in opened position and which are operable upon a simple push on the door to automatically close the latter.

Another important object of the present invention is the provision of a unit which can be incorporated into existing folding doors for providing means for the automatic closing of the latter.

With the above and other objects in view, as will be presently apparent, the invention consists in general of certain novel details of construction and combinations of parts hereinafter fully described, illustrated in the accompanying drawings and particularly set forth in the appended claims.

In the drawings like characters of reference indicate like parts in the several views; and

Figure 1 is an elevation showing the inner elements of the improved door in closed condition;

Figure 2 is a plan view of the structure shown in Figure 1;

Figure 3 is an enlarged edge view of the structure the view being partly in section and partly in elevation;

Figure 4 is a plan view of the door as shown in Figure 3;

Figure 5 is a section on the line 5—5 of Figure 3;

Figure 6 is a section on the line 6—6 of Figure 3;

Figure 7 is an enlarged section on the line 7—7 of Figure 1; and

Figure 8 is an enlarged detail section on the line 8—8 of Figure 1.

As here disclosed the door is provided with a pair of spaced foldable covers 10 formed of heavy cloth each arranged to fold in a series of vertical pleats. As thus formed the lateral edges of these covers form spaced pairs. Interposed between one pair of these edges is a vertical strip 11 to which this pair is tacked or otherwise firmly secured. The strip 11 defines the outer free edge of the door and is adapted to abut the jamb member 12

2

of the door opening when the door is in closed position. Between the right hand edges of the cloth sides is a channel shaped strip 13 to which the edges are permanently secured. This strip 13 is secured to the other jamb 14 of the door opening.

Fixed to the strip 11 is a channel like guide member 15 the flanges of which are returned to provide a slot 16. Extending through this slot is the upper end of a diagonally disposed frame rod 17 the end of which has a shaft 18 fixed thereon. This shaft carries a pair of guide rollers 19; the arrangement being such that this end of the rod 17 is guided to move in a vertical line. The rod 17 extends downward angularly from the guide 15 and passes between a pair of frame braces 20 which have their lower ends pivoted to the lower end of the guide at 21. A pivot 22 connects the rod 17 to the braces 20.

At the upper ends of the bars 20 is a pivot 23 which connects the bars 20 to a pair of frame bars 24 which extend downwardly towards the strip 13. The lower ends of the bars 24 are secured to a pair of ears 25 projecting from the lower end of a vertical strip 26 fixed to strip 13; a pivot 27 serves for this connection.

Fixed on the lower part of the strip 26 is a cylinder 28 wherein is a piston 29 from which extends a piston rod 30 passing through the cylinder head 31. In the cylinder surrounding the rod 30 is a pair of concentric coiled compression springs 32 urging the piston towards the bottom of the cylinder. The lower end of the cylinder is air tight except for a suitable leakage hole in the bottom part of the cylinder, the leakage being adjusted by a valve which may be a screw 33 which fits in said hole and controls the escape of the air. The upper end of the strip 26 is bent outwardly to provide a guide eye 34.

At the lower end of the frame rod 17 is a pivot 35 to which is pivoted the lower ends of frame rods 36 which cross the bars 24 and are pivoted thereto as at 38.

The upper end of the rods 36 is curved split to provide a fork 39 which straddles the rod 30 and is connected thereto by a pin 40 passing through the rod and having its ends engaging slots 41 formed in the arms of the fork. Projecting from the fork 39 is a small fork 42 on which may push pivot 23.

At 44 is a latch member the lower end of which is attached to the strip 26 by a pivot 45. The upper end of this latch member is urged by a spring 46 to engage in a notch 47 formed in the rod 30.

In operation the door is opened by moving the strip 11 to the right. This will cause the movable ends of the linkage parts 17, and 36 to move away from the pivotal joints at 21 and 27 and, when the opening is complete, the latch 44 will engage in the notch 47 and thus hold the door open. To close the door the strip 11 is pushed slightly to the right. This will cause fork 39 to move to the right relative to pin 40 and push and release the latch 44 from the piston rod whereupon the springs 32 will move the rod downwardly so that the upper ends of the rods 36 will move downward and thus cause the linkage within the housing to expand laterally and force the strip 11 to the left. It is to be noted that the bars 17, 20, 24 and 36 between the foldable cloth sides and the edge strips constitute the well known lazy-tongs linkage and maintain the strips 11 and 13 parallel to themselves during closing and opening movement of the door. Closing movement of the door is suitably retarded by the air cylinder 28 which forms an air cushion or retarder.

Although a specific embodiment of the invention has been illustrated and described, it will be understood that various alterations in the details of construction may be made without departing from the scope of the invention as indicated by the appended claims.

What I claim is:

1. In an accordion door, a pair of strips for defining the edges of the door, lazy tongs operatively connecting said strips, foldable covers on opposite sides of the door secured at their vertical edges to opposite faces of said strips, spring means within said door operable on said lazy tongs to urge the latter into extended position to thereby urge closing of said door, means to lock said lazy tongs in retracted position to thereby maintain said door in opened position, and means on said lazy tongs engageable with said locking means to release said locking means for unlocking said lazy tongs upon pressure exerted on said door in the direction of opening movement.

2. In an accordion door as claimed in claim 1, further including retarder means associated with said spring means and acting to retard the action of the latter.

3. An accordion door comprising, in combination, a pair of rigid strips defining the edges of the door, two foldable covers secured to said strips, linkage means mounted within said door and between said covers and interconnecting said strips, said linkage movable between an extended and a retracted position corresponding to the opened and closed position of said door respectively, spring means attached to said linkage means and adapted to be stressed upon opening movement of said door, and operable to automatically close said door, means to lock said linkage means in retracted position, and means on said linkage means engageable with said locking means to release said locking means for unlocking said linkage means upon pressure exerted on said door in the direction of opening movement.

4. In an accordion door as claimed in claim 3, further including retarder means associated with said spring means to retard the action of the latter.

5. In an accordion door as claimed in claim 4, wherein said linkage, spring and retarder means are wholly concealed within said door.

6. In an accordion door, a pair of strips for defining the edges of the door, lazy tongs operatively connecting said strips, foldable covers on opposite sides of the door secured at their vertical edges to opposite faces of said strips, a cylinder and piston unit secured to one of said strips between said covers, said cylinder and piston unit defining an air tight compartment in said cylinder, valve means for controlling the escape of air from said

compartment, spring means within said cylinder urging said piston in a direction to compress air within said compartment, said cylinder and piston unit being operatively connected to said lazy tongs, whereby retracting movement of said lazy tongs causes compression of said spring, said spring effecting automatic extension movement of said lazy tongs to thereby close said door, and a latch member engageable with the piston rod of said piston to lock said piston in a position in which said spring is in a compressed state and in which said lazy tongs are in a retracted position.

7. In an accordion door as claimed in claim 6 further including means on said lazy tongs engageable with said latch member to release the same from engagement with said piston rod, upon further retracting movement of said lazy tongs.

8. As a unit for insertion within an accordion door of the type having two spaced flexible lateral coverings, said unit serving for the automatic closing of said accordion door, said unit comprising a lazy tong system, two spaced parallel strips to which the opposite ends of the linkages of said lazy tong system are pivotally connected, an air tight cylinder and piston unit secured to one of said strips, one linkage of said lazy tong being pivotally connected to the piston rod of said unit, an air valve to adjust escape of air from said unit upon movement of said piston, springs means within said cylinder to urge said piston to compress air within said compartment and to urge retracting movement of said lazy tong system, means for locking said piston rod in an extended position in which said spring is in compressed condition, and means on said lazy tong linkage engageable with said locking means to release the same upon further retraction movement of said lazy tong system.

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