



1

2

3,306,345  
CLOSURE

Wilbur R. Youngs, 2700 Northbourne Drive,  
Springfield, Ohio 45506  
Filed Nov. 16, 1964, Ser. No. 411,365  
7 Claims. (Cl. 160-243)

This invention relates to a door or closure, and more particularly to a flexible fabric door or closure, which is particularly adapted for use with aircraft hangars.

This invention provides an inexpensive weatherproof fabric closure which is adapted to resist wind, and utilizes an improved and inexpensive operating mechanism.

To the accomplishment of the foregoing and related ends, said invention, then, consists of the means herein-after fully described and particularly pointed out in the appended claims, the following description and annexed drawings setting forth in detail certain illustrative embodiments of the invention, such disclosed means constituting, however, but a few of the various forms in which the principle of this invention may be employed.

In the annexed drawings:

FIG. 1 is a perspective view of an embodiment of this invention.

FIG. 2 is a cross-sectional view taken in the plane indicated by the line 2-2 of FIG. 1.

FIG. 3 is a cross-sectional view taken in the plane indicated by the line 3-3 of FIG. 1.

FIG. 4 is a cross-sectional view taken in the plane indicated by the line 4-4 of FIG. 1.

FIG. 5 is an end view of the embodiment of the invention shown in FIG. 1.

FIG. 6 is an enlarged fragmentary side view of a latching mechanism used to hold the door in a closed position.

Briefly stated this invention is in a closure for an opening defined by a base (e.g., a sill plate, the ground, a concrete pad or the like), a head member and side members. In accordance herewith there is provided a flexible, weatherproof fabric curtain material which covers the opening. The fabric is secured to the head member along its top marginal edge. A roller is secured to the bottom marginal edge of the fabric and is supported thereby. A rope, usually a wire rope or cable, is wound around the end of the roller and firmly anchored to the ground, for example at the bottom of the adjacent side member. A pulley mounted in a block is disposed between the roller end and the anchor for coaction with the cable to wind and unwind it from the roller. This is accomplished by raising and lowering the pulley block along the adjacent side member. As the pulley block is raised, the pulley changes the direction of the applied force against the cable causing it to unwind from around the roller end, which produces rotation thereof. As the roller rotates it wraps itself in the fabric curtain and moves towards the head member thereby removing the curtain from the opening. When the pulley block is lowered, the strain on the cable is removed and the roller will roll by gravity downwards from the head member, unwrapping itself from the curtain as it moves. The roller is rotated in a reverse direction as it unwraps itself from the curtain, which forces the payed out cable to rewind itself on the roller end.

Referring more particularly to FIGS. 1-6 of the annexed drawings, there is shown a door opening defined by a head member 11 and side members 12 and 13. A flexible, weatherproof, fabric material 14, e.g., a tough polyvinyl chloride plastic sheet, covers the opening 10. The fabric material or curtain 14 is secured to the head member 11 by any suitable fastening means, e.g., a rigid bar 15 (FIG. 2) integral and coextensive with the top marginal edge 16 of the fabric material 14, for supporting

engagement in the complementary configured recess 17 in the head member 11.

A tube or roller 18 is secured to the bottom marginal edge of the fabric material 14 by any suitable fastening means, e.g., a rigid bar 21 (FIG. 3) coextensive with the bottom marginal edge 19 of the fabric 14, and secured thereto for interlocking coaction in the longitudinal recess 22 of the roller 18 as the fabric material 14 is rolled thereon. The roller 18 is at least coextensive with the fabric material 14, and is supported thereby. Preferably, the roller ends 23 and 24 extend beyond the ends of the fabric material 14.

A track 25 is secured to the opening 10 adjacent one of the side members, e.g., side member 13. The track 25 is enclosed except for the longitudinal recess 30 therein. In this particular embodiment of the invention, the track 25 is secured within a substantially Z-shaped structural member 26 secured to the side member 13. The member 26 protectively encases the track 25 and the operating mechanism. It also gives the door opening a more esthetic appearance. The roller 18 is designed to move up and down in the opening 10 adjacent the side member 12 and section 27 of the member 26.

A bracket or pulley block 28 is mounted on wheels which are movable in and along the track 25. Preferably, the block 28 is composed of a pair of A-frames 29 and 31 which are held in spaced relation by a plurality of spacers, e.g., spacer 32. A pair of wheels 35 and 36 are secured to the base portions 33 and 34 of A-frames 29 and 31, respectively, in spaced relation to another pair of wheels 37 and 38 which are also secured to the base portions 29 and 31, respectively. The apex portions 39 and 41 of the A-frame members 29 and 31, respectively, extend from the track recess 30. A drive pulley 42 is rotatably mounted between portions 39 and 41.

A cable 43 is secured to the block 28. The cable 43 extends to an operating pulley 44, adjacent the head member 11 and aligned with the track 25, where it is reeved therearound. The free end of the cable 43 is secured to any suitable cable winding and unwinding means, e.g., a winch 45.

A similar cable 46 is firmly anchored below the roller 18. The cable 46 may be anchored to the bottom of the track 25 or the ground adjacent thereto, by any suitable anchoring means (not shown). The cable 46 is reeved around the drive pulley 42, and extends to the adjacent roller end 24, around which it is wound a number of times, its end being secured to the roller.

The block 28 is pulled upward along the track 25 towards the head member 11, as the cable 43 is wound up by rotating the winch 45. As the block 28 moves upward along the track 25, the drive pulley 42 attached thereto, pulls against the cable 46 wound around roller end 24 causing the cable 46 to unwind therefrom, which rotates the roller 18. The rotating roller 18 wraps itself in the fabric material 14. As the roller 18 wraps itself in the fabric material 14, it moves towards the head member 11. In this manner, the fabric material 14 is removed from the opening 10.

To cover the door opening 10 with the fabric material 14, the cable 43 is payed out by reversing the rotation of the winch 45. This causes the block 28 to move downward away from the head member 11. As the bracket 28 moves downward, the upward strain on the cable 46 is removed. The roller 18 will start unwrapping itself from the fabric material 14. This unwrapping forces the roller 18 to rotate in a reverse direction which produces further unwrapping of the material from the roller while causing the cable 46 to wind itself around the roller end 24.

Any suitable guide means may be used to guide the other end 23 of the roller 18 along the side member 12.

For example, there may be provided a similar cable 47 wound once around the roller end 23, having one end firmly anchored to the head member 11, and its other end firmly anchored to bottom of the side member 12 or to the ground adjacent thereto. Such auxiliary cable means is not required for satisfactory operation of the closures of this invention.

A latching mechanism, generally indicated at 48 (FIGS. 4 and 6) is used to retain the roller 18 adjacent the bottom of the opening 10, while tension is applied to the cable 43 tending to rotate the roller 18 and thus tensioning the fabric for better resistance to wind. The mechanism 48 is characterized by a bracket 49 secured to the side member 13 and extending therefrom, adjacent its bottom end 50 (FIG. 1). The bracket 49 extends beyond the roller 18. A latch arm 51 is rotatably mounted to the free end 52 of the bracket 49 by any suitable means, e.g., pivot pin 40. The latch arm 51 is biased in roller engaging and holding position by spring 53. The bracket 49 is secured to the member 13 beyond the roller end 24 permitting the roller 18 to roll thereby. The latch arm 51 is designed to engage the roller end 24. The roller 18 forces the latch arm 51 outwardly as it moves thereby. As the roller 18 moves past the bracket 49, the spring 53 forces the latch arm 51 inwardly to engage the upper portion of the roller end 24, whereby the roller 18 is held in closed position adjacent the ground. The cable 43 is then tightened or put under tension by rotating the winch 45. The roller 18 tends to rotate, whereby it wraps itself in the fabric material 14. However, the roller 18 is held in a closed position and not permitted to move towards the head member 11 by the latch 51. The fabric material 14 becomes increasingly tightened around the roller 18 as it rotates. The tightening of the fabric on the roller 18 causes the material 14 in the opening 10 to stiffen and its resistance to wind is accordingly greatly increased.

It should be apparent from the above description that any suitable means for changing the direction of application of applied force, could be used in place of the pulley mounted on the pulley block for unwinding and winding coaction with the cable reeved around the roller end. For example, a simple turning bar or pin could be used.

Also, any suitable guide means may be used to guide the pulley block along the side member. For example, the block may be guided by a cable passed therethrough, having its ends anchored adjacent the bottom and top of the side member. It is also, for example, unnecessary for the block to be mounted on wheels to make the mechanism operable, as the block may have a flange extending therefrom, which is slidable in and along the track. However, the invention as previously described, is more easily operated and is, therefore, preferred.

Thus, there has been provided a fabric door closure with a new and novel operating mechanism. The wind resistance of the fabric closure is greatly increased. The operating parts are simplified making the closure economical to manufacture and install.

Other modes of applying the principle of this invention may be employed instead of those specifically set forth above, changes being made as regards the details herein disclosed, provided the elements set forth in any of the following claims, or the equivalent of such be employed.

It is, therefore, particularly pointed out and distinctly claimed as the invention:

1. A closure for an opening defined by a base, a head and side members comprising:

- (a) a flexible, weatherproof, fabric curtain;
- (b) means for securing the top marginal edge of the fabric curtain to the head member;
- (c) a roller;
- (d) means for securing the roller to the bottom marginal edge of the fabric curtain;

(e) a rope secured to one end of the roller and adapted to be wound therearound, the other end of the rope being firmly anchored to the base below the roller;

(f) means for anchoring the rope to the base;

(g) means movable along a side member between the base and head member as the roller moves along the curtain coacting with the rope adjacent the roller end, for changing the direction of application of an applied force; and

(h) means for selectively applying a tensioning force to the rope in a direction towards the head member and for relieving the force, respectively, causing the roller to rotate towards the head member, whereby the roller wraps itself in the curtain removing it from the opening, and the force when relieved causing the roller to rotate away from the head member, whereby the roller unwraps itself from the curtain to cover the opening.

2. A closure for an opening defined by a base, a head member and side members, comprising:

(a) a flexible, weatherproof, fabric curtain to cover the opening;

(b) means for securing the top marginal edge of the fabric curtain to the head member;

(c) a roller;

(d) means for securing the roller to the bottom marginal edge of the fabric curtain;

(e) an idler pulley movable to and from the head member adjacent one of the side members;

(f) means coacting between the side member and the idler pulley for guiding the pulley;

(g) means secured to the idler pulley for raising and lowering it to and from the head member;

(h) a cable reeved through the idler pulley, one end thereof extending from the idler pulley to the adjacent end of the roller where it is wrapped therearound and secured thereto, the other end of the cable extending from the idler pulley and being firmly anchored to the base; and

(i) means for anchoring the cable to the base; the idler pulley when raised coacting with the cable wound around the roller end causing the cable to unwind therefrom, and rotate the roller, whereby the roller wraps itself in the fabric material as it moves along the fabric curtain, and the idler pulley when lowered, permitting the roller to roll away from the head member, and unwrap itself from the fabric curtain to cover the opening.

3. A closure for an opening defined by a base, a head member and side members, comprising:

(a) a flexible, weatherproof, fabric curtain to cover the opening;

(b) means for securing the top marginal edge of the fabric curtain to the head member;

(c) a roller;

(d) means for securing the roller to the bottom marginal edge of the fabric curtain;

(e) a pulley block movable adjacent one of the side members to and from the head member;

(f) an idler pulley rotatably mounted in the pulley block;

(g) means coacting between the side member and the pulley block for guiding the block along the side member;

(h) rope means secured to the block for raising and lowering it to and from the head member;

(i) a cable reeved through the idler pulley, one end thereof extending from the idler pulley to the adjacent end of the roller where it is wrapped therearound and secured thereto, the other end of the cable extending from the idler pulley and being firmly anchored to the base; and

(j) means for anchoring the rope; the block when raised causing the idler pulley to pull against the rope wound around the roller end causing the rope to un-

5

wind therefrom causing rotation thereof, whereby the roller wraps itself in the fabric curtain as it moves upwards therealong, and the block when lowered permitting the roller to move away from the head member, whereby the roller upwraps itself from the fabric curtain to cover the opening.

4. The closure of claim 3, wherein the means (g) includes:

- (1) a track secured to the side member adjacent the pulley block for guiding said pulley block, the track being at least coextensive with the side member; and
- (2) means secured to the block for coaction with the track to permit movement of the block therealong, the means including a pair of wheels secured to the block and movable in the track.

5. The closure of claim 3, wherein the means (h) includes:

- (1) an operating pulley secured above the head member substantially aligned with the track;
- (2) a cable received through the operating pulley, having one end secured to the block and its other end extending therefrom; and
- (3) means secured to the free end of the cable for paying in and paying out the cable.

6. A closure for an opening defined by a base, a head member and side members, comprising:

- (a) a flexible, weatherproof, fabric curtain to cover the opening;
- (b) means for securing the top marginal edge of the fabric curtain to the head member;
- (c) a roller secured to the bottom marginal edge thereof and supported thereby;
- (d) means for securing the roller to the bottom marginal edge of the fabric curtain;
- (e) a track secured to one of the side members and coextensive therewith;

6

(f) a pulley block mounted on wheels which are movable in and along the track;

(g) an idler pulley mounted on the block;

(h) an operating pulley mounted adjacent the top of the track and substantially aligned therewith;

(i) a cable received through the operating pulley, having one end thereof secured to the block;

(j) means secured to the free end of the cable for selectively winding it in and out, whereby the block is moved along the track in a desired direction to and from the head member;

(k) a second cable received through the idler pulley, one end thereof extending from the idler pulley to the adjacent end of the roller where it is secured thereto, the other end of the cable being firmly anchored to the base; and

(l) means for anchoring the cable to the base; the idler pulley when raised coacting with the cable wound around the roller end causing the cable to unwind therefrom, and rotate the roller, whereby the roller wraps itself in the fabric material at it moves along the fabric curtain, and the idler pulley when lowered, permitting the roller to roll away from the head member, and upwrap itself from the fabric curtain to cover the opening.

7. The closure of claim 1, which includes:

(n) means coacting between the other end of the roller and the adjacent side member for guiding the roller therealong while permitting rotation thereof.

#### References Cited by the Examiner

#### UNITED STATES PATENTS

3,211,211 10/1965 Youngs ----- 160—243

HARRISON R. MOSELEY, *Primary Examiner.*

P. M. CAUN, *Assistant Examiner.*