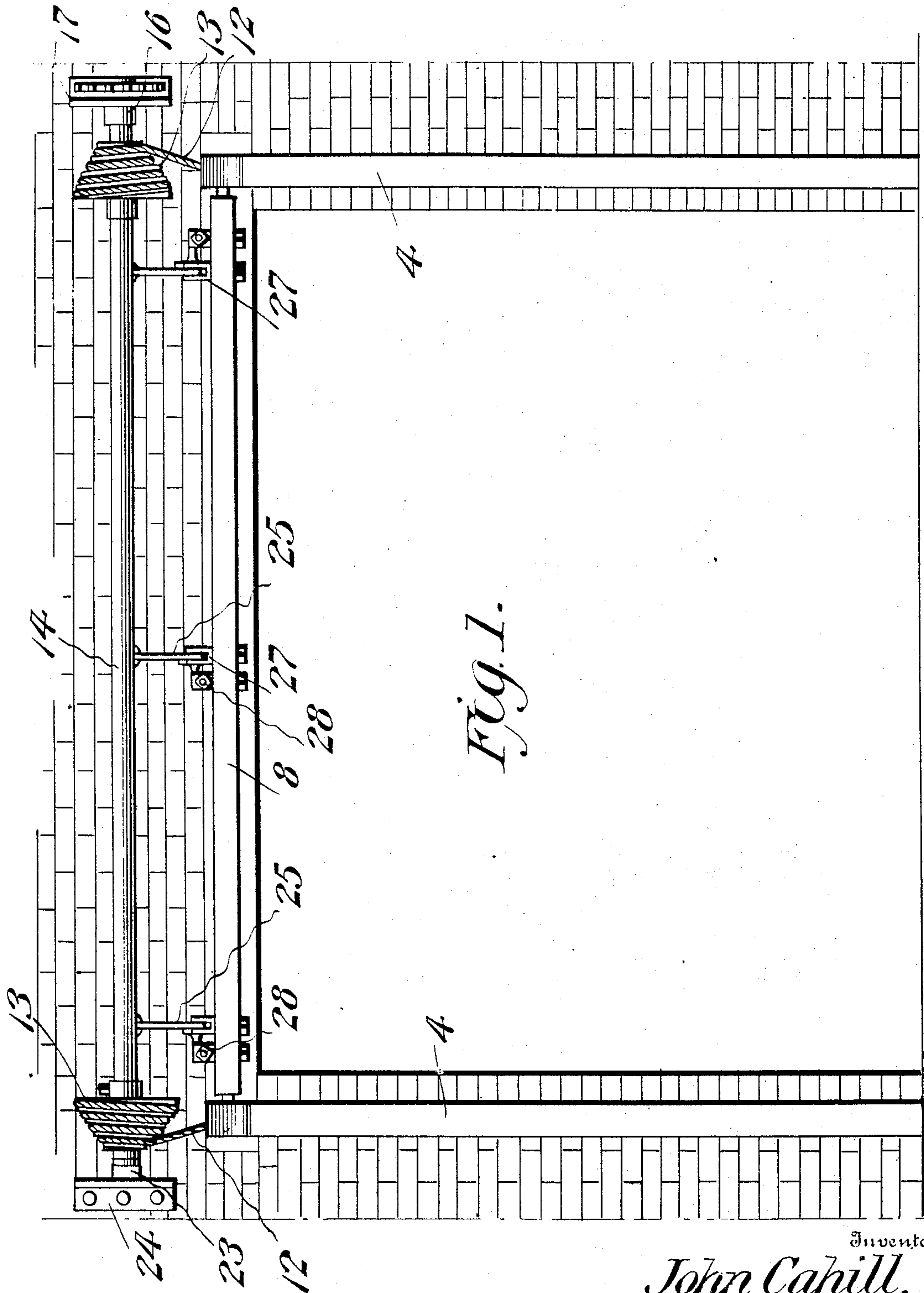


J. CAHILL.  
SHUTTER.

APPLICATION FILED MAY 9, 1905.

2 SHEETS—SHEET 1.



Inventor

*John Cahill,*

By

*Victor J. Evans*

Attorney

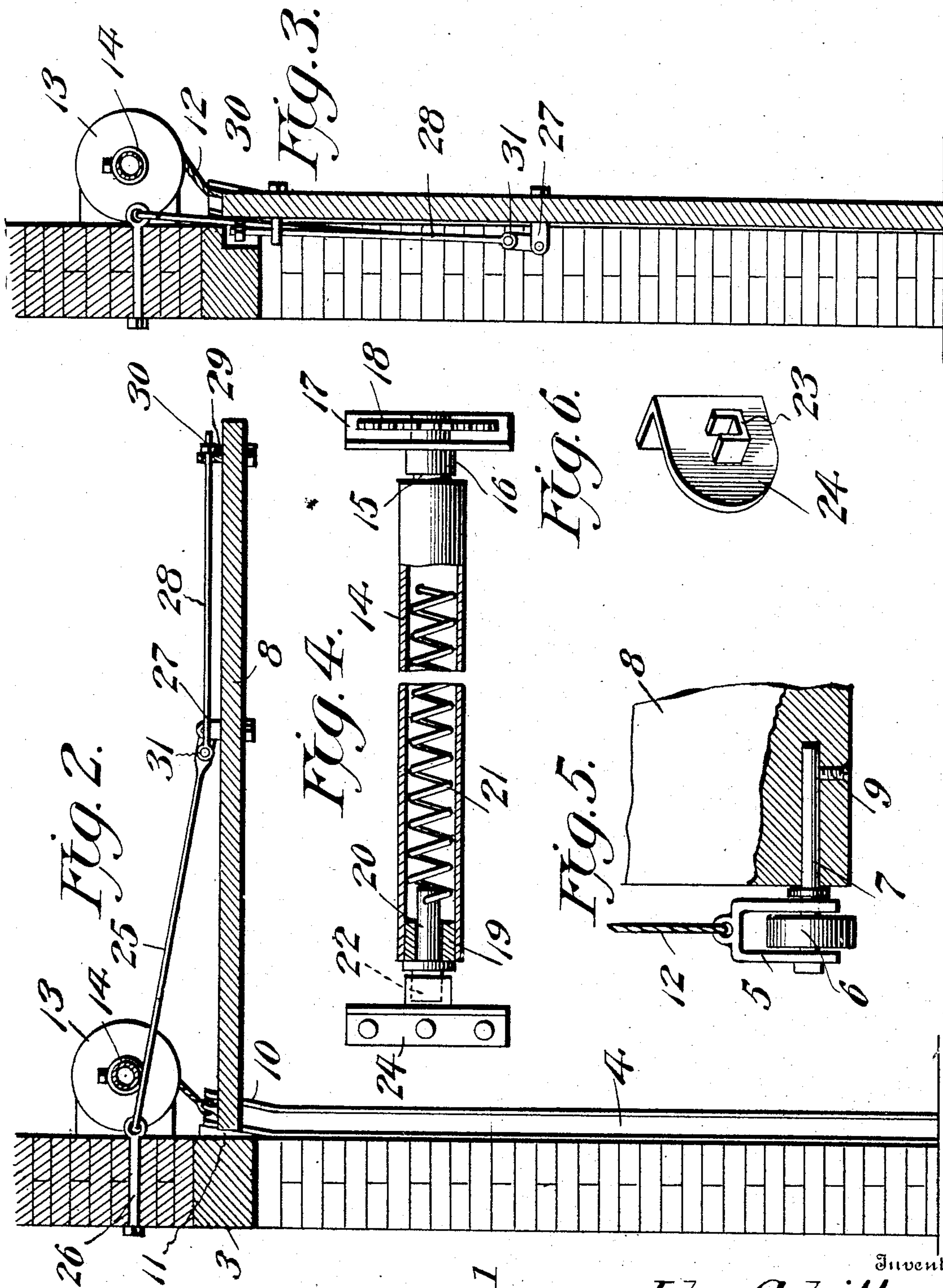
Witnesses

*Geoffman*  
*C. C. Limer*

J. CAHILL.  
SHUTTER.

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2 SHEETS—SHEET 2.



Witnesses  
*Geckman*  
*C. C. Dineen*

Inventor  
*John Cahill*  
By *Victor J. Evans*  
Attorney



# UNITED STATES PATENT OFFICE.

JOHN CAHILL, OF NORFOLK, VIRGINIA.

## SHUTTER.

No. 824,410.

Specification of Letters Patent.

Patented June 26, 1906.

Application filed May 9, 1905. Serial No. 259,571.

*To all whom it may concern:*

Be it known that I, JOHN CAHILL, a citizen of the United States, residing at Norfolk, in the county of Norfolk and State of Virginia, have invented new and useful Improvements in Shutters, of which the following is a specification.

This invention relates to shutters or closures for windows, doors, and other openings, and particularly to a shutter or closure of the sliding and swinging type shown in my prior application, filed March 29, 1904, Serial No. 200,651, allowed January 9, 1905.

The object of the present invention is to improve and simplify the construction set forth in my aforesaid application and to provide novel means for efficiently counterbalancing and controlling the movements of the door and relieving the same from excess strain from the weight thereof when adjusted to open position.

In the accompanying drawings, Figure 1 is a front elevation of a portion of a building or other structure, showing the improved shutter and operating mechanism therefor applied thereto, the shutter appearing in open position. Fig. 2 is a transverse vertical section through the parts as arranged as shown in Fig. 1. Fig. 3 is a view similar to Fig. 2, showing the door closed. Fig. 4 is a front view of the winding-shaft and its supports, a portion of said shaft being broken away to expose the interior construction. Fig. 5 is a detail view, partly in section, of a portion of the door and one of the antifriction-rollers; and Fig. 6 is a detail view of one of the supporting-brackets for the shaft.

Referring now more particularly to the drawings, the numeral 1 designates the wall of a suitable structure, having therein a window or other opening 2 and a transverse beam or girder 3 at the top of said opening. Suitably secured to the wall at a distance from the opposite side terminals of the opening 2 are guides 4, open at their inner sides, as shown in Fig. 2. Arranged within the guides 4 are sliding brackets 5, preferably of U or yoke form, each of said brackets having arranged between the arms thereof an antifriction-roller 6, journaled on a trunnion-pin 7. The two trunnion-pins 7 project outwardly from opposite sides of a shutter or closure 8 at or near the lower edge of the latter. This shutter 8 may be of any preferred construction and composed entirely of either metal or wood or a composite structure of

both materials, as desired. The inner ends of the trunnion-pins 7 are held in sockets in the door by set-screws 9, while the outwardly-projecting ends thereof are journaled in the arms of the brackets 5 and carry the antifriction-rollers 6, which are journaled to rotate thereon to permit the shutter or closure 8 to slide freely up and down in the guides 4 and to swing outwardly when the lower end thereof is elevated to the upper ends of said guides, as hereinafter described. Rollers 6 are of such diameter as to bear against or contact with the inner and outer portions of the guides and prevent jamming of the brackets therein. The upper ends of the guides are offset or bent outwardly at an oblique angle, as indicated at 10, and are braced by spacing and deflecting wedges 11, arranged between the same and the beam or girder 3. These wedges, which may be made of wood or metal, prevent the offset or outwardly-bent upper ends 10 of the guides from being forced inwardly under strain when the door is opened. Independent wedge-shaped pieces may be interposed between the two offset guide ends 10, or a continuous wedge-shaped piece extending between the upper terminals of the guides at the top of the door-opening and across the outer face of the beam 3 may be employed.

Secured at their lower ends to the sliding brackets 5 are counterbalancing cords or cables 12, which are thus attached to the lower edge of the door. The upper ends of these cords or cables are fastened to winding-drums 13, mounted upon a hollow winding-shaft 14, arranged above the door-opening. The shaft 14 is provided at one end with a trunnion 15 to turn within a cylindrical bearing 16 on a bracket-plate 17, suitably fixed to the wall 1. The said trunnion 15 extends through the cylindrical bearing 16 to the outer side of the bracket and carries a sprocket-wheel 18, which may be operated by any known type of chain or sprocket elevating mechanism for raising the door. The other end of the shaft 14 is open and provided with a bearing-sleeve 19, through which projects a plug 20, to the inner end of which is fixed one end of a counterbalancing coil-spring 21, disposed within the shaft, the opposite end of said spring being secured in any suitable manner to the shaft. The plug 20 projects beyond the shaft and has a rectangular end 22, which fits within an open rectangular keeper-socket 23, carried by a



bracket 24, fixed to the wall 1. By this construction it will be seen that the hollow shaft 14 is revolubly mounted and is adapted to turn in one direction against the resistance of  
 5 and to wind up the spring 21 and to be turned in the opposite direction by the reaction of said spring. The shaft 14 is connected through the cords or cables 12 to the lower  
 10 edge of the door by means of the winding-drums 13 attached thereto, the construction and arrangement being such that as the door in closing descends in the guideways 4 the  
 shaft 14 will be revolved outwardly against the resistance of and to wind up the spring 21,  
 15 which will thus oppose a resistance to the downward movement of the door to adapt it to descend freely and without shock or jar to closed position, the length of the spring being  
 such as to counterbalance the weight of the  
 20 door to regulate the easy descent of the door in an efficient manner, thus obviating the necessity of employing restraining force through the sprocket-wheel 18 and associate  
 raising and lowering mechanism to regulate  
 25 the closing movement. The winding-drums 13 are of conical form and provided with spiral grooves to receive the cords and adapt them to wind regularly thereon, the upper  
 ends of the cords being fixed to the drums at  
 30 the point of greatest diameter of the latter and in such manner with said cords will wind upwardly and rearwardly thereon as the door is raised and the shaft 14 turned rearwardly  
 under the action of the spring 21 and will un-  
 35 wind forwardly therefrom when the door is swung inward and permitted to slide downwardly in the guideways 4 to closed position. It will be understood, of course, that the ten-  
 40 sion of the spring 21 increases as the door descends in the guideways 4, this increase being compensated for in the present instance with-  
 out the use of independent auxiliary means by making the winding-drums of conical  
 45 form and securing the cords or cables thereto in the manner described, as on account of the unwinding of the cords from the smaller to the successively larger convolutions of the  
 spiral grooves of the drums the resistance to their unwinding movement will be gradually  
 50 and appropriately increased, producing, in effect, an increasing leverage of resistance to compensate for the increase in the tension of the spring to counterbalance the weight of  
 the door and adapt it to descend easily in the  
 55 guideways 4. The number of winding-springs and winding-drums and winding cords and cables employed of course vary according to the weight of the door which is used.

60 When the shaft 14 is turned rearwardly, the cords or cables 12 will be wound up on the drum 13, thus elevating the door in the guideways 4, the door being gradually thrown outwardly from the wall or other  
 65 support 1 as it ascends. When the roller-

brackets 5 reach the lower ends of the offset or inclined portions 10 of the guideways 4, the lower edge of the door is projected outwardly from the wall 1 into the offset portions 10, thus guiding the lower edge of the  
 70 door away from the wall and permitting the same to swing freely through its trunnion-pins 7 on the sliding brackets 5 to allow the door to come to a horizontal position without binding or sticking in the guideways 4,  
 75 thus insuring a free and easy movement of the door to its full-open position.

When the door is adjusted to its open position, it is necessary to employ means for supporting the same in such position and a de-  
 80 sideratum to provide means for preventing it from bending intermediate of its length and sagging at its outer end owing to the preponderance of weight of such end. To this end  
 I provide a required number of guy or stay  
 85 rods 25, each of which is pivotally attached at its inner end to an eyebolt 26, fixed in the wall 1, and pivotally attached at its outer end to a pivot-pin mounted in the arms of a  
 yoke-shaped bracket 27, bolted or otherwise  
 90 suitably fastened to the door or closure 8 at a suitable point outwardly beyond or above the center thereof. These rods are so arranged as to fold practically upwardly with the gate  
 when the latter is closed, as shown in Fig. 3,  
 95 and to extend at an outward and downward angle from the wall 1 to their points of attachment to the door or closure 8 to support the latter when opened, as shown in Fig. 2,  
 in a horizontal position. Associated with  
 100 each guy or stay rod 25 is a truss-rod 28, extending longitudinally therefrom to the outer edge of the door, each rod 28 passing at its outer end through an opening in a suitable  
 bracket or connection 29, fastened to the  
 105 door near its outer or upper edge and provided beyond the bracket with a securing-nut 30. The inner end of the rod 28 projects inwardly beyond the pivot-bracket 27 and is  
 connected with the outer end of the stay-rod  
 110 by a crank or wrist pin 31. The rods 28 are thus so mounted that when the door swings open to a horizontal position and the rods 25 straighten out under the downward move-  
 ment thereof the crank or wrist pins 31 will  
 115 be thrown rearwardly and downwardly behind the pivot-bracket 27, thus drawing upon the rods 28 and placing them under tension, whereby they are caused to straighten out  
 the outer end of the door or closure 8 to a  
 120 horizontal position, thus overcoming the tendency of the same to bend or sag downward under the preponderance of the weight thereof when the door is open. By this construction also the inner and outer portions of  
 125 the door will approximately counterbalance each other, thus relieving the inner end of the door, which is supported by the winding-spring through the winding connections, and  
 the upper ends of the guides 4 from excess  
 130



strain. When the door swings inwardly and slides downwardly to closed position, the crank or wrist pins 31 will swing outward or forward until when the door reaches a fully-  
 5 closed position the connected ends of the rods 25 and 28 will lie above and wholly on one side of the pivot-brackets 27, thus removing the tensional pull upon the rods and outer or upper end of the door to prevent the same  
 10 from being bent out of shape. The rods 28 slide freely in the openings in the brackets 29, and these openings are preferably flared to also permit the rod to tilt during its movement, thus permitting it to readily assume  
 15 the required positions during the opening and closing movements of the door without throwing strain upon the crank or wrist pins 31. It will thus be seen that the door will be effectually counterbalanced and rendered  
 20 easy of operation and will also be properly stayed and braced when in open position.

It will be observed that the action of the offset portions 10 of the guideways in projecting the door outward from the wall 1 intensifies the longitudinal strain on the truss-  
 25 rods 28, thus increasing their efficiency. Another advantage attained by the use of the offset portions 10 is as follows: I have found by practical experience that it is inadvisable  
 30 to make the guides 4 straight and vertical at their upper ends, for the reason that the guide-brackets 5 tend to hang therein when the door is open and to oppose an initial resistance to the closing movement of the door,  
 35 due to the pressure of said brackets against the inner walls of the guideways under the inward thrust of the truss-rods 28. By obliquely offsetting the upper ends of the guideways this objection is overcome, owing to the  
 40 fact that as soon as the counterbalancing cords or cables 12 are unwound and the lower edge of the door sags in the offset portions 10 the inthrust action of the truss-rods 28 is transmitted at an inward and downward angle and as the rollers of the brackets 5 bear  
 45 against the walls of the portions 10 such walls form inclined surfaces which tend to direct the rollers inward and downward, thus adapting the brackets to run freely down the  
 50 guides as soon as the cords or cables 12 begin to unwind. While the desirability of using guides provided with the offset portions 10 in connection with a door provided with the truss-rods 28, as herein shown, will be  
 55 readily understood, I do not limit this feature of the invention to such use, as guides so constructed may be employed with advantage in connection with the door shown in my prior application before referred to or any other  
 60 construction of door of the same type.

The improved shutter or closure when open will provide a shade or protecting means with respect to the opening which it is adapted to close and will serve as a shutter  
 65 when used in connection with warehouses,

freight-houses, and the like, for the ends of wagons, which may be backed up in line with the opening for loading and unloading purposes.

Having thus described the invention, what I claim as new is—

1. In a door or like closure, a wall or like structure having a doorway, a door slidably and pivotally connected at one end at the sides of the doorway, elevating and supporting means carried by the wall and attached  
 75 to the slidably and pivotally connected end of the door, and means connected to the wall and to the center and outer end of the door to support the outer end of the door when in an  
 80 open position, such means being adapted to exert a tension between the center connection and outer end of the door, to straighten and stiffen the said outer end of the door and hold it from sagging.

2. A shutter, means for pivotally mounting and guiding one end of the shutter, counteracting supporting means attached to said guided end, stay-rods for supporting the shutter when in open position, and truss-rods  
 90 connected to the outer end of the shutter and to the stay-rods in a manner to be placed under tension to prevent sagging of the outer end of the shutter, substantially as described.

3. A shutter, means for pivotally mounting and guiding one end of the shutter, counteracting supporting means attached to the guided end, stay-rods pivotally connected to the shutter and adapted to support the same  
 95 in open position, truss-rods connected at their outer ends to the outer ends of the shutter, and crank connections between the outer ends of the stay-rods and the inner ends of the truss-rods whereby when the shutter  
 100 swings to open position the truss-rods will be placed under tension to straighten out the outer end of the shutter and hold it from sagging, substantially as described.

4. A shutter, means for pivotally and slidably mounting one end of the shutter, elevating and supporting means attached to the guided end, a stay element pivotally connected with the shutter at or near the center thereof, and a truss member connected with said  
 110 stay element and the outer edge of the shutter and placed under tension when the shutter is opened to stay and prevent sagging of the outer end of the shutter.

5. In a door or like closure, a wall or like structure having a doorway, a door slidably and pivotally connected at one end at the sides of the doorway, elevating and supporting means carried by the wall and attached  
 120 to the slidably and pivotally connected end of the door, a stay pivotally connected to the wall and to the center of the door, and means connected to said stay and to the outer end of the door in such manner as to straighten out and stiffen the outer end of the door when the door moves to a fully-open position.



6. In a door or like closure, the combination of a door-frame, vertical guides at the sides thereof, a shutter pivotally and slidably mounted at one end in said guides, counter-  
5 acting supporting means attached to the guided end of the shutter, and a stay connecting the door-frame with the outer end of the door for supporting the door when in an open position, the upper ends of the guides  
10 being inclined in a direction away from the door-frame and toward the outer end of the door when the latter is open to throw the guided end of the door outward from the door-frame as the door swings to a full-open  
15 position, substantially as described.

7. In a shutter or like closure, the combination of a support, vertical guides secured thereto and provided with outwardly-inclined upper ends, a shutter pivotally and slidably  
20 mounted at one end in the guides, counteracting elevating means attached to the guided end of the shutter, means for supporting the shutter in open position, and means coacting with said supporting means to place  
25 the outer end of the shutter under tension, thus straightening it out and preventing the same from sagging.

8. In a shutter or like closure, the combination of a support, guides attached thereto  
30 and provided with outwardly-inclined upper ends, a shutter or closure pivotally and slidably mounted at one end in said guides, counteracting elevating means attached to the guided end of the shutter, a support for the  
35 shutter when in opened position, and a truss member connected to the outer end of the shutter and to said support in a manner to be

placed under tension to prevent sagging of the outer end of the shutter, substantially as described.

9. A shutter, means for pivotally mounting and guiding one end of the shutter, counteracting supporting and elevating means attached to the guided end, means for supporting the outer end of the shutter, said means  
45 including a truss element automatically placed under tension when the shutter moves to open position to prevent sagging of the outer end of the shutter, and means operative upon the guided end of the shutter to  
50 project the latter outward and intensify the truss tension.

10. In a shutter or like closure, the combination of a support, vertical guides secured thereto, means for pivotally and slidably  
55 mounting the shutter at one end in said guides, counteracting elevating and supporting means attached to the guided end of the shutter, a stay-rod pivotally connected with the support and central portion of the shutter  
60 to support the latter in open position, and a truss-rod connected with the outer end of the shutter and pivoted to the stay-rod in a manner to be placed under tension to prevent sagging of the outer end of the shutter, said stay-  
65 rod being adapted to fold substantially parallel with the shutter when the latter is closed.

In testimony whereof I affix my signature in presence of two witnesses.

JOHN CAHILL.

Witnesses:

DAVID W. GOULD,  
JOHN L. FLETCHER.