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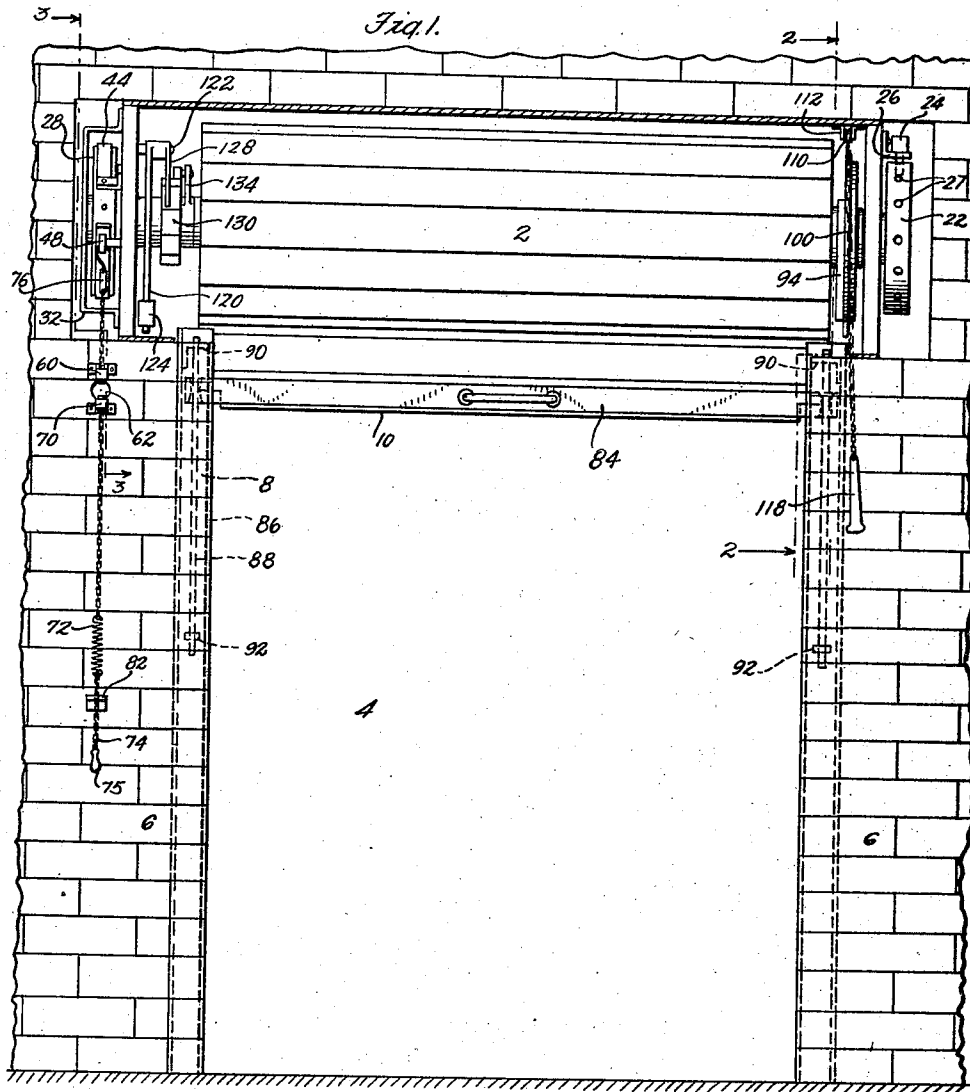
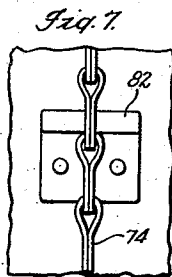
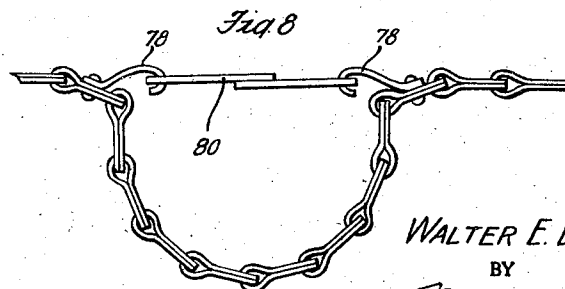
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1,617,440

AUTOMATIC FIRE SHUTTER MECHANISM

Filed Dec. 23, 1925

4 Sheets-Sheet 1



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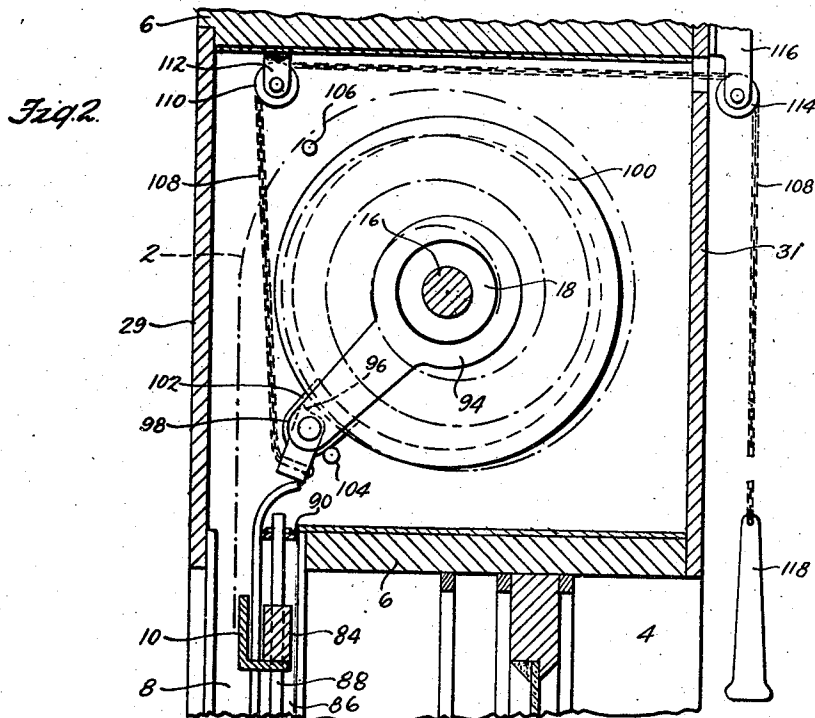
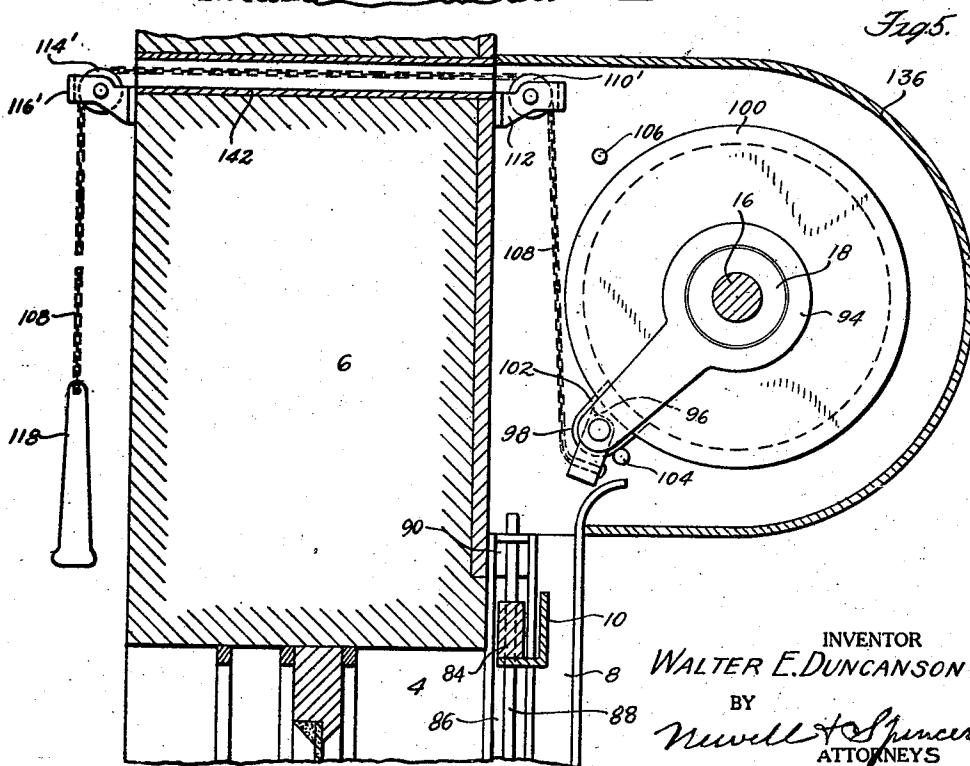
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1,617,440

AUTOMATIC FIRE SHUTTER MECHANISM

Filed Dec. 23, 1925

4 Sheets-Sheet 2



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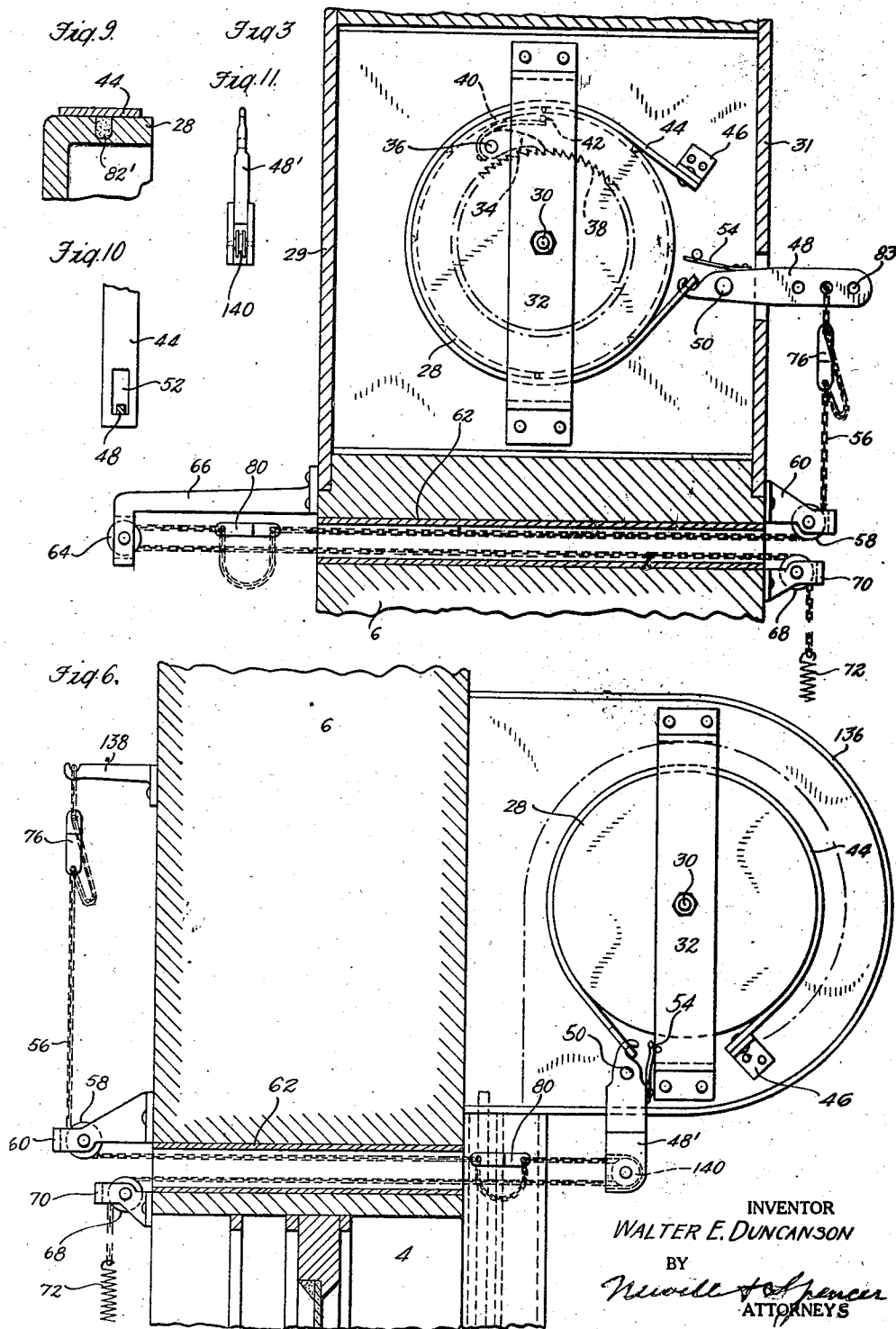
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AUTOMATIC FIRE SHUTTER MECHANISM

Filed Dec. 23, 1925

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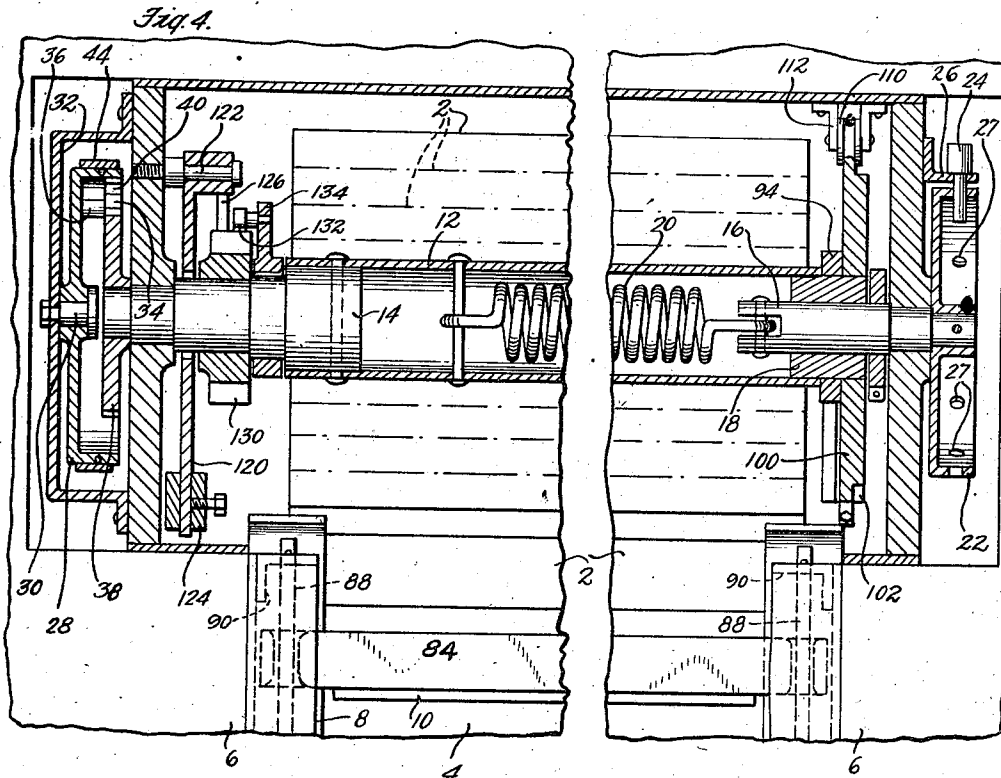
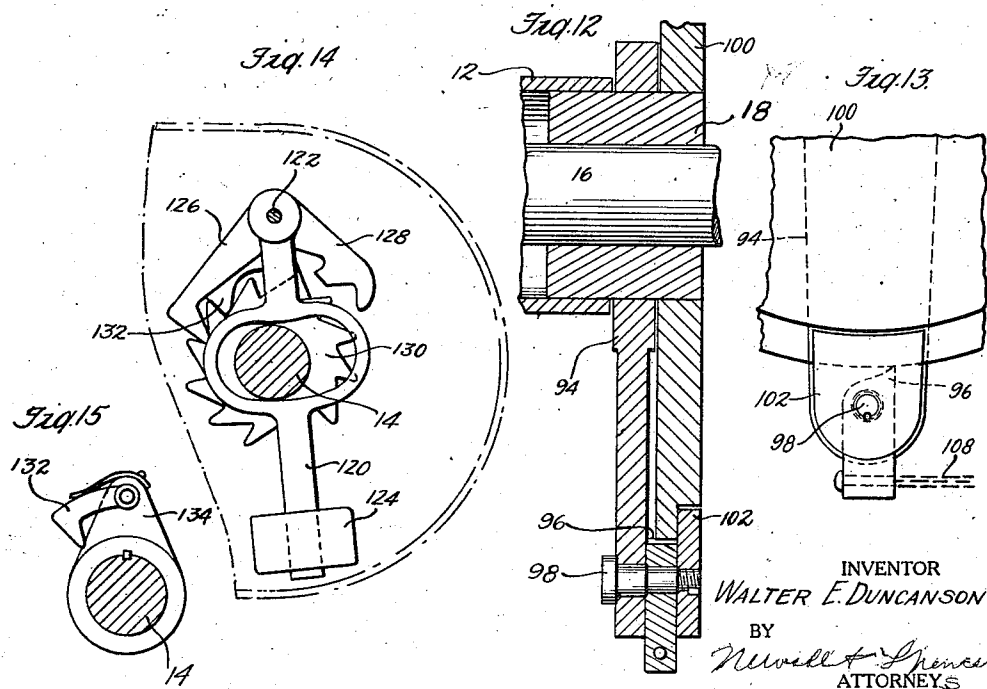
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1,617,440

AUTOMATIC FIRE SHUTTER MECHANISM

Filed Dec. 23, 1925

4 Sheets-Sheet 4



UNITED STATES PATENT OFFICE.

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AUTOMATIC FIRE-SHUTTER MECHANISM.

Application filed December 23, 1925. Serial No. 77,250.

This invention relates to automatic fire shutters, and more particularly to fire shutters of the type in which the shutter is constructed and arranged to be coiled on and uncoiled from a rotary roller in opening and closing the same.

In fire shutters of the automatic type, the shutter is held in fully open or partially open position by a mechanism comprising an element which is fusible upon the occurrence of a dangerous rise in temperature. Upon the fusing of this element, the shutter is released by said holding mechanism and allowed to close.

Automatic fire shutters are frequently tested by the fire underwriters to determine whether they are in operating condition. In testing a shutter, either the fusible element is fused or the shutter-holding mechanism is otherwise operated upon to release the shutter. Fire shutters are also often closed and locked at night so as to prevent the entrance of thieves or other unauthorized persons into the building and also to prevent or retard the passage of fire through the wall opening.

In the usual construction, after each of said closing operations, the shutter is restored to its fully open or partially open position by grasping the handles with which the shutter is ordinarily provided, and raising the shutter. The shutter may be raised to a partially open position while the operator stands on the floor of the building. In raising the shutter to its fully open position, the raising operation is completed by the operator, while standing on any suitable elevated support such as the sill of a window at which the shutter may be installed. This manner of raising the shutter manually obviously requires considerable labor and is highly inconvenient and the operation may be dangerous, as when the shutter is mounted on the outside of a high window opening.

One object of the present invention is to provide fire shutters of the automatic type with novel and improved lifting mechanism by which the shutter may be quickly and easily raised manually to its open position.

The holding mechanism of shutters of this type ordinarily comprises two or more chain sections between which are interposed fusible links connecting said sections, the shutter being released by the fusing of one of these links. The fusing of a link leaves two

free or unconnected chain ends, and in resetting the shutter mechanism, a new link is inserted to connect up these chain ends. The resetting of the shutter mechanism, therefore, requires considerable labor and time, particularly when the fused link is located in a high position on the outside of a building. In this case, the inserting of a new link may require the operator to place himself in a dangerous situation.

Another object of the present invention is to improve the construction and mode of operation of the mechanism for holding an automatic fire shutter in open position and to provide a shutter holding mechanism which may be quickly and easily reset from within the building after each fusing of the fusible element.

With this and other objects in view, the invention comprises the novel and improved features, constructions and combinations of parts hereinafter described and particularly pointed out in the claims, the advantages of which will be readily understood and appreciated by those skilled in the art.

The invention will be clearly understood from the accompanying drawings illustrating the invention in its preferred form and the following detailed description of the constructions therein shown.

In the drawings:

Fig. 1 is a view in front elevation of an automatic fire shutter mechanism embodying the invention;

Fig. 2 is a sectional view taken substantially on the line 2—2 of Fig. 1;

Fig. 3 is a sectional view taken substantially on the line 3—3 of Fig. 1;

Fig. 4 is a view in vertical section taken substantially in the plane through the axis of the shutter;

Fig. 5 is a view similar to Fig. 2 illustrating a modified construction;

Fig. 6 is a view similar to Fig. 3 of the modified construction shown in Fig. 5;

Fig. 7 is a detail view in front elevation, illustrating certain parts of the device for holding the shutter in open position;

Fig. 8 is a detail view in side elevation illustrating certain parts of the shutter-holding devices;

Fig. 9 is a detail sectional view of the brake disc forming part of the shutter-holding mechanism;

Fig. 10 is a detail view illustrating a por-

tion of the brakeband and an associated part, forming part of the shutter-holding mechanism;

Fig. 11 is a detail view illustrating a brakeband actuating lever forming part of the shutter-holding mechanism shown in Fig. 6;

Fig. 12 is a detail sectional view illustrating certain parts of the shutter-lifting mechanism;

Fig. 13 is a detail view in side elevation showing certain parts of the mechanism illustrated in Fig. 12;

Fig. 14 is a detail view in side elevation, illustrating the mechanism for retarding the downward movement of the shutter; and

Fig. 15 is a detail view in side elevation illustrating certain parts of the mechanism shown in Fig. 14.

Referring to Figs. 1 to 4 inclusive, 7 to 10 inclusive and 12 to 15 inclusive of the drawings, the coiling shutter embodied in the construction therein shown may be of any suitable type such as that made up of jointed metal slats, and is indicated at 2 in the drawing, the shutter being diagrammatically shown.

The shutter is mounted or installed adjacent an opening 4 in a wall 6 of a building to close this opening in case of fire. The shutter is arranged to be coiled up on and be uncoiled from a rotary roller and the lateral margins of the shutter engage in channel shaped guides 8, arranged on opposite sides of the door opening. An angle bar 10 is attached to the lower margin of the shutter, as shown in Fig. 5.

The shutter is mounted upon a rotary roller 12 to which one end of the shutter is attached. To one end of the roller 12 is secured a short shaft 14, engaging in a bearing in the shutter frame. The other end of the shutter is mounted to rotate upon a shaft 16 fixed in the shutter frame, this shaft passing through a block 18 secured within one end of the roller 12.

The shutter is preferably partially counter-balanced so that a relatively light force is required to hold the same in open position or to close the same against the action of the shutter-holding means. The counterbalancing mechanism comprises a coiled spring 20 arranged within the roller 12, one end of which spring is attached to the roller and the other end of which is attached to the shaft 16, as shown in Fig. 4. With this arrangement of the counterbalancing spring 20, the spring is constantly operative and acts on the shutter in all positions thereof. The shaft 16 is rotatably adjustable in its bearing in the shutter frame to adjust the tension of the spring 20 and is held in adjusted position by means of a disc 22 secured to the outer end of the shaft and a pin 24 engaging in an opening in a fixed bracket 26 and

in one of a series of openings 27 in said disc.

The spring 20 is preferably formed with its coils out of contact and is attached at its ends respectively to the roller 12 and the shaft 16 so that when installed, the spring is free from longitudinal tension. Thus there is no friction between the coils of the spring during the rotation of the roller and no end thrust produced by the spring upon the roller to cause the roller or its connected parts to bind frictionally against the parts of the shutter frame. This enables a smooth, positive closing action to be effected.

As shown clearly in Figs. 2 and 3, the shutter roller and associated parts are mounted in an opening in the wall 6 and enclosing plates 29 and 31 form, together with the said wall, a housing within which the shutter is normally enclosed.

The mechanism for holding the shutter normally in open position, comprises, in the illustrated form of the invention, a brake-wheel or drum 28 rotatably mounted upon a stud 30 secured in a suitable bent supporting plate 32 attached to the shutter frame. The brake wheel 28 is connected for rotation with the shutter roller during the uncoiling movement of the shutter by means of a pawl 34 pivoted on a stud 36 secured in the wheel 28, this pawl being arranged to engage the teeth on the periphery of a toothed disc 38 secured to the outer end of the shaft 14. The pawl is yieldingly held in engagement with the teeth of the disc by means of a leaf spring 40, one end of which is secured to the pawl and the other end of which engages a pin 42 secured to the wheel. This connection between the shaft 14 and the brake-wheel enables the roller 12 to rotate independently of the brake-wheel during the raising of the shutter and also enables the shutter to be held from descending at any point in the shutter-raising operation by holding the brake-wheel from rotation. The disc 38 is preferably provided with a relatively large number of peripheral teeth so that the movement of the curtain corresponding to the distance between two of the teeth of the disc will be relatively small.

The brake-drum is engaged by a brakeband 44 passing about the same, one end of which is secured to a bracket 46 attached to the shutter frame. The brakeband is preferably formed from spring metal and is placed under tension in bending the same about the brake-drum so that the band tends to spring outwardly away from the periphery of the drum. The other end of the brakeband is connected with an actuating and controlling lever 48 pivoted at 50 on the shutter frame, one end of which is formed with a hook engaging in a slot 52 in the brakeband. The lever 48 is acted upon by a leaf spring 54 which tends to swing the same

in a direction to diminish the tension of the brakeband.

The lever 48 is normally held in position to maintain the brakeband in engagement with the brake-drum with sufficient pressure to maintain the shutter in raised position by mechanism comprising one or more elements which are fusible upon the occurrence of a dangerous rise in temperature; the fusing of one of these elements releasing said lever. As shown in Fig. 3, the lever 48 projects through an opening in the enclosing plate 31 to the inside of the wall 6 and the said mechanism for holding the lever in position is connected with the lever upon the inner side of the wall. This mechanism comprises a chain section 56 attached at one end to the lever 48 and extending downwardly therefrom about a pulley 58 mounted on a bracket 60 attached to the inner side of the wall 6. The chain thence extends outwardly through a pipe 62 mounted in the wall and over a pulley 64 mounted on a bracket 66 attached to the outer side of the wall. The chain then passes back through the pipe 62 to the inner side of the wall and extends over a third pulley 68 mounted on a bracket 70. To the other end of the chain section 56 is connected one end of a coiled spring 72, to the other end of which is connected a chain section 74 carrying a handle 75.

Two links of the chain section 56 are connected by a fusible link 76 located upon the inner side of the wall 6, the links of the chain having hooks 78 which are inserted in openings in the ends of the fusible links. The length of that part of the chain section 56 connected by the fusible link is considerably greater than the length of the fusible link so that the said part of the chain section 56 hangs in a slack loop. Two links of the chain section 56 are connected in a similar manner by a fusible link 80 leaving a slack loop of said chain section hanging between the ends of said link. The link 80 is located upon the outer side of the wall 6.

In setting the holding mechanism for the lever 56, a downward pull is exerted on the chain section 74 thereby stretching the spring 72 and the chain section 74 is then secured in position preferably by inserting the same in a slot in a bracket 82 attached to the wall.

When the mechanism for holding the lever 48 is thus set, the pull exerted on the inner end of the lever by the chain section 56 will maintain the brakeband in braking engagement with the brake-drum 28 and this pressure of the brakeband on the brake-drum may be adjusted so that the shutter will be held in raised position by a suitable adjustment of the chain section 74 relative to the bracket 82. Upon the occurrence of a dangerous rise in temperature, on either side of the wall 6, one of the fusible links 76 and 80

will fuse and the slack portion of the chain between the ends of said link will relieve the tension on the lever 48 and allow the brakeband 44 to release the brake-drum 28. The shutter will then descend and close the wall opening. Chain section 56 may be connected with the lever 48 at different points longitudinally of the lever to adjust the pull on said lever, the lever having a series of openings 83 through which the chain may be passed.

In testing an automatic shutter of this type, a representative of the underwriters often applies a torch to one of the fusible links to cause the release of the shutter. In resetting the shutter-holding mechanism after the fusing of one of these links, a corresponding new link is attached in proper position with relation to the chain section 56. In the present construction, when either of the fusible links 76 and 80 is fused, a new link may be inserted quickly and easily by an operator from the inside of the building. This obviates the necessity for the operator to place himself in a high or dangerous position in resetting this mechanism as is often the case with constructions heretofore produced.

In inserting a new fusible link for the one which has been fused in the present construction, there are no loose chain ends to be picked up and attached together. In this operation, the chain section 74 is disengaged from the bracket 82 and the two links to which the hooks 78 are attached are drawn sufficiently close together to allow a new fusible link to be inserted in position. A new link 80 may be readily inserted from within the building. By grasping the chain section 56 between the fusible link 76 and pulley 58, or below the pulley 58 and pulling the same through the pipe 62, that part of the chain section to which the link 80 is to be attached may be drawn through the pipe to the inside of the wall 6. The new link 80 may then be readily attached in place, after which the link may be drawn back to its normal position on the outside of the wall 6 by pulling on the chain section 74.

It is often desirable that an operator should be able to raise and lower the fire shutter without disturbing the emergency devices for holding the shutter normally in raised position. In the present construction, the connection between the shaft 14 and the brake wheel 28 allows the shutter to be raised without rotating the brake wheel. The brake mechanism, therefore, does not retard the raising movement of the shutter. In lowering the shutter manually the operator grasps the lower edge of the shutter and pulls the same down against the friction exerted by the brake band 44 on the brake wheel. In order that this friction may be more readily overcome, the contacting surfaces of the brake wheel and

brake band are rendered somewhat slippery by the application of grease thereto. As shown clearly in Figure 9, the brake wheel is provided with a series of pockets 82' which are filled with grease to apply the same to the surfaces.

With the above construction the brake band always exerts a yielding pressure upon the brake wheel and this pressure may be adjusted so that it is just sufficient to overcome the overbalancing weight of the shutter when open. In closing the shutter manually it is necessary to exert a force just sufficient to overcome the frictional action of the brake. Thus, the shutter may be readily closed and may thereafter be raised to its normal position without disturbing the emergency mechanism for holding the shutter normally open.

When the shutter is released the weight of the shutter will cause the same to descend to closed position. In order to increase the force acting upon the shutter during the first part of its closing movement, a weight bar 84 is mounted with its ends engaging in guides in channel bars 86 mounted at the sides of the door opening, these channel bars being located within the guides for the shutter. The angle bar 10 at the lower end of the shutter projects across the path of movement of the weight bar 84 so that the weight bar is engaged and lifted by the shutter during the upward or opening movement of the shutter. The weight bar also slides upon guide rods 88 passing loosely through plates 90 secured within the upper ends of the channel bars 86, the downward movement of the guide rods being limited by suitable stops. The guide rods 88 engage loosely in openings in the ends of the weight bar and the downward movement of the weight bar is limited by means of nuts 92 threaded upon the lower ends of the guide rods. By a suitable adjustment of these nuts the extent of the downward movement of the weight bar may be readily adjusted.

The mechanism for raising the shutter manually is arranged to be operated to impart an intermittent rotary movement to the roller 12 and thereby to raise the shutter step by step. The shutter-raising mechanism comprises a swinging arm 94 pivoted upon the block 18 to swing coaxially with the roller 12. This arm carries at its outer end a gripping block 96 pivoted upon a stud 98 secured in the arm and arranged to engage the periphery of a disk 100 secured to the block 18 to rotate with the block and shutter roller. The arm 94 is held from movement away from the disk 100 by means of a plate 102 secured to the stud 98 and overlapping the margin of the disk on the side thereof opposite the said arm.

The arm 94 normally occupies its limiting downward position, as shown in Figure 5,

with the plate 102 in engagement with a stop pin 104 secured to the shutter frame. With the arm in this position the gripping block 96 is normally held out of engagement with the periphery of the disk by the weight of the outer portion of said block, so that the disk can rotate freely. In raising the shutter the gripping block is first swung in a direction to engage the same with the periphery of the disk 100 and said block and arm 94 are then swung upwardly, the movement of the arm being limited by a stop pin 106 arranged to engage the plate 102. This movement of the gripping block and arm 94 rotates the disk 100 in a direction to raise the shutter, the shutter roller rotating independently of the brake wheel during this movement. The gripping block is then released from gripping engagement with the periphery of the disk 100 and gripping block and arm 94 are allowed to drop back to their initial positions. These movements of the gripping block and arm are repeated until the shutter is raised to its fully open position.

The gripping block and arm are actuated in the manner described by means of a chain 108 attached at one end to the outer portion of said gripping block and extending upwardly therefrom over a pulley 110 mounted on a bracket 112. Thence, the chain extends inwardly through an opening in the plate 31, and over a pulley 114 mounted on a bracket 116 and then downwardly upon the inside of the wall 6, the chain having a handle 118 attached to its lower end. With the arm 94 and gripping block 96 in the position shown in Figure 2, by grasping the handle 118 and pulling downwardly on the same, the gripping block will be caused to grip the periphery of the disc 100, and the gripping block and arm will then be swung upwardly to rotate said disc through a part of a revolution. Upon releasing the handle 118, the arm or gripping block will drop back to their original position. By repeating this operation a number of times the shutter may be readily raised from closed position to its normal open position.

The shutter also is preferably provided with a mechanism for retarding the downward movement of the shutter. In the present form of the invention, the retarding mechanism is similar to that disclosed in applicant's pending application, Serial No. 7,513, filed February 7, 1925. This retarding mechanism comprises a swinging arm 120 pivoted at 122 on the shutter frame and carrying at its lower end an adjustable weight 124 and a pair of pawls 126 and 128 secured rigidly to said arm and arranged to engage a toothed wheel loosely mounted upon the shaft 14. This toothed wheel is connected for rotation with the shaft 14 during the downward movement of the shutter by

means of a spring pressed pawl 132 pivoted upon an arm 134 secured to said shaft and arranged to engage the toothed wheel 130 (see Figs. 4, 14 and 15).

5 As the shaft 14 is rotated during the downward movement of the shutter, the toothed wheel 130 is rotated therewith through the engagement of the pawl 132 with said wheel and the swinging arm 120 is swung in opposite directions by the action of said wheel upon the pawls 128 and 126, thereby retarding the downward movement of the shutter. When the shutter is raised, the pawl 132 passes idly over the teeth of the toothed wheel 130 so that the retarding mechanism has no retarding effect upon the movement of the shutter.

In the construction shown in Figs. 1, 2, 3 and 4, the roller upon which the shutter is coiled, the mechanism for supporting the roller, the mechanism for holding the shutter in open position and the retarding mechanism for the shutter are all arranged within the housing formed by the opening in the wall 6 and the enclosing plates 29 and 31. In the construction shown in Figures 5 and 6 the shutter roller and certain of the associated parts are mounted within a casing 136 attached to the outer side of the wall 6, the shutter being arranged to be coiled up in this casing. The brake band 44, the brake band controlling lever and the devices acting on the lever to hold the brake band in braking engagement with the brake wheel, differ somewhat in specific construction and arrangement from the corresponding parts shown in Figures 1 to 4 inclusive, but have the same mode of operation.

As shown in Figs. 5, 6 and 11, the chain section 56 is attached at its upper end to a bracket 138 projecting from the inside of the wall 6. Thence the chain section passes over pulley 58, through pipe 62 and then about a pulley 140 mounted on the brakeband controlling lever 48. From this pulley the chain section extends back through the pipe 62 to the inside of the wall, over pulley 68 and is connected with spring 72.

The shutter lifting mechanism shown in Fig. 5 has substantially the same general construction and mode of operation as the lifting mechanism shown in Figs. 1 to 4 inclusive.

In the construction shown in Fig. 5, however, the chain 108 passes from the gripping block 96 upwardly over a pulley 110' mounted on a bracket 112', then through a pipe 142 mounted in the wall 6 to the inner side of the wall, then over a pulley 114' mounted on a bracket 116' and downwardly along the inner side of the wall.

The shutter raising mechanism above described may be employed in connection with either shutters of the "normally open" type, or with shutters of the "counterbalanced

type". It, therefore, is adapted for use in combination with shutters for fire wall, corridor, elevator and exterior wall openings. It is to be understood, therefore, that the shutter raising mechanism is not limited in its application to any particular class of coiling shutters.

What is claimed as new is—

1. An automatic fire shutter mechanism comprising in combination a roller, an underbalanced shutter arranged to be coiled on and uncoiled from said roller to open and close a wall opening, means for holding the shutter in various open positions arranged to release the shutter upon the occurrence of a dangerous rise in temperature, and flexible means arranged to be operated manually to raise the shutter.

2. An automatic fire shutter mechanism comprising in combination a movable shutter arranged adjacent a wall opening, means for holding the shutter in various open positions arranged to release the shutter upon the occurrence of a dangerous rise in temperature, and flexible means arranged to operate independently of the downward movement of the shutter for raising the shutter manually from one side of said wall.

3. An automatic fire shutter mechanism comprising in combination a roller, a shutter arranged to be coiled up on and uncoiled from said roller, means for holding the shutter in open position, arranged to release the shutter upon the occurrence of a dangerous rise in temperature, and means arranged to be manually operated normally to impart an intermittent upward movement to the shutter.

4. An automatic fire shutter mechanism comprising in combination a roller, a shutter arranged to be coiled up on and uncoiled from said roller to open and close the same, means for holding the shutter in open position, arranged to release the shutter upon a dangerous rise in temperature, an intermittent grip device for imparting a step by step raising movement to the shutter, and flexible means for manually actuating said grip device.

5. An automatic fire shutter mechanism comprising in combination a roller, a shutter arranged to be coiled up on and uncoiled from said roller to open and close the same, means for holding the shutter in open position, arranged to release the shutter upon the occurrence of a dangerous rise in temperature, and normally inactive mechanism for raising the shutter manually.

6. An automatic fire shutter mechanism comprising in combination a roller, a shutter arranged to be coiled up on and uncoiled from said roller, means for holding the shutter in various open positions arranged to release the shutter upon the occurrence of a dangerous rise in temperature,

and means arranged to operate independently of the downward movement of the shutter for raising the shutter manually.

7. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening, means for holding the shutter in open position, and means for imparting manually a step by step raising movement to the shutter, said first means including devices for holding the shutter from descending after each rising movement imparted thereto.

8. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening and means comprising a slippery brake for holding the shutter in open position.

9. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening, and mechanism comprising a brake for holding the shutter in any position, said brake having grease-holding recesses for applying grease to the contacting surfaces of the brake.

10. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening, means for holding the shutter at any position, arranged to release the shutter upon the occurrence of a dangerous rise in temperature, said means allowing the shutter to be lifted freely and mechanism for raising the shutter manually.

11. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening, means for holding the shutter in open position, arranged to release the shutter upon the occurrence of a dangerous rise in temperature, mechanism for retarding the downward movement of the shutter, said holding means and retarding mechanism being arranged to allow the shutter to be lifted freely and to hold the shutter from descending when partially or wholly raised, and mechanism for manually raising the shutter.

12. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening, mechanism for holding the shutter in open position, flexible means arranged to control said mechanism comprising a fusible element, and normally slack means for connecting the points in said flexible means normally connected by said fusible element.

13. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening, devices for holding the shutter in raised position, a train of connected elements for controlling said devices comprising a fusible link and normally slack means for connect-

ing points in said train upon opposite sides of said fusible link.

14. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening, devices for holding the shutter in open position, a train of connected elements comprising a fusible link located on the outside of the wall for controlling said devices, said train passing through said wall so that the fusible link may be replaced from the inner side of the wall.

15. An automatic fire shutter, comprising in combination a coiling shutter arranged adjacent a wall opening, devices for holding the shutter in open position, a train of connected elements comprising a fusible member for controlling said devices, arranged to allow an elongation of said train to release said devices upon the fusing of said member while the remaining elements continue in connected relation.

16. An automatic fire shutter mechanism, comprising in combination a coiling shutter arranged adjacent a wall opening, devices for holding the shutter in open position and flexible means for controlling said devices, comprising a fusible member arranged to allow an elongation of said means to release said devices upon the fusing of said member.

17. An automatic fire shutter mechanism, comprising in combination a coiling shutter arranged adjacent a wall opening, devices for holding the shutter in open position, comprising a fusible element and flexible means for supporting the same, arranged so that the fusible element may be applied to said means on one side of the wall and drawn by said means, through the wall to the other side thereof.

18. An automatic fire shutter mechanism, comprising in combination a coiling shutter movable adjacent a wall opening to open and close the same, devices for holding the shutter in open position, flexible means comprising a fusible link located on the outside of the wall for controlling said devices, said flexible means passing through said wall so that the fusible link may be replaced from the inner side of the wall.

19. An automatic fire shutter mechanism, comprising in combination a coiling shutter arranged to open and close a wall opening, constantly operative counterbalancing means for the shutter, means for holding the shutter in open position, arranged to release the shutter upon the occurrence of a dangerous rise in temperature, and means arranged to operate independently of the downward movement of the shutter for raising the shutter manually.

20. An automatic fire shutter mechanism comprising in combination a movable shut-

ter constructed and arranged for movement to open and close a wall opening, constantly operative counterbalancing means for the shutter, means for holding the shutter in
 5 open position arranged to release the shutter upon the occurrence of a dangerous rise in temperature, and means arranged to operate independently of the downward movement
 10 of the shutter for raising the shutter manually when it has closed following its release by said holding means.

21. An automatic fire shutter mechanism comprising in combination a movable shutter arranged adjacent a wall opening, means
 15 for holding the shutter in various open positions, arranged to release the shutter upon the occurrence of a dangerous rise in temperature, and means arranged to operate independently of the downward movement of
 20 the shutter for raising the shutter whenever it is closed or partially open.

22. An automatic fire shutter mechanism comprising in combination a movable shutter arranged adjacent a wall opening, means
 25 for holding the shutter in any position in which it is placed, arranged to release the shutter upon the occurrence of a dangerous rise in temperature, and means normally operatively disconnected from the shutter for
 30 raising the shutter manually.

23. An automatic fire shutter mechanism comprising in combination a movable shutter constructed and arranged for movement to open and close a wall opening, means for
 35 holding the shutter in an open position, arranged to allow the shutter to be raised and lowered manually while said means continues in operation, and manually operable means for raising the shutter.

40 24. An automatic fire shutter mechanism comprising in combination a movable shutter arranged adjacent a wall opening, manually operable means for raising the shutter, and means for holding the shutter in any
 45 position in which it is placed, arranged to allow the shutter to be raised and lowered manually against the action of said holding means.

50 25. An automatic fire shutter mechanism comprising in combination a movable shutter, constructed and arranged for movement to open and close a wall opening, means for

holding the shutter in any position in which it is placed, arranged to allow the shutter to be raised and lowered manually against
 55 the action of said holding means, and manually operable means for normally imparting, when operated, a step-by-step lifting movement to the shutter.

26. An automatic fire shutter mechanism
 60 comprising in combination a coiling shutter arranged to open and close a wall opening, a roller upon which said shutter is coiled, means for rotating the roller to raise the shutter, comprising an oscillatory arm and
 65 a connection between said arm and roller for intermittently rotating the roller.

27. An automatic fire shutter mechanism comprising in combination a coiling shutter arranged to open and close a wall opening,
 70 a roller upon which said shutter is coiled, means for rotating the roller to raise the shutter, comprising an oscillatory arm, mounted coaxially with the roller, a gripping device carried by said arm for inter-
 75 mittently rotating the roller by said arm, and a flexible element connected with said arm for oscillating the arm manually.

28. A fire shutter mechanism comprising in combination, a coiling shutter arranged
 80 adjacent a wall opening, constantly operating counterbalancing means for the shutter, and an independent lifting device inactive during certain movements of the shutter for raising the shutter manually.

29. A fire shutter mechanism comprising in combination a coiling shutter arranged adjacent a wall opening, counterbalancing means operating on the shutter during any
 90 movement of the shutter, and an independent lifting device inactive during certain movements of the shutter for raising the shutter manually.

30. A fire shutter mechanism comprising in combination, a movable shutter arranged
 95 adjacent a wall opening, means for counterbalancing the shutter for up and down movement, and means normally operatively disconnected from the shutter for raising the shutter manually.

Signed at New York this 14th day of December 1925.

WALTER E. DUNCANSON.