

Oct. 29, 1935.

W. G. MILLER

2,019,084

CLOSURE MEMBER

Filed Dec. 23, 1931

4 Sheets-Sheet 1

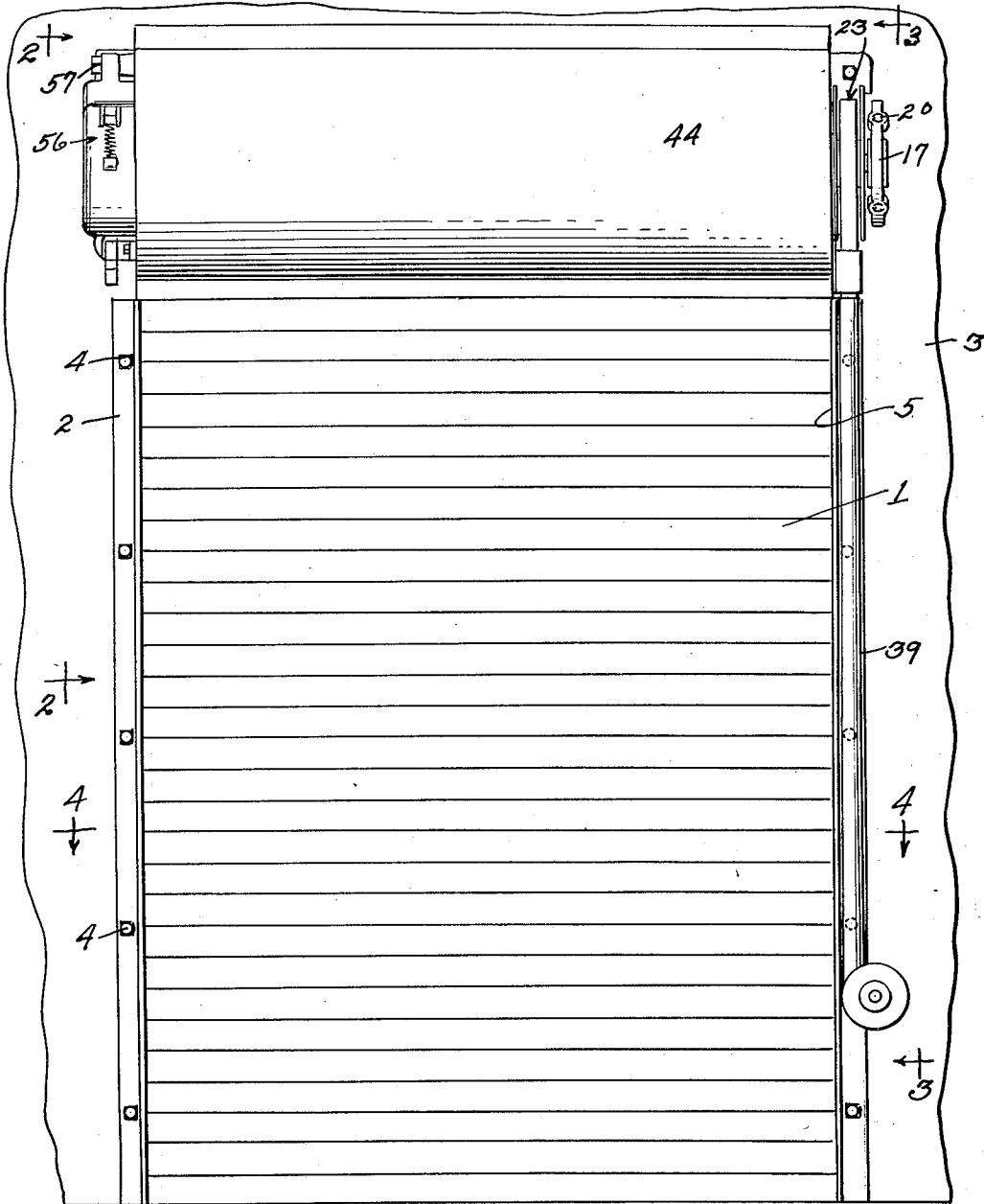


Fig. 1

INVENTOR.

INVENTOR:
WILLIAM G. MILLER

BY

Charles E. Wisner

ATTORNEY.

Oct. 29, 1935.

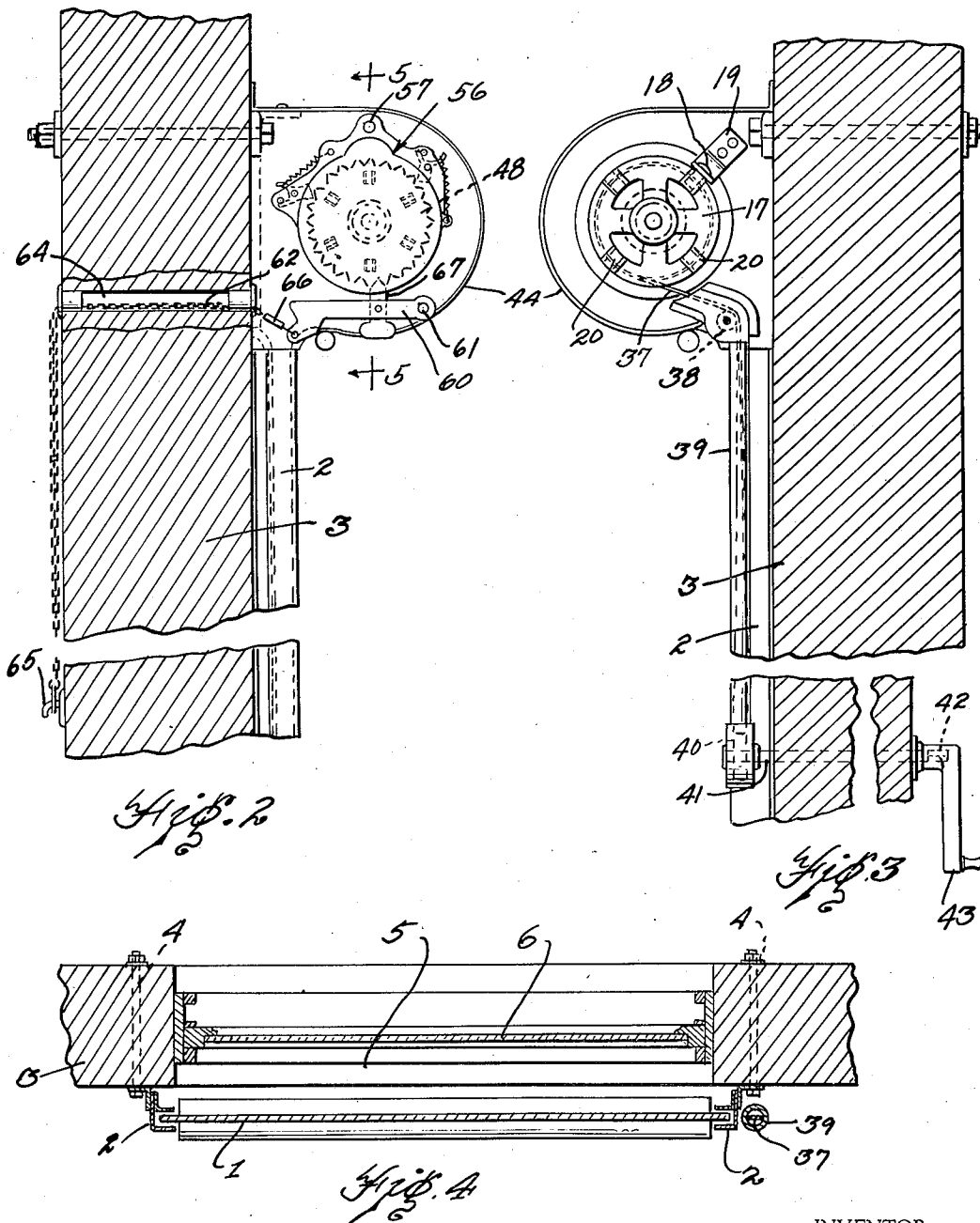
W. G. MILLER

2,019,084

CLOSURE MEMBER

Filed Dec. 23, 1931

4 Sheets-Sheet 2



INVENTOR.
WILLIAM G. MILLER

BY

Charles E. Wimmer

ATTORNEY.

Oct. 29, 1935.

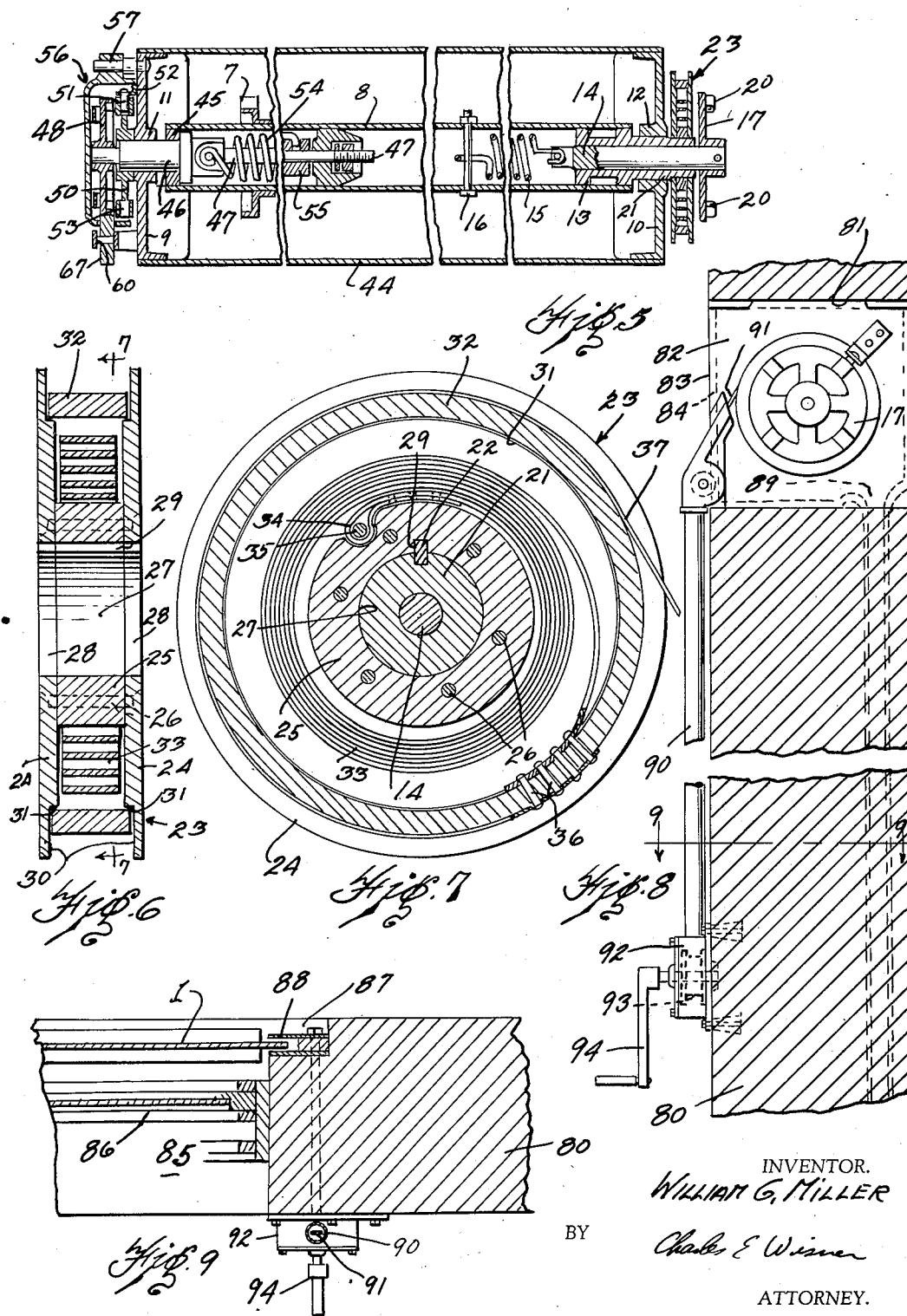
W. G. MILLER

2,019,084

CLOSURE MEMBER

Filed Dec. 23, 1931

4 Sheets-Sheet 3



INVENTOR.
WILLIAM G. MILLER
BY
Charles E. Wisner
ATTORNEY.

Oct. 29, 1935.

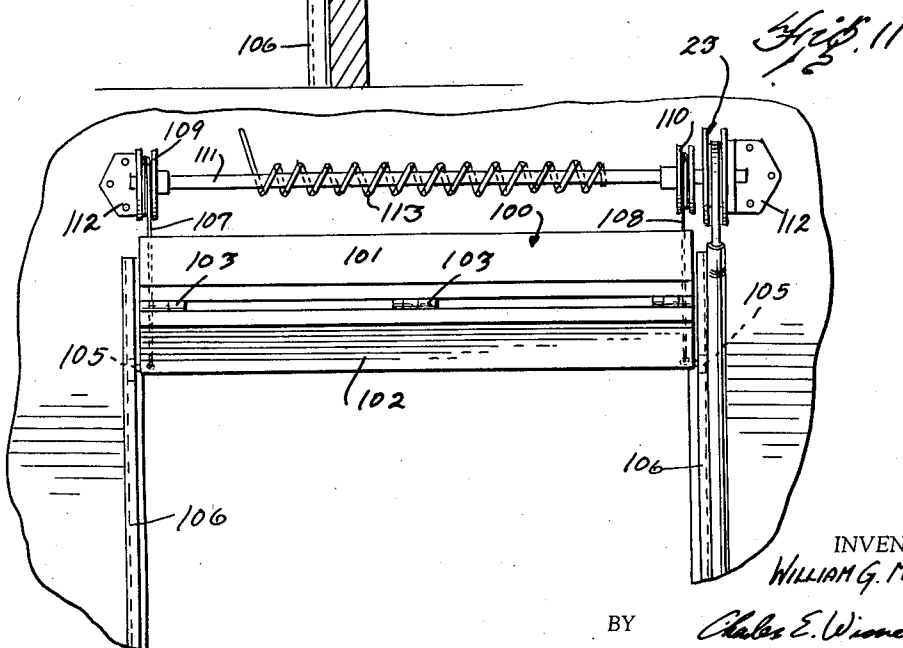
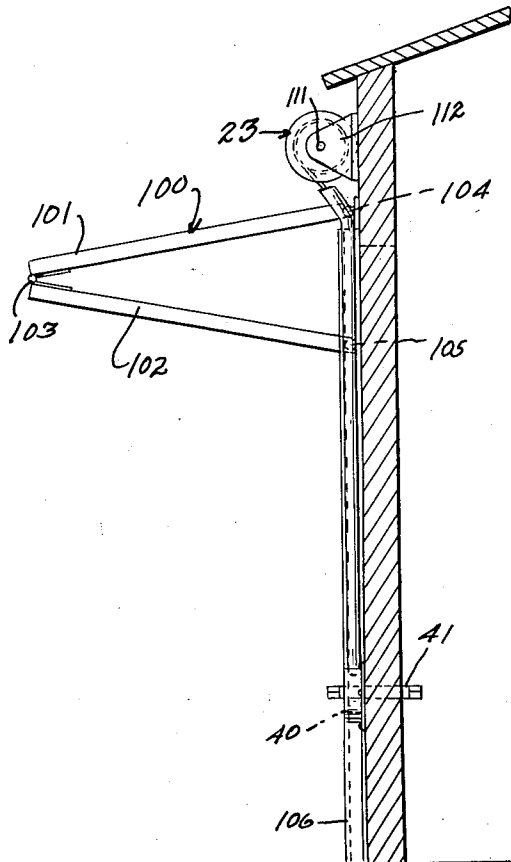
W. G. MILLER

2,019,084

CLOSURE MEMBER

Filed Dec. 23, 1931

4 Sheets-Sheet 4



INVENTOR.
WILLIAM G. MILLER

BY

Charles E. Wiener

ATTORNEY.

UNITED STATES PATENT OFFICE

2,019,084

CLOSURE MEMBER

William G. Miller, Detroit, Mich., assignor to The
R. C. Mahon Company, Detroit, Mich., a corpo-
ration of Michigan

Application December 23, 1931, Serial No. 582,889

13 Claims. (Cl. 189—57)

This invention relates to improvements in clo-
sure members. It is common practice to provide
a steel shutter for closure members of a build-
ing, such as windows or doors that are adjacent
5 another building which constitutes a fire hazard,
the shutters so arranged as to automatically
lower when a heat to a dangerous degree or
above a predetermined temperature is brought
into close proximity to the shutter. It is, there-
10 fore, an object of this invention to provide a roll-
ing steel shutter which will automatically lower
in the presence of fire or which may be released
by hand to permit lowering of the same in order
to test whether the shutter is in working condi-
15 tion and which is provided with a winding reel
operable from the interior of a building to raise
the shutter and which is so designed as to per-
mit the shutter to be lifted by hand.

Another object of the invention is in the pro-
vision of a device of this character having one
20 end of the drum on which the shutter is wound
provided with a winding spool and a flexible tape
or cable having one end connected to the spool
and its other end connected to a hand operated
25 winding reel positioned at a point remote to the
winding spool, and means in the winding spool
for maintaining tension on the winding tape to
permit the shutter to be lifted by hand.

Another object of the invention is in the pro-
vision of a device of this character which may be
30 placed in the wall above the closure member to
be protected or which may be placed on the face
of the wall and which is relatively simple in con-
struction and which will operate with a maximum
35 degree of efficiency and which will not easily get
out of order in operation.

These objects and the several novel features
of the invention are hereinafter more fully de-
scribed and claimed and the preferred form of
40 construction by which these objects are attained
is shown in the accompanying drawings in which—

Fig. 1 is an elevational view of a shutter placed
on the outer face of a wall, in its lowered posi-
45 tion.

Fig. 2 is a section taken on line 2—2 of Fig. 1.

Fig. 3 is a section taken on line 3—3 of Fig. 1.

Fig. 4 is a section taken on line 4—4 of Fig. 1.

Fig. 5 is a section taken on line 5—5 of Fig. 1.

50 Fig. 6 is an enlarged sectional view through
the winding spool.

Fig. 7 is a section taken on line 7—7 of Fig. 6.

Fig. 8 is a view similar to Fig. 3 showing the
shutter placed in the wall.

55 Fig. 9 is a section taken on line 9—9 of Fig. 8.

Fig. 10 is an end view of a modified form of
door structure embodying my invention.

Fig. 11 is an elevational view thereof.

Referring to the drawings, the door or shut-
ter 1 is composed of a plurality of interlocking
5 plates of any desired type and the edges of the
shutter are slidably positioned in the guide 2
secured to the outer face of the wall 3 by means
of the bolts 4. The shutter 1 is adapted to
close the opening 5 in the wall in which the win-
10 dow 6 is positioned, the same being of any de-
sired type. The upper edge of the shutter is
secured to the member 7 rigidly attached to the
sleeve or pipe 8. The brackets 9 and 10 are
15 positioned one adjacent each edge of the shut-
ter and are provided with the respective bear-
ing portions 11 and 12 for supporting the sleeve
8. A bushing 13 is pressed or otherwise secured
in one end of the sleeve 8 and forms a bearing
for the shaft 14. A spring 15 has one end con-
20 nected to the shaft 14 and its other end con-
nected to the sleeve 8 by means of the bolt 16
extending therethrough and the outer end of
the shaft 14 is preferably pinned to the retaining
wheel 17 the same being held from rotation by
25 the pin 18 extending through the stationary
bracket 19 and insertible in one of the sockets 20
provided on the face of the retaining wheel 17.
The bushing 13 is formed with the extension 21
which extends through the bearing portion 12
30 in the end plate 10 and the portion extending
beyond the outer face of the end plate 10 is pro-
vided with a key slot for receiving the key 22.

A winding spool 23 is formed of the end plates 24
and a hub 25 positioned therebetween and se-
35 cured thereto by the rivets 26. The hub 25 is
formed with an aperture 27 of a diameter equal
to the diameter of the apertures 28 in the end
plates 24. A keyway 29 is formed in the end plates
24 and the hub 25 to permit the winding spool
40 to be secured to the portion 21. The end plates 24
are each provided on their inner face with the
reduced portions 30 forming the annular shoul-
ders 31 for positioning the annular ring 32 loosely
45 between the reduced portions 30 of the end plates
24, as is more clearly shown in Fig. 6. A relatively
light flat spiral spring 33 has its inner end pro-
vided with a loop 34 through which a pin or rivet
35 passes, the pin 35 extending through the end
plates 24 to securely fasten one end of the spring
50 to the winding spool 23. The opposite end of the
spring 33 is secured to the ring 32 by means of the
rivets 36, this feature being more clearly shown
in Fig. 7. A winding tape or cable 37 is likewise
55 secured to the outer face of the annular ring 32

by means of the rivets 36. By referring to Fig. 3 it will be seen that the tape or cable 37 passes over the idler roll 38 and thence down through the conduit 39 positioned on the outer face of the wall 5 and has its lower end connected to the winding reel 40 mounted upon the shaft 41 extending through the wall 3 having a squared extension 42 for receiving the removable crank 43.

A sheet metal housing 44 is secured to the end plates 9 and 10 for covering the shutter 1 in its raised or rolled position. The end of the sleeve 8 adjacent the end plate 9 is formed with the bearing 45 in which the member 46 is positioned and a rod 47 is positioned in the member 46 and the outer end of the same has secured thereto the serrated disc 48 and the outer end of the member 46 is secured to the hub of the retaining wheel 50 the same being prevented from rotation by means of the pin 51 extending through the stationary bracket 52 and into one of the sockets 53 provided in the periphery of the retaining wheel 50. The spring 54 has one end attached to the member 46 and has its other end inserted in the aperture in the ring 55 positioned on the shaft 47. It will thus be seen that the tension of the spring 54 may be adjusted to any desired tension by rotating the retaining wheel 50 and that the spring 15 may likewise be adjusted to any desired tension by rotating the retaining wheel 17. It will be understood, of course, that the locking pin for the retaining wheel will first be removed and when the desired tension is secured the pins will again be inserted in one of the sockets. An escapement or governor 56 is pivotally mounted upon the stud 35 57 secured in the end wall 9 and is designed to prevent a too quick dropping of the shutter when the same is released.

A bar 60 is pivotally connected at 61 to the outer face of the end plate 9 and the opposite end has connected thereto one end of the chain 62 the intermediate portion of the chain passing through the aperture 64 provided in the wall of the building and the opposite end of the chain being secured to the hook 65 positioned on the inner face of the wall. A fusible link 66 is provided in the chain 62 at a point adjacent the connection of the chain to the bar 60 so that the link is outside of the building and in the event that heat to a dangerous degree is applied to the exterior of the building the fusible link 66 will melt and allow the shutter 1 to fall, as will be more fully described. A locking member 67 is pivotally mounted upon the bar 60 intermediate its ends and the upper end thereof is tapered or beveled to fit in one of the serrations provided upon the serrated disc 48. It will thus be seen that since the chain 62 holds the bar 60 approximately horizontal that the locking member 67 will prevent rotation of the disc 48 and will hold the shutter 1 in its raised position. In the event that fire causes the link 66 to melt the bar 60 will swing down about its pivot 61 and will release the locking member 67 from engagement with the serrated disc 48 and will permit the spring 54 to rotate the sleeve 8 thereby lowering the shutter 1. The escapement mechanism 56 will prevent to rapid lowering of the shutter thereby preventing injury to anyone who happens to be beneath the shutter at the time of lowering.

In the event that it is desired to raise the shutter after it has been closed by fire it is only necessary to grip the handle on the bottom of the shutter and raise the same or by placing a crank 43 on the squared end 42 and rotating the crank the shutter will likewise be raised.

Referring again to Fig. 7 it will be seen that

when the shutter is in its open or raised position that the spring 33 will be practically unwound but will not be all the way unwound as the same is not of sufficient strength to overcome the friction of the tape passing over the idler rolls and around the winding drum 40. As the shutter is lowered the hub portion of the winding spool 23 will be rotated in a counter-clockwise direction and since the looped end 34 of the spring is carried by the pin 35 the spring will be wound up 10 and will then rotate the ring 32 also in a counter-clockwise direction and will wind the tape 37 from the reel 40 onto the ring 32 and when the shutter is completely lowered the spring 33 will unwind part way until all of the tape has been unwound 15 from the reel 40 and since the end of the tape is fastened to the reel 40 any further rotation of the ring 32 is stopped. If now the shutter is lifted by hand the spring 33 will again be unwound practically all the way but inasmuch as 20 the tendency of the spring in unwinding is to move the ring 32 in a counter-clockwise direction no appreciable amount of movement will be imparted to the ring thereby permitting the winding tape to retain its coiled position around the ring 32. 25

If, however, when the shutter is lowered it is desired to raise the same by operation of the crank 43 the winding drum 35 will be rotated in a clockwise direction through the spring 33. It will thus be seen that the shutter, when lowered, may be 30 either manually lifted or lifted through operation of the crank 43 and the spring 37. This cannot be accomplished if the ring 32 was formed integral with the winding spool 23 as then the tape or cable 37 will simply unwind from the ring 32 35 and loop or twist with the danger of having the same entangle with some of the mechanism and prevent operation of the shutter.

If it is desired to test the shutter to see if it is in working condition it is only necessary to 40 release the chain 62 from the hook 65 thereby releasing the latch 67 and permitting the shutter to drop or lower. When the shutter is again raised the chain may then be fastened to the hook 65 putting the device in operative condi- 45 tion.

Referring to Figs. 8 and 9, I have shown a modified form of construction in which the sleeve on which the shutter is rolled is positioned in an aperture in the wall and the winding reel and 50 crank are placed on the inner face of the wall and the conduit which encases the flexible tape or cable is likewise positioned on the inner face of the wall. In this construction the wall 80 is provided with an aperture 81 extending from the 55 inner to the outer face thereof and the end or bearing plates 82 and 83 are set therein and if desired a sheet metal housing 84 of rectangular form may be positioned in the aperture 81 to close the openings in the inner and outer face of 60 the wall.

The outer face of the wall adjacent the opening 65 85 in which the closure 86 is positioned is provided with a recess 87 in which the guides 88 are positioned. The lower edge of each of the end plates 82 and 83 are provided with the open throat 89 that aligns with the upper edge of the guides 88 to permit passage of the edges of the shutter therethrough. A conduit 90 encloses the flexible 70 tape or cable 91 and is positioned on the inner face of the wall and the lower end of the conduit opens to a housing 92 which encases the winding reel 93 the same being operable by rotation of the removable crank 94. The operation of this form 75

of device is identical with the device heretofore described.

Although the tensioning means is primarily for use with fire shutters nevertheless the same principle may be applied to various types of closure means such as is shown in Figs. 10 and 11. In this form of structure the door 100 is formed of the sections 101 and 102 hingedly connected together at 103 and the upper end of the section 101 is hingedly connected to the frame at 104. The lower end of the section 102 is provided at each end with a roller 105 each riding in one of the guide channels 106. The cables 107 and 108 are connected to the lower edge of the door one adjacent each side thereof and the opposite ends are connected to the respective pulleys 109 and 110 the same being mounted upon the shaft 111 carried in suitable bearings 112.

A counter-balancing spring 113 has one end connected to the shaft 11 and has its other end secured to some stationary portion of the door frame. This spring will be wound up as the door is lowered and will counter-balance the weight thereof and will rotate the shaft 11 as the door is raised to wind the cables 107 and 108 on their respective pulleys 109 and 110. The tensioning device or winding spool 23 is identical with the device heretofore described. In this form of construction the shaft 41 extends through the door frame to permit the winding reel 40 to be operated either from the inside or outside of the building in which the door is installed. It will thus be noted that the door 100 may be lifted by hand to its open position as shown in Fig. 10, or the same may be raised when lowered by rotating the shaft 41 by means of the crank 43. It will be understood, of course, that various types of closure members may be used in conjunction with my improved tensioning device without departing from the spirit of the invention and the scope of the appended claims.

From the foregoing description it becomes evident that I have provided a rolling steel shutter which is so constructed as to permit the same to be raised by hand and which is mounted on a sleeve, the sleeve having a winding spool to which a flexible tape is attached the opposite end of the tape being connected to a winding reel to permit the shutter to be raised by rotation of the winding reel and the winding spool to which the upper end of the tape is connected provided with means for holding the tape in close contact with the winding drum when the shutter is being lifted by hand.

Having thus fully described my invention, its utility and mode of operation, what I claim and desire to secure by Letters Patent of the United States is—

1. In a device of the character described, a rolling steel shutter, a winding drum therefor, a spring tending to turn the drum to unwind the shutter to closed position, means for latching the shutter in its rolled position, thermally and manually controlled means for releasing the latching means to permit unwinding of the shutter, means for rewinding the shutter on the winding drum when the shutter is lowered, comprising a winding spool attached to and rotatable by the winding drum, a cable, one end attached to the winding spool, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable thereon to raise the shutter, and spring means for automatically maintaining tension on the

cable at all times to prevent buckling thereof when the shutter is raised.

2. In a device of the character described, a rolling steel shutter, a winding drum therefor, a spring tending to turn the drum to unwind the shutter to closed position, means for latching the shutter in its rolled position, thermally and manually controlled means for releasing the latching means to permit unwinding of the shutter, means for rewinding the shutter on the winding drum when the shutter is lowered, comprising a winding spool attached to and rotatable by the winding drum, a cable, one end attached to the winding spool, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable thereon to raise the shutter, and spring means in the winding spool for automatically maintaining tension on the cable at all times to prevent buckling thereof when the shutter is raised.

3. In a device of the character described, a rolling steel shutter, a winding drum therefor, means for latching the shutter in its rolled position, thermally and manually controlled means for releasing the latching means to permit unwinding of the shutter, means for rewinding the shutter on the winding drum when the shutter is lowered comprising a two piece winding spool, one piece attached to and rotatable by the winding drum, spring means for connecting the two pieces together, a cable, one end attached to the second piece of the winding spool, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable thereon to raise the shutter, said spring means connecting the two pieces of the winding spool together designed to rotate the second piece relative to the first piece to maintain tension on the cable at all times to prevent buckling thereof when the shutter is lifted by hand.

4. In a device of the character described, a rolling steel shutter, a winding drum therefor, means for latching the shutter in its rolled position, thermally and manually controlled means for releasing the latching means to permit unwinding of the shutter, means for rewinding the shutter on the winding drum, when the shutter is lowered, comprising a winding spool including a hub portion attached to and rotatable by the winding drum, a ring concentrically arranged with the axis of the hub, spring means for connecting the hub and ring together, a cable, one end attached to the ring, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable to raise the shutter, said spring means connecting the hub portion and the ring of the winding spool together designed to rotate the ring relative to the hub portion to maintain tension on the cable at all times to prevent buckling thereof when the shutter is lifted by hand.

5. In a device of the character described, a rolling steel shutter, a winding drum therefor, means for latching the shutter in its rolled position, thermally and manually controlled means for releasing the latching means to permit unwinding of the shutter, means for rewinding the shutter on the winding drum when the shutter is lowered, comprising a two piece winding spool, one piece attached to and rotatable by the winding drum, a coiled spring, one end attached to one piece and the other attached to the second piece of the winding spool, a cable, one end attached to the second piece of the winding spool,

a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding cable to wind the cable thereon to raise the shutter, said spring connecting the two pieces of the winding spool together, wound in a manner to rotate the second piece relative to the first piece to maintain tension on the cable at all times to prevent buckling thereof when the shutter is lifted by hand.

6. In a device of the character described, a rolling steel shutter, a winding drum therefor, means for latching the shutter in its rolled position, thermally and manually controlled means for releasing the latching means to permit unwinding of the shutter, means for rewinding the shutter on the winding drum when the shutter is lowered, comprising a winding spool including a hub portion attached to and rotatable by the winding drum, and a ring concentrically arranged with the axis of the hub, a coiled spring, one end connected to the hub, the opposite end connected to the ring, a cable, one end attached to the ring, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable thereon to raise the shutter, the said spring connecting the hub portion of the ring and the winding spool together so wound as to rotate the ring relative to the hub portion to maintain tension on the cable at all times to prevent buckling thereof when the shutter is lifted by hand.

7. In a device of the character described, a rolling steel shutter, a winding drum therefor, means for latching the shutter in its rolled position, thermally controlled means for releasing the latching means to permit unwinding of the shutter, means for rewinding the shutter on the winding drum when the shutter is lowered, comprising a two-piece winding spool, one piece attached to and rotatable by the winding drum, spring means for connecting the two pieces together, a cable, one end attached to the second piece of the winding spool, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable thereon to raise the shutter, said spring means connecting the two pieces of the winding spool together designed to rotate the second piece relative to the first piece to maintain tension on the cable when the shutter is lifted by hand to prevent buckling of the cable.

8. In a device of the character described, a closure member, a winding spool, means operable by movement of the closure member for rotating the winding spool, spring means wound up by movement of the closure member to open position and tending to move the same to closed position, a cable, one end attached to the winding spool, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable thereon to raise the closure member, and spring means for maintaining tension on the cable to prevent buckling thereof when the closure member is lifted by hand.

9. In a device of the character described, a closure member, a two piece winding spool, means operable by movement of the closure member for rotating one piece of the winding spool, a coiled spring, one end attached to one piece and the other attached to the second piece of the winding spool, a cable, one end attached to the second

piece of the winding spool, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding cable to wind the cable thereon to raise the closure member, said spring connecting the two pieces of the winding spool together, wound in a manner to rotate the second piece relative to the first piece to maintain tension on the cable as the closure member is lifted by hand to prevent buckling of the cable.

10. In a device of the character described, a closure member, a two piece winding spool, means operable by movement of the closure member for rotating one piece of the winding spool, spring means for connecting the two pieces of the winding spool together, a cable, one end attached to the second piece of the winding spool, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable thereon to raise the closure member, said spring means connecting the two pieces of the winding spool together designed to rotate the second piece relative to the first piece to maintain tension on the cable as the closure member is lifted by hand to prevent buckling of the cable.

11. A device of the character described, a closure member, a winding spool, including a hub portion, means operable by movement of the closure member for rotating said hub portion, a ring concentrically arranged with the axis of the hub, spring means for connecting the hub and ring together, a cable, one end attached to the ring, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable to raise the closure member, said spring means connecting the hub portion and the ring of the winding spool together designed to rotate the ring relative to the hub portion to maintain tension on the cable as the closure member is being lifted by hand to prevent buckling of the cable.

12. In a device of the character described, a closure member, a winding spool including a hub portion, means operable by movement of the closure member for rotating said hub, a ring concentrically arranged with the axis of the hub, a coiled spring, one end connected to the hub, the opposite end connected to the ring, a cable, one end attached to the ring, a winding reel, the opposite end of the cable attached thereto, means for manually rotating the winding reel to wind the cable thereon to raise the shutter, the said spring connecting the hub portion and the ring of the winding spool together, so wound as to rotate the ring relative to the hub portion to maintain tension on the cable as the closure member is being lifted by hand to prevent buckling of the cable.

13. In a tensioning device, a winding spool including a hub portion, and a ring concentrically arranged with the axis of the hub, spring means for connecting the hub and ring together, a cable, one end attached to the ring, means for rotating the hub portion, manual means for pulling the cable to unwind the same from the ring, the said spring means connecting the hub portion and the ring of the winding spool together designed to rotate the ring relative to the hub portion to maintain tension on the cable at all times.

WILLIAM G. MILLER.