

AUTOMATIC UNROLL DEVICE FOR FIRE-PROOF SHUTTERS

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to an automatic unroll device, and more particularly to an automatic unroll device for fire-proof shutters.

2. Description of Related Art

A conventional fire-proof shutters in accordance with the prior art shown in Fig. 15 comprises a free unroll device (30'), an operated
10 chain (62'), a drive device (61') and a switch (63'). The user presses the switch (563,) to start the drive device (61') for driving a rolling device (60') to roll-up or unroll the shutters. The shutters is unrolled or rolled up by manpower pulling the operated chain (62') when the power is failure. In addition, the free unroll device (30') has a lever
15 (31') mounted thereon. In an emergency condition, such as a fire alarm, the shutters is departed from the rolling device (60') and freely unrolled to separate from danger when the lever (31') is wrenched. However, the temperature usually is very high when in a fire accident such that the operator may not wrench the lever (31') to unroll the
20 shutters and separate danger.

The present invention has arisen to mitigate and/or obviate the disadvantages of the conventional fire-proof shutters.

SUMMARY OF THE INVENTION

The main objective of the present invention is to provide an improved automatic unroll device for fire-proof shutters, which will sense the temperature of the environment and automatically drive.

To achieve the objective, the automatic unroll device in accordance with the present invention comprises a seat and a housing attached to each other. A thermal controller, an automatic unroll controller and multiple cables respectively disposed within the seat and the housing. A main controller, an auxiliary controller, an electromagnetic valve, a manual controller, a T-shaped controller and a position plate respectively mounted on the seat. The T-shaped controller is connected to the main controller and selectively engaged to the position plate. The auxiliary controller, the electromagnetic valve and the manual controller respectively make the T-shaped controller disengaged from the position plate and drive the main controller to operate the automatic unroll controller for closing the fire-proof shutters.

Further benefits and advantages of the present invention will become apparent after a careful reading of the detailed description with appropriate reference to the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective schematic view of an automatic unroll device for fire-proof shutters in accordance with the present invention;

Fig. 2 is a partially exploded perspective view Fig. 1;

Fig. 3 is a top plan view of the automatic unroll device in Fig.
1;

Fig. 4 is an exploded perspective view of the automatic unroll
device of the present invention;

5 Fig. 5 is a perspective schematic view of a first embodiment of
the automatic unroll device in accordance with the present invention;

Fig. 6 is a top plan view of the first embodiment of the
automatic unroll device in accordance with the present invention;

Fig. 7 is a perspective view of a second embodiment of the
10 automatic unroll device in accordance with the present invention;

Fig. 8 is a top plan view of a third embodiment of the automatic
unroll device in accordance with the present invention;

Fig. 9 is a first operational view of the automatic unroll device
in accordance with the present invention;

15 Fig. 10 is a second operational view of the automatic unroll
device in accordance with the present invention;

Fig. 11 is a third operational view of the automatic unroll
device in accordance with the present invention;

Fig. 12 is a fourth operational view of the automatic unroll
20 device in accordance with the present invention;

Fig. 13 is a fifth operational view of the automatic unroll device
in accordance with the present invention;

Fig. 14 is a sixth operational view of the automatic unroll

device in accordance with the present invention; and

Fig. 15 is perspective view of a conventional fire-proof shutters in accordance with the prior art.

DETAILED DESCRIPTION OF THE INVENTION

5 Referring to the drawings and initially to Figs. 1-4, an automatic unroll device for fire-proof shutters in accordance with the present invention comprises a seat (10) and a housing (11) mounted on the seat (10). The seat (10) has a bottom (103), a front plate (101) and a rear plate (102) respectively upwardly extending from two opposite
10 edges of the bottom (103) to form a U-shape. A first hook (104) is formed on an inner periphery of the front plate (101) and multiple threaded holes (105) respectively defined in the front plate (101) and the rear plate (102). A front through hole (106) is defined in the front plate (101), a rear through hole (107) is defined in the rear plate (102)
15 and multiple through holes (108) are defined in the rear plate (102).

A main controller (12) is mounted between the front plate (101) and the rear plate (102). The main controller (12) includes a pusher (121) longitudinally extending from a first end thereof to form a first shoulder (125). A second shoulder (122) formed on a middle section of
20 the main controller (12). A first resilient member (123) is sleeved on a second end of the main controller (12) and has two opposite ends respectively abutting the second shoulder (122) and the rear plate (102). A longitudinal hole (124) is defined in main controller (12) and extends

through the main controller (12). The first end and the second end of the main controller (12) respectively extend through the front through hole (106) and the rear through hole (107).

An auxiliary controller (13) is mounted in the seat (10) and has
5 a flange (131) radially extending from a middle section of the auxiliary controller (13). A second resilient member (132) sleeved on the auxiliary controller (13). The second resilient member (132) has two opposite ends respectively abutting the flange (131) and the rear plate (102) aligning with a corresponding one of the multiple through holes
10 (108) in the rear plate (102).

A manual controller (14) mounted on the bottom (103) of the seat (10). The manual controller (14) has a second hook (141) formed thereon. A third resilient member (142) has two opposite ends respectively fixed on the first hook (104) on the front plate (101) and
15 the second hook (141) of the manual controller (14).

An electromagnetic valve (15) is mounted on the bottom (103) and has a connector (151) extending therefrom. A position plate (16) is mounted on an interior of the front plate (101). The position plate (16) has a stopper (161) formed thereon and a micro switch (162) mounted
20 thereon.

A T-shaped controller (17) is mounted on the main controller (12). The T-shaped controller (17) has a first plate (172) and a second plate (173) mounted to each other, and multiple rollers (171) positioned

between the first plate (172) and the second plate (173). The rollers (171) are engaged to the stopper (161) of the position plate (16). A fastener (175) sequentially extending through the longitudinally hole (124), the first plate (172) and the second plate (173) to position the
5 T-shaped controller (17) on the main controller (12). The first plate (172) and the second plate (173) respectively have a bore (174) defined in a free end of each of the first plate (172) and the second plate (173). The free end of the first plate (172) is connected to the connector (151) of the electromagnetic valve (15) and the free end of the second plate
10 (173) abuts the flange (131) of the auxiliary controller (13) opposite to the second resilient member (132).

A thermal controller (20) connected to the auxiliary controller (13) by a first cable (41). The thermal controller (20) includes a clutch (23) having a first end combined with a hot melt metal (21) and a
15 second end combined with a connector (22) that is connected to the first cable (41). An automatic unroll controller (30) is mounted under the seat (10) and corresponds to the pusher (121) of the main controller (12).

The first cable (41) has a first buckle (411) and a first adjuster (412). A second cable (42) has a second buckle (421), a second adjuster (422) and a sleeve (423). A third cable (43) has a third buckle (431), a third adjuster (423) and a sleeve (433). The first buckle (411), the
20 second buckle (421) and the third buckle (431) are respectively fixed in

a corresponding one of the multiple through holes (108) in the rear plate (102) for allowing the first cable (41), the second cable (42) and the third cable (43) extending through the rear plate (102). The first cable (41) is connected to the flange (131) of the auxiliary controller (13), the second cable (42) is disposed between the T-shaped controller (17) and the main controller (12) and the third cable (43) is partially and securely received in a cavity (143) that is defined in the manual controller (14).

A rolling device (60) is mounted on the seat (10). The rolling device (60) includes a drive device (61), two operated chains (62) and a switch (63) for controlling the drive device (61). A plate (601) is secured on the rolling device (60) for positioning the rolling device (60) on the seat (10).

With reference to the Figs. 5 and 6 that show a first schematic embodiment of the present invention, the structure of the embodiment is similar to that shown in the Figs. 1-4, wherein the manual controller (14) and the electromagnetic valve (15) is detached. The opposite ends of the third resilient member (142) are respectively secured on the first hook (104) of the seat (10) and the first plate (172) of the T-shaped controller (17). The third cable (43) is connected to the first plate (172) of the T-shaped controller (17).

With reference to Fig. 7 that shows a second schematic embodiment of the present invention, the structure of this embodiment

is similar to that shown in the Figs. 1-4, wherein the first plate (172) and the second plate (173) of the T-shaped controller (17) are integrally formed with each other.

With reference to Fig. 8 that shows a third schematic embodiment of the present invention, the structure of this embodiment is similar to that shown in the Figs. 1-4, wherein the present invention further comprises a smoke sensor (70) electrically connected to the electromagnetic valve (15). The smoke sensor (70) drives the electromagnetic valve (15) to pull the first plate (172) of the T-shaped controller (17) to make the roller (171) disengaged from the stopper (161) of the position plate (16). The first resilient member (123) of the main controller (12) is released and pushes the main controller (12), which is connected to the T-shaped controller (17), due to the restitution force of the first resilient member (123). As a result, the main controller (12) pushes the automatic unroll controller (30) to make the shutters disengaged from the rolling device (60) for closing.

With reference to Fig. 9, the first resilient member (123) of the main controller (12) is released and pushes the main controller (12), which is connected to the T-shaped controller (17), due to the restitution force of the first resilient member (123) when the electromagnetic valve (15) pulls the first plate (172) of the T-shaped controller (17) to make the roller (171) disengaged from the stopper (161) of the position plate (16). As a result, the main controller (12)

pushes the automatic unroll controller (30) to make the shutters
disengaged from the rolling device (60). The T-shaped controller (17)
is moved to the original position and the roller (171) of the T-shaped
controller (17) engaged to the stopper (161) of the position plate (16)
5 when the second cable (42) is pulled.

With reference to Fig. 10, the first resilient member (123) of the
main controller (12) is released and pushes the main controller (12),
which is connected to the T-shaped controller (17), due to the
restitution force of the first resilient member (123) when the third cable
10 (43) is pulled to make the manual controller (14) push the first plate
(172) of the T-shaped controller (17) and the roller (171) disengaged
from the stopper (161) of the position plate (16). As a result, the main
controller (12) pushes the automatic unroll controller (30) to make the
shutters disengaged from the rolling device (60). The T-shaped
15 controller (17) is moved to the original position and the roller (171) of
the T-shaped controller (17) engaged to the stopper (161) of the
position plate (16) when the second cable (42) is pulled.

With reference to Fig. 11, the clutch (23) flips and releases the
first cable (41) when the hot melt metal (23) is melt under 50°C. The
20 second resilient (132) drive the flange (131) of the auxiliary controller
(13) to make the auxiliary controller push the first plate (172) of the
T-shaped controller (17) and the roller (171) disengaged from the

stopper (161) of the position plate (16). The first resilient member (123) of the main controller (12) is released and pushes the main controller (12), which is connected to the T-shaped controller (17), due to the restitution force of the first resilient member (123). As a result, the
5 main controller (12) pushes the automatic unroll controller (30) to make the shutters disengaged from the rolling device (60). The T-shaped controller (17) is moved to the original position and the roller (171) of the T-shaped controller (17) engaged to the stopper (161) of the position plate (16) when the second cable (42) is pulled.

10 With reference to Figs 12-14, the first shoulder (125) of the main controller (12) is departed from the micro switch (162) when the main controller is engaged to the stopper (160) of the position plate (16). The main controller (12) is moved to make the first shoulder (125) contract with the micro switch (162) to cut off the power when
15 T-shaped controller (17) is disengaged from the stopper (161) of the position plate (16). As a result, the electromagnetic valve (15) would not be continually operated and cause danger because the micro switch (162) is electrically connected to the electromagnetic valve (15).

 Although the invention has been explained in relation to its
20 preferred embodiment, it is to be understood that many other possible modifications and variations can be made without departing from the spirit and scope of the invention as hereinafter claimed.

WHAT IS CLAIMED IS:

1. An automatic unroll device for fire-proof shutters

comprising:

- 5 a seat and a housing mounted on the seat, the seat having a bottom, a front plate and a rear plate respectively upwardly extending from two opposite edges of the bottom, a first hook formed on an inner periphery of the front plate, a front through hole defined in the front plate, a rear through hole defined in the rear plate and multiple through holes defined in the rear plate;
- 10 a main controller mounted between the front plate and the rear plate, the main controller including a pusher longitudinally extending from a first end thereof to form a first shoulder, a second shoulder formed on a middle section of the main controller, a first resilient member sleeved on a second end of the main controller and
- 15 having two opposite ends respectively abutting the second shoulder and the rear plate, a longitudinal hole defined in main controller and extending through the main controller, the first end and the second end of the main controller respectively extending through the front through hole and the rear through hole;
- 20 an auxiliary controller mounted in the seat and having a flange radially extending from a middle section of the auxiliary controller, a second resilient member sleeved on the auxiliary controller, the second resilient member having two opposite ends respectively

abutting the flange and the rear plate aligning with a corresponding one of the multiple through holes in the rear plate;

a manual controller mounted on the bottom of the seat, the manual controller having a second hook formed thereon;

5 an electromagnetic valve mounted on the bottom;

a position plate mounted on an interior of the front plate, the position plate having a stopper formed thereon and a micro switch mounted thereon;

a T-shaped controller mounted on the main controller, the
10 T-shaped controller having a first plate and a second plate mounted to each other, and multiple rollers positioned between the first plate and the second plate, the rollers engaged to the stopper of the position plate, a fastener sequentially extending through the longitudinally hole, the first plate and the second plate to position the T-shaped controller on
15 the main controller, a free end of the first plate connected to the electromagnetic valve and the free end of the second plate abuts the auxiliary controller opposite to the second resilient member;

a thermal controller connected to the auxiliary controller by a first cable, the thermal controller including a clutch having a first end
20 combined with a hot melt metal and a second end combined with a connector that is connected to the first cable, the first cable connected to the flange of the auxiliary controller;

an automatic unroll controller mounted under the seat and

corresponds to the pusher of the main controller;

a second cable disposed between the T-shaped controller and the main controller; and

a third cable partially and securely received in a cavity that
5 is defined in the manual controller.

2. The automatic unroll device as claimed in claim 1, wherein T-shaped controller is engaged to the stopper of the position plate.

3. The automatic unroll device as claimed in claim 1, wherein the electromagnetic valve has a connector extending therefrom and the
10 free end of the first plate of the T-shaped controller is connected to connector of the electromagnetic valve.

4. The automatic unroll device as claimed in claim 1, wherein the free end of the second plate of the T-shaped controller abuts the flange of the auxiliary controller.

15 5. The automatic unroll device as claimed in claim 1, wherein the manual controller includes a third resilient member having two opposite ends respectively connected to the first hook of the seat and the second hook of the manual controller.

6. The automatic unroll device as claimed in claim 1, wherein
20 the melting point of the hot melt metal is 50°C.