BUFFER APPARATUS OF ROLLING CURTAIN

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ABSTRACT
A buffer apparatus for rolling curtain. The buffer apparatus is disposed in a reel of the rolling curtain, including a housing, a clutch mechanism disposed in the housing and movable between an adjoining position and a separated position and a driving shaft fitted in the housing and drivenly connected with the clutch mechanism. One end of the driving shaft protrudes from the housing to connect with a rotary disc. The rotary disc is drivable by the reel to drive and rotate the driving shaft and operate the clutch mechanism. When the reel forward rotates to drop the drape of the curtain, the clutch mechanism is moved from the adjoining position to the separated position and no damping effect is created. When the reel backward rotates to wind the drape and a certain length of the drape remains, the clutch mechanism is moved from the separated position to the adjoining position. At this time, the rotary disc operates a damping mechanism to provide damping effect so as to provide a buffering effect when the reel winds the drape.
BUFFER APPARATUS OF ROLLING CURTAIN

BACKGROUND OF THE INVENTION

[0001] The present invention is related to a curtain, and more particularly to a buffer apparatus mounted in a rolling curtain. The buffer apparatus provides a buffering effect when the rear winds the drape of the rolling curtain.

[0002] A conventional rolling curtain includes a rotatable reel and drape wound on the reel. A locating mechanism and a winding mechanism having torque spring are disposed in the reel. When a user pulls the drape downward, the reel is driven to forward rotate, for example, counterclockwise rotate so as to release the drape. During the forward rotation of the reel, the winding mechanism conserves a resilient energy.

[0003] When the user stops pulling the drape, the locating mechanism provides a locating effect to prevent the reel from being further rotated. Therefore, the drape is kept in a certain height.

[0004] When winding the drape, the user further slightly downward pulls the drape so as to release the reel from the located state. At this time, the reel can be freely rotated and the winding mechanism can drive the reel to backward rotate for winding the drape.

[0005] When the winding mechanism winds the drape, the torque spring will release the resilient energy to make the reel fast rotate. As a result, the drape will be wound at a very fast speed. Therefore, it is necessary to provide a buffer apparatus in the reel for buffering the winding speed of the rolling curtain.

SUMMARY OF THE INVENTION

[0006] It is therefore a primary object of the present invention to provide a buffer apparatus for rolling curtain. When the reel of the rolling curtain winds the drape in a final stage, the buffer apparatus buffers the winding speed of the reel so as to avoid impact of the drape.

[0007] The present invention can be best understood through the following description and accompanying drawings wherein:

BRIEF DESCRIPTION OF THE DRAWINGS

[0008] FIG. 1 is a sectional view showing that the buffer apparatus of the present invention in mounted in the reel of a rolling curtain;

[0009] FIG. 2 is a front partially sectional view of a preferred embodiment of the present invention;

[0010] FIGS. 3 to 6 show the housing of the present invention;

[0011] FIGS. 7 to 10 show the shafted member of the present invention;

[0012] FIGS. 11 to 14 show the clutch member of the present invention;

[0013] FIG. 15 is a sectional view of the reducing mechanism of the present invention;

[0014] FIGS. 16 to 27 show the components of the reducing gear set of the present invention, wherein FIG. 25 is a sectional view taken along line 25-25 of FIG. 15;

[0015] FIGS. 28 to 30 show the driving shaft of the present invention;

[0016] FIG. 31 is a sectional view taken along line 31-31 of FIG. 2;

[0017] FIGS. 32 to 34 show the controller of the present invention;

[0018] FIGS. 35 to 40 show the linking collar of the present invention;

[0019] FIGS. 41 to 43 show the rotary disc of the present invention;

[0020] FIG. 44 shows the relationship between the clutch member and shafted member of the present invention in the adjoining position;

[0021] FIG. 45 is a stretched view according to FIG. 44;

[0022] FIG. 46 is a stretched view showing that the clutch member is moved to the separated position;

[0023] FIG. 47 is a view according to FIG. 2, showing that the buffer apparatus is positioned in the separated position; and

[0024] FIG. 48 is a stretched view showing the disengagement travel of the clutch member.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0025] Please refer to FIG. 1. The buffer apparatus 20 of the present invention is mounted in a reel 12 of a rolling curtain 10. Only the right half of the rolling curtain is shown in FIG. 1.

[0026] The rolling curtain has a rail 14 and two end pieces 15 respectively disposed at two ends of the rail. (Only the right end piece is shown in FIG. 1.) The reel 12 can be rotated between the two end pieces 15. The buffer apparatus 20 can be specifically operated with the forward or backward rotated reel. In addition, a winding mechanism (not shown) is mounted in the left half of the reel 12 (not shown in FIG. 1). When the reel is forward rotated to release the drape 16, the torque spring of the winding mechanism conserves a resilient energy. The winding mechanism pertains to prior art.

[0027] In a preferred embodiment of the present invention, the buffer apparatus 20 is connected with a locating mechanism 17. The buffer apparatus 20 and the locating mechanism 17 are both mounted in the reel 12. The locating mechanism 17 pertains to prior art. Referring to FIG. 2, the locating mechanism 17 has a shaft 18 and a barrel body 19 rotatably fitted around the shaft 18. The outer circumference of the barrel body 19 is engaged with inner wall face of the reel 12 so that the barrel body 19 and the reel 12 can be synchronously rotated. A detent unit (not shown) is disposed between the barrel body 19 and the shaft 18. When a user pulls the drape 16 to drive and rotate the reel, the barrel body 19 can drive the detent unit to reciprocally operate between a locked state and an unlocked state. In the locked state, the barrel body 19 cannot be rotated. In the free state (unlocked state), the barrel body 19 can rotated about the shaft 18. One end 181 of the shaft 18 of the locating mechanism 17 is inserted in the right end piece 15 and cannot be rotated.
The buffer apparatus 20 includes a housing 30 which is an elongated cylindrical body as shown in FIGS. 3 to 6. Two ends of the housing 30 are respectively formed with two axial cavities 32, 34 communicating with each other via a shaft hole 35 formed between the cavities 32, 34. A shaft tube 36 leftward extends from one end of the shaft hole. The shaft tube protrudes from the left end of the housing by a predetermined length. The housing is disposed in the reel 12. The length of the housing is parallel to the axis of the reel.

The buffer apparatus 20 further includes a clutch mechanism A including a shafted member 40 and a clutch member 50. The shafted member 40 has a disc section 42 as shown in FIGS. 7 to 10. A connector 44 and a shaft section 46 are respectively disposed on two end faces of the disc section 42. An arched cam section 48 is disposed on the end face of the disc section 42 with the shaft section 46. The arc of the arched cam section 48 is not larger than 180 degrees. The cam section 48 and the shaft section 46 are concentric. The disc section 42 of the shafted member 40 covers right end of the housing 30 as shown in FIG. 2. The disc section 42 has a latch section 43 fixedly latched in a latch hole 31 of the right end of the housing 30. The connector 44 is positioned on outer side of the housing 30. The shaft section 46 and the cam section 48 are positioned in the first cavity 32 of the housing.

Referring to FIGS. 11 to 14, the clutch member 50 has a disc section 52. A right end face of the disc section 52 is formed with a connecting hole 53 and a second cam section 54 around the connecting hole 53. The second cam section 54 has an arc not larger than 180 degrees. A connector 55 is disposed on a left end face of the disc section 52. A free end of the connector is formed with a noncircular connecting hole 56. The connecting holes 56, 53, and the cam section 54 are concentric. The clutch member 50 is positioned in the first cavity 32 of the housing. The shaft section 46 of the shafted member 40 is inserted in the right end of the connecting hole 53. The two cam sections 54, 48 are opposite to each other. The clutch member can be rotated about the shaft section 46 of the shafted member 40. Also, the clutch member can be slid along the axis of the shaft section 46.

The shaft 18 of the locating mechanism 17 is fixedly connected in the insertion hole 45 of the connector 44 of the shafted member by an insertion pin as shown in FIG. 2. Accordingly, the buffer apparatus 20 is connected with the locating mechanism and the housing 30 is located without moving.

The buffer apparatus 20 further includes a reducing mechanism as shown in FIG. 15. The reducing mechanism is a reducing gear set 60 including a casing 62. As shown in FIGS. 16 to 18, the casing 62 is a hollow cylindrical body having an interior cylindrical chamber. A right end of the casing 62 is closed and formed with an opening 64. A left end of the casing 62 is open. An inner circumference of the casing 62 is formed with an annular splined section 66. The splines of the splined section 66 are parallel to the axis of the casing.

The reducing mechanism further includes a planet gear shaft 70 as shown in FIGS. 19 to 21. The planet gear shaft 70 has a disc section 72 and a noncircular connectors 74 and a shaft section 76 respectively disposed on two faces of the disc section 72. The planet gear shaft 70 is mounted in the casing 62 with the connector 74 extending through the opening 64 out of the casing. The connector 74 is fixed at one end of the opening 64 by a C-shaped retaining 77. The disc section 72 abuts against the other end of the opening 64. Accordingly, when the planet gear shaft 70 is moved, the entire reducing gear set is driven and moved.

The reducing mechanism further includes two disc bodies 78, 80 as shown in FIGS. 22 to 24. A gear section 82 is disposed on right end face of each disc body. The shaft section 76 of the planet gear shaft is rotatably fitted in the shaft holes 84 of the disc bodies 78, 80.

The reducing mechanism further includes multiple planet gears 85 as shown in FIGS. 15 and 25. The planet gears 85 are pivotally connected on the disc section 72 of the planet gear shaft and the shaft bosses 73 of the disc bodies 78, 80. The outer circumferences of the planet gears are engaged with the splined section 66 of the inner circumference of the casing 62. In addition, the gear section 82 of the first disc body 78 is engaged with the inner circumference of the planet gear 85 pivotally disposed on the second disc body 80. The gear section 82 of the second disc body 80 is engaged with the planet gear pivotally disposed on the planet gear shaft 70. Accordingly, when the first disc body 78 drives the second disc body 80 to rotate, a reducing effect is achieved. Also, when the second disc body drives the planet gear shaft, a reducing effect is achieved.

The reducing mechanism further includes a cap body 86 having a latch section 88 as shown in FIGS. 26 and 27. The cap body 86 covers the open end of the casing 62 with the latch section 88 latched with the latch hole 68 of the casing 62.

The reducing gear set 60 is also mounted in the first cavity 32 of the housing 30. The ribs 69 formed on outer circumference of the casing 62 are inserted in the longitudinal insertion channels 38 formed on inner circumference of the cavity 32. Therefore, the casing 62 can only slide within the cavity 32 without rotation. The connector 74 of the planet gear shaft 70 is inserted in left end of the connecting hole 53 of the clutch member 50 and fixed by an insertion pin. Accordingly, the reducing gear set 60 and the clutch member 50 can be synchronously displaced along the axis of the housing 30. In addition, the planet gear shaft 70 and the clutch member 50 can be synchronously rotated.

The buffer apparatus 20 further includes a driving shaft 90 as shown in FIGS. 28 to 30. The driving shaft 90 has a gear section 92 at right end. The driving shaft 90 is fitted through the shaft hole 35 of the housing 30 as shown in FIG. 2 with the gear section 92 positioned in the first cavity 32. The left end of the driving shaft 90 protrudes out the shaft tube 35. The right end of the driving shaft 90 is fitted through the hole 89 of the cap body 86 of the reducing gear set into the reducing gear set as shown in FIG. 15. The gear section 92 is engaged with inner circumference of the planet gear 85 on the first disc body 78. Such engagement is a reducing design, whereby when the driving shaft 90 drives the first disc 78, a reducing effect is achieved. Also, when the first disc body drives the second disc body 80 and the second disc body drives the planet gear shaft 70, a reducing effect is achieved. By means of the three-stage reducing design, when the rotational speed of the driving shaft is transmitted to the planet gear shaft, the rotational
speed is greatly reduced. According to the design of a preferred embodiment of the present invention, the ratio of the rotational speed of the driving shaft 90 to the rotational speed of the planet gear shaft 70 is 27:1, that is, each time the driving shaft revolves by 27 cycles, the planet gear shaft only revolves by one cycle.

[0039] Moreover, a second latch member 94 (C-shaped retainer) is latched with the driving shaft 90 as shown in FIG. 2. The gear section 92 and the latch member 94 respectively abut against two ends of the cap body 82 of the reducing gear set, whereby the driving shaft can be axially displaced along with the reducing gear set.

[0040] The buffer apparatus 20 further includes a damping mechanism B including a damper and a controller.

[0041] Referring to FIGS. 2 and 31, in this embodiment, the damper 95 is a coil spring mounted in the second cavity 34 of the housing. An outer circumference of the damper 95 abuts against inner circumference of the cavity 34. A protruding end 96 inward extends from one end of the damper.

[0042] Referring to FIGS. 32 to 34, the controller 100 is disposed at left end of the housing for controlling the damper 95. The controller 100 is a hollow cylindrical body having a sealed end and a closed end. The closed end is formed with a central inner hole 102. A shift section 104 is formed on inner wall face of the sealed end. The shift section is a projection with a 180 degree arched cross-section. The controller is rotatably fitted with the left end of the housing 30. An annular groove 106 is formed on inner circumference of the controller. An annular rib 37 is formed on outer circumference of the housing for hooking the annular groove 106 of the controller. Accordingly, the controller will not detach from the housing. The shift section 104 extends into the second cavity 34 and is positioned in the damper 95 as shown in FIG. 31. The shift section 104 corresponds to the protruding end 96 of the damper for shifting the protruding end. In addition, an oil is painted between the inner circumference of the controller and the outer circumference of the left end of the housing. By means of the oil, a damping effect is achieved when the controller rotates.

[0043] The buffer apparatus 20 further includes a linking collar 110 as shown in FIG. 2. The linking collar 110 is fitted around the controller 100 via a one-way transmission member (which is a one-way bearing 120 in this embodiment). The one-way bearing 120 is a conventional member. When the linking collar 110 is rotated in a direction, through the one-way bearing 120, the controller is driven to synchronously rotate. Reversely, when the linking collar is rotated in another direction, the one-way bearing idles so that the linking collar cannot drive the controller.

[0044] In this embodiment, the linking collar 110 has an outer sleeve section and an inner sleeve section. Referring to FIGS. 35 to 37, the inner sleeve section 112 is a hollow cylindrical body one end of which is fixedly connected with outer circumference of the one-way bearing 120. The controller 100 is fitted in the inner circumference of the one-way bearing.

[0045] Referring to FIGS. 38 to 40, the outer sleeve section 115 is also a hollow cylindrical body having a left closed end. A touch section 116 is formed on the end face of the closed end. The outer sleeve section 115 is fitted around the inner sleeve section 112 with latch hole 117 latched with latch section 113 of the inner sleeve section. Accordingly, the inner and outer sleeve sections are fixedly fitted with each other and synchronously rotate. It should be noted that the linking collar can be alternatively a one-piece member.

[0046] The extending length of the shaft tube 36 of the housing just reaches a position where the linking collar 110 is mounted, whereby the shaft tube 36 can be fitted in the inner holes 102, 118 of the controller 100 and the linking collar 110 to stabilize the controller 100 and the linking collar 110 when rotated. The free end of the driving shaft 90 protrudes more outward than the linking collar.

[0047] The buffer apparatus 20 further includes a rotary disc 130 as shown in FIGS. 41 to 43. An end face of the rotary disc is formed with at least one trigger section 132. (In this embodiment, there are three concentric trigger sections.) The rotary disc 130 is formed with a noncircular central hole 134 in which the free end of the driving shaft 90 is fixedly connected for driving the driving shaft to rotate. A latch section 135 is formed on an edge of the noncircular hole 134 for latching with the driving shaft so that the rotary disc will not detach from the driving shaft. The rotary disc has a profile adapted to the rib 121 formed on inner circumference of the reel 12 of the rolling curtain. Accordingly, the rotary disc is engaged with the inner circumference of the reel and is drivable by the reel.

[0048] The buffer apparatus 20 further includes a spring 140 disposed in the first cavity 32 as shown in FIG. 2. One end of the spring abuts against the reducing gear set 60. The other end of the spring abuts against a partitioning board 33 between the two cavities 32, 34. The spring resiliently forces the reducing gear set, whereby in normal state, the reducing gear set tends to move to right end of the housing.

[0049] When the drape 16 of the curtain is completely wound by the reel 12, the clutch member 50 is put in an engagement travel. At this time, as shown in FIGS. 44 and 45, the cam section 54 of the clutch member is zigzag dislocated from the cam section 48 of the shaft member 40. The spring 140 resiliently makes the reducing gear set 60, clutch member 50, driving shaft 90 and rotary disc 130 together displace to the right end of the housing 30. In this state, the clutch member and the shafted member attach to each other to define a shortest distance. The rotary disc 130 is positioned in a position where the trigger section 132 can shift the touch section 116 of the linking collar 110 so that the rotary disc can drive the linking collar.

[0050] When a user pulls the bottom end of the drape 16 downward to drop the drape, the reel 12 is driven to rotate in forward direction, that is, in counterclockwise direction when seen from right side of FIG. 1. When the reel 12 rotates, the barrel body 19 of the locating mechanism 17 and the rotary disc 130 are driven to rotate in forward direction. At the same time, the winding mechanism in the reel is driven by the reel to conserve a resilient energy.

[0051] When the rotary disc 130 is positively rotated along with the reel, the driving shaft 90 is driven to rotate. At this time, the linking collar 110 is shifted to rotate. When the driving shaft 90 rotates, via the reducing gear set 60, the clutch member 50 is driven to rotate. Due to the reducing effect, the clutch member rotates at very slow speed. Also, when the linking collar 110 forward rotates, the outer loop
of the one-way bearing 120 idles so that the linking collar cannot drive the controller 100 to rotate. Accordingly, when the reel forward rotates, the controller is kept in a stationary state.

[0052] During dropping of the drape 16, the clutch 50 always very slowly angularly displaces. After the user drops the drape by a certain distance which in this embodiment is set 30 cm, the clutch member 50 is angularly displaced from the angular position of FIG. 45 to the angular position of FIG. 46 (shown by a stretched drawing). At this time, by means of the guide of the slopes 541, 481 of the cam sections 54, 48, the cam section 54 of the clutch member rides on the cam section 48 of the shafted member 40 to start the disengagement travel of the clutch member. When the drape is downward pulled by 30 cm, the two cam sections just finish the travel of length of the slopes 541, 481 to start the disengagement travel.

[0053] After the disengagement travel starts, the cam sections 54, 48 overlap each other so that the distance between the clutch member 50 and the shafted member 40 is increased. At this time, the clutch member is displaced toward left end of the housing 30 to push the gear set 60, driving shaft 90 and rotary disc 130 leftward to a disengaged position as shown in FIG. 47. In the disengaged position, the distance between the rotary disc 130 and the linking collar 110 is increased. At this time, the rotary disc is still driven by the reel to forward rotate. However, the trigger section 132 can no more shift the touch section 116 of the linking collar. Therefore, the linking collar keeps stationary.

[0054] When the drape is further dropped, the rotary disc 130 keeps driving the driving shaft 90 to rotate. Via the reducing gear set 60, the clutch member 50 is further rotated in the disengagement travel to change the angular position as shown in FIG. 48. In the disengagement travel, the cam sections 541, 481 keep overlapping each other so that the buffer apparatus 20 is still positioned in the disengaged position.

[0055] After the user drops the drape 16 to a desired height and stops pulling the drape, when the reel is resiliently driven by the winding mechanism and tends to revolve back in a reverse direction, that is, in clockwise direction when seen from right side of FIG. 2, the locating mechanism 17 will be triggered to rotate back into a locking state. Under such circumstance, the reel is locked and prevented from rotating so that the drape is kept in the desired height.

[0056] When winding the drape, the user further slightly downward pulls the drape. At this time, the reel will drive the locating mechanism 17 to forward rotate to release the locating mechanism from the locking state. Under such circumstance, the barrel body 19 can freely rotate back without dogging the reel. Therefore, the winding mechanism can resiliently drive the reel to rotate back in reverse direction to wind the drape.

[0057] When the reel 12 rotates back, the rotary disc 130 is driven to rotate in reverse direction. Accordingly, the rotary disc drives the driving shaft 90, the reducing gear set 60 and the clutch member 50 to rotate in reverse direction. However, when the rotary disc 130 is positioned in the disengaged position, the rotary disc cannot drive the linking collar 110 so that the linking collar 110 and the controller 100 keep stationary. When winding the drape, the reducing effect of the reducing mechanism forms a first stage of buffering effect so that the drape will not be wound by the reel at a too fast speed.

[0058] When the clutch 50 is reversely rotated, the clutch member 50 is angularly displaced from the state of FIG. 48 to the state of FIG. 46 and kept in the buffering travel.

[0059] The angular position of the clutch member is varied with the rotation of the reel and the height of the drape. When the reel winds the drape and a certain length (30 cm) of the drape remains, the clutch 50 is right displaced to the position of FIG. 46, that is, the starting position of the buffering travel. When the reel further rotates back, the clutch member is further angularly displaced to dislocate the cam section 54 from the cam section 48 of the shafted member 40. At this time, the slopes 541, 481 contact with each other. Accordingly, along with the reversely rotated reel, the clutch member will gradually restore from the buffering travel to the adjoining travel of FIGS. 44, 45. Therefore, the two cam sections are restored to the zigzag detected state without overlapping each other so that the distance between the clutch member and the shafted member is shortened. At this time, the spring 140 pushes the reducing gear set and synchronously drives the driving shaft 90, rotary disc 130 and the clutch member to displace rightward back to the adjoining position as shown in FIG. 2. Thereafter, the trigger section 132 of the rotary disc 130 shifts the touch section 116 of the linking collar 110 to drive the linking collar to rotate in reverse direction. At this time, the inner and outer loops of the one-way bearing 120 are synchronously rotated so that the linking collar via the one-way bearing drives the controller 100 to synchronously rotate.

[0060] Referring to FIG. 31, when the controller 100 rotates, the shift section 104 of the controller will shift the protruding end 96 of the damper 95 so as to expand the circumference thereof. At this time, the circumference of the damper 95 abuts against the wall face of the second cavity 34. Accordingly, when the controller drives the damper to rotate within the second cavity 34, the damper provides a frictional damping effect. Also, the oil painted between the controller 100 and the housing 30 provides a damping effect against the rotation of the controller. Accordingly, when the buffer apparatus 20 is positioned in the adjoining position, the reel has wound the drape in a final stage. During the final winding procedure, the damping effect of the damping mechanism B forms a second stage of buffering effect for the reel so as to slow down the winding speed of the drape.

[0061] During the unwinding procedure of the drape, no matter whether the buffer apparatus is positioned in the adjoining position or the separated position, the damper will not provide any damping effect so that the dropping of the drape will not be affected. The damping mechanism will provide damping effect only when the drape is wound so as to buffer the winding speed. Moreover, the damping mechanism will provide damping effect only when the winding of the drape is about to finish. When the drape still has a considerable length, the reel will wind the drape at a faster rotational speed. Therefore, the winding time of the drape will not be affected.

[0062] The above embodiments are only used to illustrate the present invention, not intended to limit the scope thereof. Many modifications of the above embodiments can be made without departing from the spirit of the present invention.
What is claimed is:

1. A buffer apparatus for rolling curtain, the buffer apparatus being disposed in a reel of the rolling curtain to provide a buffering effect when the reel winds a drape of the rolling curtain, the buffer apparatus comprising:

   a housing which is an elongated body, the length of the housing being parallel to the axis of the reel; a first cavity being formed in right end of the housing;

   a clutch mechanism disposed in the first cavity and movable between an adjoining position and a separated position along the length of the housing;

   a driving shaft fitted in the housing and movable along the length of the housing; a left end of the driving shaft protruding from a left end of the housing;

   a reducing mechanism disposed in the first cavity between the clutch mechanism and the driving shaft; an inner end of the driving shaft being connected with a left end of the reducing mechanism; a right end of the reducing mechanism being connected with a left end of the clutch mechanism, by means of the reducing effect of the reducing mechanism, the driving shaft drives the clutch mechanism to operate, the driving shaft and the clutch mechanism being synchronously displaceable;

   a resilient member disposed in the housing for applying a resilient force onto the clutch mechanism, whereby when the clutch mechanism is positioned in the adjoining position, the resilient member makes the clutch mechanism and the driving shaft tend to move toward the right end of the housing;

   a damping mechanism disposed at left end of the housing for providing a damping effect;

   a one-way transmission member connected with the damping mechanism for providing a one-way transmission effect; and

   a rotary disc fixedly connected with outer end of the driving shaft, an outer circumference of the rotary disc being connected with inner circumference of the reel by insertion, the rotary disc being rotatable along with the reel to drive the driving shaft, the rotary disc being also drivable by the driving shaft to displace along the axis of the reel, whereby when the clutch mechanism is positioned in the adjoining position, the rotary disc can drive the one-way transmission member and when the rotary disc drives the one-way transmission member to rotate in forward direction, the one-way transmission member will not provide any transmission effect so that the damping mechanism will not operate, when the rotary disc is forward rotated along with the reel, the clutch mechanism being driven to move from the adjoining position to the separated position, whereby the clutch mechanism drives the driving shaft and the rotary disc to displace toward left end of the housing, in the separated position, the rotary disc being unable to drive the one-way transmission member, whereby when the reel forward rotates to release the drape of the curtain, the damping mechanism will not operate, when the reel backward rotates to wind the drape and a certain length of the drape remains unwound, the clutch mechanism being moved from the separated position to the adjoining position, whereby the rotary disc can drive the one-way transmission member to backward rotate for operating the damping mechanism to create damping effect so as to buffer the rotational speed of the reel.

2. The buffer apparatus as claimed in claim 1, wherein the right end of the housing has a first cam section and the clutch mechanism including a clutch member having a second cam section on right end face, the clutch member being pivoted disposed in the first cavity and rotatable within the first cavity and movable along the length of the housing, the first and second cam sections being opposite to each other, a left end of the clutch member being connected with the reducing mechanism, whereby in the adjoining position, the two cam sections are dislocated from each other, the clutch member being pushed by the resilient member to displace toward the right end of the housing, when the clutch member is rotated to the separated position, the two cam sections overlapping each other to make the clutch member displace toward the left end of the housing by a certain distance.

3. The buffer apparatus as claimed in claim 1, wherein the clutch mechanism includes a shafted member and a clutch member, the shafted member being fixedly disposed at the right end of the housing, a left end face of the shafted member facing the first cavity and being formed with a first cam section, the clutch member having a disc section and a second cam section disposed on right end face of the disc section, the second cam section having a certain arch length, the clutch member being positioned between the shafted member and the reducing mechanism, a right end of the clutch member being pivotally connected with the shafted member and rotatable and slideable relative to the shafted member, the first and second cam sections being opposite to each other, a left end of the clutch member being connected with the reducing mechanism, whereby in the adjoining position, the two cam sections are dislocated from each other, the clutch member being pushed by the resilient member to displace toward the right end of the housing, when the clutch member is rotated to the separated position, the two cam sections overlapping each other to make the clutch member displace toward the left end of the housing.

4. The buffer apparatus as claimed in claim 3, wherein a shaft section is disposed on left end face of the shafted member, a right end face of the clutch member being formed with a connecting hole, the shaft section of the shafted member being fitted in the connecting hole, whereby the clutch member can be rotated and slide relative to the shafted member.

5. The buffer apparatus as claimed in claim 1, wherein the circumference of the first cavity is formed with a predetermined number of insertion channels along the length of the housing, the reducing mechanism being a reducing gear set having a casing and a predetermined number of reducing gears mounted in the casing, the reducing gears being drivable by the driving shaft, outer circumference of the casing being formed with a predetermined number of ribs inserted in the insertion channels, the reducing gear set and the clutch mechanism being synchronously displaceable without rotation.

6. The buffer apparatus as claimed in claim 5, wherein the casing is a hollow cylindrical body having an interior cylindrical chamber, an inner circumference of the casing being formed with an annular splined section, the reducing gear set further including:
a planet gear shaft having a disc section, a connector being disposed at right end of the disc section, the planet gear shaft being rotatably mounted in the casing with the connector extending out of the right end of the casing; and

a predetermined number of planet gears concentrically pivotally disposed on left end face of the disc section, outer circumferences of the planet gears being engaged with the splined section of the inner circumference of the casing, the reducing gear set being connected with the clutch mechanism via the connector of the planet gear shaft, a gear section being disposed at inner end of the driving shaft, the gear section extending into the casing of the reducing gear set for driving the planet gears to rotate, whereby the planet gear shaft can drive the clutch mechanism to operate.

7. The buffer apparatus as claimed in claim 1, wherein the damping mechanism includes a damper which is a coil spring, an outer circumference of the damper abutting against inner circumference of left end of the housing to provide a damping effect.

8. The buffer apparatus as claimed in claim 7, wherein the damping mechanism further includes a controller disposed at left end of the housing, the one-way transmission member being connected with the controller, whereby when the rotary disc is backward rotated, the rotary disc can drive the controller via the one-way transmission member so as to operate the damper.

9. The buffer apparatus as claimed in claim 7, wherein a second cavity is formed in the left end of the housing, the damper being disposed in the second cavity to abut against inner circumference of the second cavity.

10. The buffer apparatus as claimed in claim 9, wherein one end of the damper is an inward extending protruding end, the damping mechanism further including a controller which is a hollow cylindrical body, a shift section being formed in the controller, the controller being fitted around the left end of the housing and drivable by the one-way transmission member to rotate, the shift section extending into the second cavity and being positioned in the damper, whereby when the controller is rotated, the shift section shifts the protruding end.

11. The buffer apparatus as claimed in claim 1, wherein the one-way transmission member is a one-way bearing, the buffer apparatus further comprising a linking collar fitted around the one-way transmission member and rotatable about the left end of the housing, the left end of the driving shaft extending out of the linking collar to fixedly connect with the rotary disc, whereby when the clutch mechanism is positioned in the adjoining position, the rotary disc can drive the linking collar to rotate, while when the clutch mechanism is positioned in the separated position, the rotary disc cannot drive the linking collar.

12. The buffer apparatus as claimed in claim 11, wherein a touch section is disposed at left end of the linking collar and at least one trigger section is disposed at right end of the rotary disc, whereby when the clutch mechanism is positioned in the adjoining position, the trigger section can drive the touch section and thus the rotary disc can drive the linking collar to rotate, while when the clutch mechanism is positioned in the separated position, the trigger section is spaced from the touch section so that the rotary disc cannot drive the linking collar.

13. The buffer apparatus as claimed in claim 12, wherein the linking collar includes an outer sleeve section and an inner sleeve section which are both hollow cylindrical bodies, the one-way transmission member being fitted in the inner sleeve, the outer sleeve being fitted around the inner sleeve, the touch section being disposed at left end of the outer sleeve section.

14. The buffer apparatus as claimed in claim 5, wherein the resilient member is disposed in the first cavity, one end of the resilient member abutting against inner wall face of the first cavity, while the other end of the resilient member abutting against the reducing mechanism.

15. The buffer apparatus as claimed in claim 1, wherein a shaft tube is disposed in the housing, a left end of the shaft tube outward protruding from the housing, a right end of the shaft tube communicating with the first cavity, the driving shaft being fitted in the shaft tube.

16. A buffer apparatus for rolling curtain, the buffer apparatus being disposed in a reel of the rolling curtain to provide a buffering effect when the reel winds a drape of the rolling curtain, the buffer apparatus comprising:

a housing which is an elongated body, the length of the housing being parallel to the axis of the reel; a cavity being formed in the housing;

a clutch mechanism disposed in the cavity and movable between an adjoining position and a separated position along the length of the housing;

a driving shaft fitted in the housing and movable along the length of the housing; a right end of the driving shaft being connected with the clutch mechanism to drive the clutch mechanism to operate, the driving shaft and the clutch mechanism being synchronously displaceable; a left end of the driving shaft protruding from a left end of the housing;

a resilient member disposed in the housing for applying a resilient force onto the clutch mechanism, whereby when the clutch mechanism is positioned in the adjoining position, the resilient member makes the clutch mechanism and the driving shaft tend to move toward the right end of the housing;

a damping mechanism disposed at left end of the housing for providing a damping effect;

a one-way transmission member connected with the damping mechanism for providing a one-way transmission effect; and

a rotary disc fixedly connected with outer end of the driving shaft, an outer circumference of the rotary disc being connected with inner circumference of the reel by insertion, the rotary disc being rotatable along with the reel to drive the driving shaft, the rotary disc being also drivable by the driving shaft to displace along the axis of the reel, whereby when the clutch mechanism is positioned in the adjoining position, the rotary disc can drive the one-way transmission member and when the rotary disc drives the one-way transmission member to rotate in forward direction, the one-way transmission member will not provide any transmission effect so that the damping mechanism will not operate, when the rotary disc is forward rotated along with the reel, the clutch mechanism being driven to move from the adjoining position to the separated position, whereby
the clutch mechanism drives the driving shaft and the rotary disc to displace toward left end of the housing, in the separated position, the rotary disc being unable to drive the one-way transmission member, whereby when the reel forward rotates to release the drape of the curtain, the damping mechanism will not operate, when the reel backward rotates to wind the drape and a certain length of the drape remains unwound, the clutch mechanism being moved from the separated position to the adjoining position, whereby the rotary disc can drive the one-way transmission member to backward rotate for operating the damping mechanism to create damping effect so as to buffer the rotational speed of the reel.

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