

ELECTRICALLY-OPERATED DOOR HAVING ANTI-FALL DEVICE

FIELD OF THE INVENTION

[0001] The present invention relates to an electrically-operated door, and more particularly, to an electrically-operated door having an anti-fall device. When the door is opened/lifted or lowered out of control, the anti-fall device can prevent or stop the door from falling accidentally.

BACKGROUND OF THE INVENTION

[0002] In general, an electrically-operated door uses an electric motor to drive a door body up and down along door rails of a pair of door pillars to complete the opening or closing action. In the case of an electrically-operated roll up door, for example, the motor drives a reel in a housing to roll up/down the door body composed of slats connected in series along the door rails of the door pillars. In the case of an electrically-operated sectional door, the electric motor drives a cable wheel on a wheel axle to pull a pulling cable. The pulling cable pulls pulleys on both sides of the lower door body to move up and down along the door rails of the pair of door pillars. Whether it is an electrically-operated roll up door or an electrically-operated sectional door, in order to prevent the door body from being operated out of control, the motor is usually provided with a speed change or deceleration mechanism for driving the door body. However, as a result of these mechanisms working for a long time, it is difficult to completely avoid damage or failure due to aging or fatigue. When the gears of the gearbox, rolling or pulling the door body, break down or when the chain or rope breaks, the door body in an open state or in the process of lifting and lowering will fall down accidentally due to loss of control of the motor. At this time, if there is no timely intervention of a braking mechanism, there is bound to be a risk of injury.

SUMMARY OF THE INVENTION

[0003] The primary object of the present invention is to provide an electrically-operated door having an anti-fall device. The electrically-operated door comprises a door body driven by an electric motor to move up and down along door rails of a pair of door pillars. At least one anti-fall device is provided above the pair of door pillars. The anti-fall device includes a holder for mounting at least one brake unit and a traction shaft on upper ends of the door rails of the pair of door pillars. The traction shaft is driven by upward

and downward movement of the door body. The brake unit includes a pawl rotor assembly and a ratchet seat.

[0004] The pawl rotor assembly includes a first rotating disk, a support on one end of the first rotating disk, and at least one banana-shaped pawl member. The support has a central shaft hole passing through the first rotating disk. The traction shaft is coupled to the shaft hole. At least one pawl space is formed between the support and the first rotating disk. The pawl member is located in the pawl space. The pawl member has a counterweight body. One end of the counterweight body has a pivot hole, and another end of the counterweight body has a pawl portion. One side of the counterweight body has a restricting portion. A pivot is pivotally connected to the first rotating disk via the pivot hole. The pawl portion has a corner notch opposite to the pivot hole of the counterweight body to form an engaging end face. The restricting portion has an elastic member acting on the support to restrict the pawl portion and the engaging end face from extending beyond the periphery of the first rotating disk in a normal state.

[0005] The ratchet seat is fixed on the holder. The ratchet seat has a central ratchet hole relative to the pawl rotator assembly. The ratchet hole surrounds the periphery of the first rotating disk. The wall of the ratchet hole has a plurality of curved notches to form ratchet teeth. The curved notches are arranged annularly and configured for receiving the counterweight body of the pawl member. The ratchet teeth each have a blocking surface.

[0006] Normally, the door body of the electrically-operated door is driven by the electric motor to slowly move up or down along the door rails of the pair of door pillars. At this time, the traction shaft of the anti-fall device is driven by the upward and downward movement of the door body. The pawl rotator assembly of the brake unit is rotated along with the traction shaft at a normal speed, that is, the centrifugal force of the counterweight body of the pawl member is still within the strength-limiting capacity of the elastic member, and the pawl portion of the pawl member is not swung out of the periphery of the first rotating disk to contact the ratchet teeth of the ratchet seat. This allows the door body to open or close normally without interference from the brake unit. When the electric motor drives the door body up or down along the door rails of the pair of door pillars and a loss of control occurs due to a failure of the transmission components, the kinetic energy of the free fall of the door body is transferred to the traction shaft of the anti-fall device, resulting in an instantaneous acceleration of the pawl rotor assembly. When the centrifugal force of the counterweight body of the pawl member is greater than the limiting elastic force of the elastic member, the engaging end face of the pawl portion of the pawl member is swung out of the periphery of

the first rotating disk to engage with the blocking surface of one of the ratchet teeth of the ratchet seat, such that the falling door body immediately stops because the traction shaft cannot be rotated. The overall structure effectively prevents the door body from falling accidentally when the door body is opened or closed.

[0007] Preferably, the support has a mounting hole relative to the restricting portion of the pawl member. The restricting portion has a screw hole into which a screw is screwed. The elastic member is a compression spring. One end of the elastic member is inserted in the mounting hole, and the other end of the elastic member is inserted in the screw hole and leans against the screw. The compressive rebound force of the elastic member can be changed through the screwing depth of the screw in the screw hole, so that the timing for throwing the counterweight body of the pawl member outward can be adjusted or set by the screw.

[0008] Preferably, a pair of pawl spaces is formed between the support and the first rotating disk of the pawl rotor assembly. A pair of the pawl members is provided in the pair of pawl spaces. The pair of pawl members are pivotally connected on the first rotating disk by the pivots. A shaft is provided near the pawl portion of the counterweight body of each of the pawl members. One end of the shaft passes through a pair of oblong holes of the first rotating disk and is pivotally connected to a pair of connecting rods. The other ends of the pair of connecting rods are pivotally connected to two ends of a synchronous link. The synchronous link has a central bearing hole for mounting a bearing matching and rotating on the traction shaft. When the pawl portion of one of the pair of pawl members is swung out of the periphery of the first rotating disk, one of the connecting rods pulls the synchronous link to swing, which enables the other connecting rod to move the pawl portion of the other pawl member to be swung out of the periphery of the first rotating disk, such that the pawl portions of the pair of pawl members are swung outward synchronously in the pair of pawl spaces. A second rotating disk is disposed on the support opposite the first rotating disk. The second rotating disk corresponds in configuration and in shape to the first rotating disk. The second rotating disk also has a pair of oblong holes for insertion of the shaft 45 that is pivotally connected to another pair of connecting rods. The other ends of another pair of connecting rods are pivotally connected to two ends of another synchronous link. Another synchronous link also has a central bearing hole for mounting a bearing matching and rotating on the traction shaft. The two paired synchronous links are connected by a pivot shaft at either end thereof. The pivot is pivotally connected to the first rotating disk and the second rotating disk via the pivot holes of the pair of pawl members, so that the swing of the pawl members is well supported. Besides, either end of the shaft of the pair of pawl members is pivotally connected

to a pair of connecting rods and a pair of synchronous links driven by a pair of pivot shafts, so that the pawl portions of the pair of pawl members are synchronously swung outward to increase stability.

[0009] Preferably, the electric motor of the electrically-operated door drives a reel to roll up/down the door body composed of slats connected in series along the door rails of the pair of door pillars. The holder of the anti-fall device is a frame-shaped seat for mounting the brake unit on a side panel of a housing. The traction shaft is secured to the reel as part of the reel. The pawl rotor assembly of the brake unit rotates synchronously with the reel. When the reel rolls the door body out of control, the brake unit will quickly stop the rotation of the traction shaft in response to the abnormal acceleration of the reel, thereby preventing the door body from falling.

[0010] Preferably, the door body of the electrically-operated door includes an upper door body pivotally connected to an upper door beam and a lower door body pivotally connected to one end of the upper door body. The electric motor drives at least one cable wheel of a wheel axle on the upper door beam. A pulling cable coiled on the cable wheel pulls pulleys on both sides of the lower door body to move up and down along the door rails of the pair of door pillars. The holder of the anti-fall device 20A is a hanging seat for mounting the brake unit and the traction shaft on the upper door beam at the upper ends of the pair of door pillars. The traction shaft is coupled to the shaft hole of the pawl rotor assembly of the brake unit. A cable reel is connected to one end of the traction shaft. A flat spiral spring is connected to the other end of the traction shaft. A cable is coiled on the cable reel. The cable has a pull end connected to the lower door body. The flat spiral spring is accommodated in a cover coupled to the ratchet seat. The outer end of the flat spiral spring is limited by a limiter on the cover, and the inner end of the flat spiral spring is connected to the traction shaft. Normally, when the lower door body of the door body is lowered, the cable will pull the traction shaft to rotate, enabling the flat spiral spring to accumulate force. When the lower door body of the door body is lifted up, the flat spiral spring will release the accumulated force to drive the traction shaft to rotate reversely, and the cable reel will automatically roll up the cable. When the door body is opened/closed or the lower door body is lifted or lowered out of control, the falling energy of the lower door body is transmitted from the cable to the traction shaft, causing the pawl rotor assembly to rotate at a high speed. The counterweight body of the pawl member immediately reacts and throws outward to generate a braking mechanism, that is, the lower door body is restrained by the cable from falling, thereby preventing the door body from falling accidentally. The cable reel is secured on one end of the traction shaft. The brake

unit secured to the holder is provided at either side of the cable reel on the traction shaft, such that the cable reel can be balanced and supported between the two brake units. The flat spiral spring is provided at either side of the cable reel on the traction shaft, and the cover having the limiter is secured to the ratchet seat. Through the flat spiral spring at either end of the traction shaft to release the accumulated force for rolling up the cable, the cable reel enhances the capability to roll up the cable.

BRIEF DESCRIPTION OF THE DRAWINGS

[0011] FIG. 1 is a perspective view according to a first embodiment of the present invention, wherein the anti-fall device is applied to a roll up door body;

[0012] FIG. 2 is a perspective view according to the first embodiment of the present invention, illustrating that the anti-fall device is disposed above the door pillars;

[0013] FIG. 3 is an exploded view of the anti-fall device according to the first embodiment of the present invention;

[0014] FIG. 4 is an exploded view of the brake unit according to the first embodiment of the present invention;

[0015] FIG. 5 is an exploded view of the pawl rotor assembly according to the first embodiment of the present invention;

[0016] FIG. 6 is a planar view of the brake unit according to the first embodiment of the present invention, wherein the second rotating disk is not shown;

[0017] FIG. 7 is a schematic view according to the first embodiment of the present invention, illustrating that the door body is operated normally;

[0018] FIG. 8 is an enlarged view of circle A in FIG. 7;

[0019] FIG. 9 is a schematic view of the brake unit according to the first embodiment of the present invention when the door body is operated out of control;

[0020] FIG. 10 is a perspective view according to a second embodiment of the present invention, wherein the anti-fall device is applied to a sectional door;

[0021] FIG. 11 is a perspective view of the anti-fall device according to the second embodiment of the present invention;

[0022] FIG. 12 is an exploded view of the anti-fall device according to the second embodiment of the present invention;

[0023] FIG. 13 is an exploded view of the flat spiral spring according to the second embodiment of the present invention;

[0024] FIG. 14 is a schematic view according to the second embodiment of the present invention, illustrating that the door body is operated normally;

[0025] FIG. 15 is a schematic view of the brake unit according to the second embodiment of the present invention when the door body is operated out of control;

[0026] FIG. 16 is an enlarged view of circle B in FIG. 14; and

[0027] FIG. 17 is an enlarged view of circle C in FIG. 15.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0028] Embodiments of the present invention will now be described, by way of example only, with reference to the accompanying drawings.

[0029] As shown in FIG. 1 and FIG. 2, the present invention discloses an electrically-operated door having an anti-fall device. The electrically-operated door 10 comprises a door body 11 driven by an electric motor 12 to move up and down along door rails 130 (as shown in FIG. 7) of a pair of door pillars 13. At least one anti-fall device 20 is provided above the pair of door pillars 13. The anti-fall device 20, as shown in FIG. 2 and FIG. 3, includes a holder 21 for mounting at least one brake unit 30 and a traction shaft 22 on the upper ends of the door rails 130 (as shown in FIG. 7) of the pair of door pillars 13. The traction shaft 22 is driven by the upward and downward movement of the door body 11. As shown in FIG. 3 through FIG. 6, the brake unit 30 includes a pawl rotor assembly 40 and a ratchet seat 50.

[0030] The pawl rotor assembly 40 includes a first rotating disk 41, a support 42 on one end of the first rotating disk 41, and at least one banana-shaped pawl member 43. The support 42 has a central shaft hole 420 passing through the first rotating disk 41. The traction shaft 22 is coupled to the shaft hole 420. At least one crescent-shaped pawl space 421 is formed between the support 42 and the first rotating disk 41. The pawl member 43 is located in the pawl space 421. The pawl member 43 has a counterweight body 430. One end of the counterweight body 430 has a pivot hole 431, and another end of the counterweight body 430 has a pawl portion 432. One side of the counterweight body 430 has a restricting portion 433.

A pivot 44 is pivotally connected to the first rotating disk 41 via the pivot hole 431. The pawl portion 432 has a corner notch 434 opposite to the pivot hole 431 of the counterweight body 430 to form an engaging end face 435. The restricting portion 433 has an elastic member 436 acting on the support 42 to restrict the pawl portion 432 and the engaging end face 435 from extending beyond the periphery of the first rotating disk 41 in a normal state.

[0031] The ratchet seat 50 is fixed on the holder 21. The ratchet seat 50 has a central ratchet hole 51 relative to the pawl rotator assembly 40. The ratchet hole 51 surrounds the periphery of the first rotating disk 41. The wall of the ratchet hole 51 has a plurality of curved notches 52 to form ratchet teeth 53. The curved notches 52 are arranged annularly and configured for receiving the counterweight body 430 of the pawl member 43. The ratchet teeth 53 each have a blocking surface 54.

[0032] Normally, as shown in FIG. 7, the door body 11 of the electrically-operated door 10 is driven by the electric motor 12 (as shown in FIG.1) to slowly move up or down (open or close) along the door rails 130 of the pair of door pillars 13. At this time, as shown in FIG. 7 and FIG. 8, the traction shaft 22 of the anti-fall device 20 is driven by the upward and downward movement of the door body 11. The pawl rotator assembly 40 of the brake unit 30 is rotated along with the traction shaft 22 at a normal speed, that is, the centrifugal force (referring to FIG. 6) of the counterweight body 430 of the pawl member 43 is still within the strength-limiting capacity of the elastic member 436, and the pawl portion 432 of the pawl member 43 is not swung out of the periphery of the first rotating disk 41 to contact or touch the ratchet teeth 53 of the ratchet seat 50. This allows the door body 11 to open or close normally without interference from the brake unit 30. When the electric motor 12 (as shown in FIG. 1) drives the door body 11 up or down along the door rails 130 of the pair of door pillars 13 and a loss of control occurs due to a failure of the transmission components (e.g., damage to the gears of the motor case or breakage of the transmission chain), the kinetic energy of the free fall of the door body 11 is transferred to the traction shaft 22 of the anti-fall device 20, resulting in an instantaneous acceleration of the pawl rotor assembly 40. As shown in FIG. 9 (in conjunction with FIG. 6), when the centrifugal force of the counterweight body 430 of the pawl member 43 is greater than the limiting elastic force of the elastic member 436, the engaging end face 435 of the pawl portion 432 of the pawl member 43 is swung out of the periphery of the first rotating disk 41 to engage with the blocking surface 54 of one of the ratchet teeth 53 of the ratchet seat 50, such that the falling door body 11 (referring to FIG. 7) immediately stops because the traction shaft 22 cannot be rotated. The overall structure, as

shown in FIG. 7, effectively prevents the door body 11 from falling accidentally when the door body 11 is opened or closed.

[0033] According to the above embodiment, preferably, as shown in FIG. 5 and FIG. 6, the support 42 has a mounting hole 422 relative to the restricting portion 433 of the pawl member 43. The restricting portion 433 has a screw hole 437 into which a screw 438 (preferably a stop screw) is screwed. The elastic member 436 is a compression spring. One end of the elastic member 436 is inserted in the mounting hole 422, and the other end of the elastic member 436 is inserted in the screw hole 437 and leans against the screw 438. The compressive rebound force of the elastic member 436 can be changed through the screwing depth of the screw 438 in the screw hole 437, so that the timing for throwing the counterweight body 430 of the pawl member 43 outward can be adjusted or set by the screw 438.

[0034] According to the above embodiment, preferably, as shown in FIG. 4, FIG. 5 and FIG. 6, a pair of pawl spaces 421 is formed between the support 42 and the first rotating disk 41 of the pawl rotor assembly 40. A pair of the pawl members 43 is provided in the pair of pawl spaces 421. The pair of pawl members 43 are pivotally connected on the first rotating disk 41 by the pivots 44. A shaft 45 is provided near the pawl portion 432 of the counterweight body 430 of each of the pawl members 43. One end of the shaft 45 passes through a pair of oblong holes 410 of the first rotating disk 41 and is pivotally connected to a pair of connecting rods 46. The other ends of the pair of connecting rods 46 are pivotally connected to two ends of a synchronous link 47. The synchronous link 47 has a central bearing hole 470 for mounting a bearing 471 matching and rotating on the traction shaft 22. As shown in FIG. 9, when the pawl portion 432 of one of the pair of pawl members 43 is swung out of the periphery of the first rotating disk 41, one of the connecting rods 46 pulls the synchronous link 47 to swing, which enables the other connecting rod 46 to move the pawl portion 432 of the other pawl member 43 to be swung out of the periphery of the first rotating disk 41, such that the pawl portions 432 of the pair of pawl members 43 are swung outward synchronously in the pair of pawl spaces 421. As shown in FIG. 4, FIG. 5 and FIG. 6, a second rotating disk 41A is disposed on the support 42 opposite the first rotating disk 41. The second rotating disk 41A corresponds in configuration and in shape to the first rotating disk 41. The second rotating disk 41A also has a pair of oblong holes 410 for insertion of the shaft 45 that is pivotally connected to another pair of connecting rods 46. The other ends of another pair of connecting rods 46 are pivotally connected to two ends of another synchronous link 47. Another synchronous link 47 also has a central bearing hole 470 for mounting a bearing 471

matching and rotating on the traction shaft 22. The two paired synchronous links 47 are connected by a pivot shaft 48 at either end thereof. The pivot 44 is pivotally connected to the first rotating disk 41 and the second rotating disk 41A via the pivot holes 431 of the pair of pawl members 43, so that the swing of the pawl members 43 is well supported. Besides, either end of the shaft 45 of the pair of pawl members 43 is pivotally connected to a pair of connecting rods 46 and a pair of synchronous links 47 driven by a pair of pivot shafts 48, so that the pawl portions 432 of the pair of pawl members 43 are synchronously swung outward to increase stability.

[0035] According to the above embodiment, preferably, as shown in FIG. 1, FIG. 2 and FIG. 3, the electric motor 12 of the electrically-operated door 10 drives a reel 14 to roll up/down the door body 11 composed of slats connected in series along the door rails 130 (as shown in FIG. 4) of the pair of door pillars 13. The holder 21 of the anti-fall device 20 is a frame-shaped seat for mounting the brake unit 30 on a side panel 150 of a housing 15. The traction shaft 22 is secured to the reel 14 as part of the reel 14. As shown in FIG. 3 and FIG. 4, the pawl rotor assembly 40 of the brake unit 30 rotates synchronously with the reel 14. As shown in FIG. 2, FIG. 7 and FIG. 9, when the reel 14 rolls the door body 11 out of control, the brake unit 30 will quickly stop the rotation of the traction shaft 22 in response to the abnormal acceleration of the reel 14, thereby preventing the door body 11 from falling.

[0036] According to the above embodiment, preferably, as shown in FIG. 10, FIG. 11, FIG. 12 and FIG. 13, the door body 11A of the electrically-operated door 10A includes an upper door body 110 pivotally connected to an upper door beam 17 and a lower door body 111 pivotally connected to one end of the upper door body 110. The electric motor 12A drives at least one cable wheel 180 of a wheel axle 18 on the upper door beam 17. A pulling cable 181 coiled on the cable wheel 180 pulls pulleys 112 on both sides of the lower door body 111 to move up and down along the door rails 130A of the pair of door pillars 13A. The holder 21A of each anti-fall device 20A (preferably, there are two anti-fall devices 20A equally arranged above the door pillars 13A) is a hanging seat for mounting the brake unit 30 and the traction shaft 22A on the upper door beam 17 at the upper ends of the pair of door pillars 13A. The traction shaft 22A is coupled to the shaft hole 420 of the pawl rotor assembly 40 of the brake unit 30. A cable reel 60 is connected to one end of the traction shaft 22A. A flat spiral spring 70 is connected to the other end of the traction shaft 22A. A cable 61 is coiled on the cable reel 60. The cable 61 has a pull end connected to the lower door body 111. The flat spiral spring 70 is accommodated in a cover 80 coupled to the ratchet seat 50. The outer end of the flat spiral spring 70 is limited by a limiter 81 on the cover 80, and the inner end of the

flat spiral spring 70 is connected to the traction shaft 22A. Normally, as shown in FIG. 14 and FIG. 16, when the lower door body 111 of the door body 11A is lowered, referring to FIG. 12 and FIG. 13, the cable 61 will pull the traction shaft 22A to rotate, enabling the flat spiral spring 70 to accumulate force. When the lower door body 111 of the door body 11A is lifted up, the flat spiral spring 70 will release the accumulated force to drive the traction shaft 22A to rotate reversely, and the cable reel 60 will automatically roll up the cable 61, as shown in FIG. 15 and FIG. 17 in conjunction with FIG. 12 and FIG. 13. When the door body 11A is opened/closed or the lower door body 111 is lifted or lowered out of control (e.g., when the cable 181 breaks), the falling energy of the lower door body 111 is transmitted from the cable 61 to the traction shaft 22A, causing the pawl rotor assembly 40 to rotate at a high speed. The counterweight body 430 of the pawl member 43 immediately reacts and throws outward to generate a braking mechanism, that is, the lower door body 111 is restrained by the cable 61 from falling, thereby preventing the door body 11A from falling accidentally. As shown in FIG. 11, FIG. 12, and FIG. 13, the cable reel 60 is secured on one end of the traction shaft 22A. The brake unit 30 secured to the holder 21A is provided at either side of the cable reel 60 on the traction shaft 22A. Preferably, the two brake units 30 are connected by at least one connecting member 31 to connect and strengthen the structure, such that the cable reel 60 can be balanced and supported between the two brake units 30. The flat spiral spring 70 is provided at either side of the cable reel 60 on the traction shaft 22A and the cover 80 having the limiter 81 is secured to the ratchet seat 50. Because the structure of both ends of the traction shaft 22A is the same, only the components on one end are shown in the figures. Through the flat spiral spring 70 at either end of the traction shaft 22A to release the accumulated force for rolling up the cable, the cable reel 60 enhances the capability to roll up the cable 61.

[0037] Although particular embodiments of the present invention have been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the present invention. Accordingly, the present invention is not to be limited except as by the appended claims.

WHAT IS CLAIMED IS:

1. An electrically-operated door, comprising a door body, an electric motor, a pair of door pillars, a traction shaft, and at least one anti-fall device, wherein the door body is driven by the electric motor to move up and down along door rails of the pair of door pillars and the at least one anti-fall device is located above the pair of door pillars, and the traction shaft is driven by upward and downward movement of the door body;

the anti-fall device including a holder and at least one brake unit, wherein the at least one brake unit and the traction shaft are mounted on the holder on upper ends of the door rails of the pair of door pillars, the at least one brake unit including a pawl rotor assembly and a ratchet seat;

the pawl rotor assembly including a first rotating disk, a support on one end of the first rotating disk, and at least one banana-shaped pawl member; the support having a central shaft hole passing through the first rotating disk, the traction shaft being coupled to the shaft hole, at least one pawl space being formed between the support and the first rotating disk, the pawl member being located in the pawl space; the pawl member having a counterweight body, one end of the counterweight body having a pivot hole, another end of the counterweight body having a pawl portion, one side of the counterweight body having a restricting portion; a pivot being pivotally connected to the first rotating disk via the pivot hole; the pawl portion having a corner notch opposite to the pivot hole of the counterweight body to form an engaging end face; the restricting portion having an elastic member acting on the support for restricting the pawl portion and the engaging end face from extending beyond a periphery of the first rotating disk in a normal state;

the ratchet seat being fixed on the holder, the ratchet seat having a central ratchet hole relative to the pawl rotator assembly, the ratchet hole surrounding the periphery of the first rotating disk, a wall of the ratchet hole having a plurality of curved notches to form ratchet teeth, the curved notches being arranged annularly and configured for receiving the counterweight body of the pawl member, the ratchet teeth each having a blocking surface;

wherein the at least one pawl space includes a pair of pawl spaces formed between the support and the first rotating disk of the pawl rotor assembly, the at least one pawl member includes a pair of the pawl members in the pair of pawl spaces, each of the pair of pawl members is pivotally connected to the first rotating disk by the pivot, a shaft of the pawl rotor assembly is provided near the pawl portion of the counterweight body of each of the pawl members, one end of the shaft passes through a pair of oblong holes of the first rotating disk

and is pivotally connected to the pair of connecting rods of the pawl rotor assembly, another ends of the pair of connecting rods are pivotally connected to two ends of the synchronous link of the pawl rotor assembly, and the synchronous link has a central bearing hole for mounting a bearing of the pawl rotor assembly matching and rotating on the traction shaft;

wherein the pawl rotor assembly includes a second rotating disk, the second rotating disk is provided on the support opposite the first rotating disk, the second rotating disk corresponds in configuration and in shape to the first rotating disk, the second rotating disk also has a pair of oblong holes for insertion of the shaft that is pivotally connected to another pair of connecting rods of the pawl rotor assembly, another ends of the another pair of connecting rods are pivotally connected to two ends of another synchronous link of the pawl rotor assembly, the another synchronous link also has a central bearing hole for mounting another bearing of the pawl rotor assembly matching and rotating on the traction shaft, and the two paired synchronous links are connected by a pivot shaft at either end thereof.

2. The electrically-operated door as claimed in claim 1, wherein the support has a mounting hole relative to the restricting portion of the pawl member, the restricting portion has a screw hole into which a screw of the pawl rotor assembly is screwed into the screw hole, the elastic member is a compression spring, one end of the elastic member is inserted in the mounting hole, and another end of the elastic member is inserted in the screw hole and leans against the screw.

3. The electrically-operated door as claimed in any one of claims 1-2, further comprising a reel, wherein the electric motor of the electrically-operated door drives the reel to roll up and down the door body composed of slats connected in series along the door rails of the pair of door pillars, the holder of the anti-fall device is a frame-shaped seat for mounting the brake unit on a side panel of a housing, and the traction shaft is secured to the reel as part of the reel.

4. The electrically-operated door as claimed in any one of claims 1-3, further comprising an upper door beam, a wheel axle, and at least one cable wheel of the wheel axle, wherein the door body of the electrically-operated door includes an upper door body pivotally connected to the upper door beam and a lower door body pivotally connected to one end of the upper door body; the electric motor drives the at least one cable wheel of the wheel axle on the upper door beam, a pulling cable coiled on the cable wheel pulls pulleys of the door body on two sides of the lower door body to move up and down along the door rails of the pair of door pillars; the holder of the anti-fall device is a hanging seat for mounting the brake unit and the

traction shaft on the upper door beam at upper ends of the pair of door pillars, the traction shaft is coupled to the shaft hole of the pawl rotor assembly of the brake unit, a cable reel is connected to one end of the traction shaft, a flat spiral spring is connected to another end of the traction shaft, a cable is coiled on the cable reel, the cable has a pull end connected to the lower door body; wherein the anti-fall device further includes a cover and a limiter, the flat spiral spring is accommodated in the cover coupled to the ratchet seat, an outer end of the flat spiral spring is limited by the limiter on the cover, and an inner end of the flat spiral spring is connected to the traction shaft.

5. The electrically-operated door as claimed in claim 4, wherein the cable reel is secured on one end of the traction shaft, and the brake unit secured to the holder is disposed at either side of the cable reel on the traction shaft.

6. The electrically-operated door as claimed in claim 5, wherein the flat spiral spring is disposed at either side of the cable reel on the traction shaft and the cover having the limiter is secured to the ratchet seat.