

IN-AND-OUT SWINGING AND SLIDING DOOR AND WINDOW

BACKGROUND OF THE INVENTION

Field of the Invention

5 The present invention relates to the technical field of doors and windows, and in particular to an in-and-out swinging and sliding door and window.

Description of Related Art

Doors and windows are important components for indoor lighting and ventilation. The
10 commonly used types of doors and windows in the related art usually include swinging doors and windows and sliding doors and windows. Swinging doors and windows are each opened and closed by rotating around an axis in a certain direction, and are divided into two forms, that is, in-swinging and out-swinging. Advantages thereof are that a structure is simple, an opening area is large, and ventilation and sealing effects are excellent. The in-swinging window
15 is convenient for window cleaning, and the out-swinging window does not occupy indoor space when the window is opened. Disadvantages thereof are that a window width is small, and a window sash is easily damaged in windy weather. Sliding windows are windows in which a window sash is mounted on a rail of a window frame, and is opened and closed by pushing and pulling. Advantages thereof are that indoor and outdoor spaces are not occupied, a structure is
20 simple, an operation is easy, a window width is large, lighting is good, and a service life is long. Disadvantages thereof are that a general sliding door and window can only be opened halfway, not fully opened, which limits a passage position.

With the development of the door and window technology, currently, there are doors and windows that can be swung and slid on the market. However, such doors and windows can
25 usually only be swung in one direction, that is, the doors and windows can only be swung

inward or outward. An opening method is single, and the doors and windows are inconvenient to use. Moreover, when such doors and windows are swung outward, there is a problem of inconvenience in wiping. At present, some doors and windows can achieve functions of in-and-out swinging and sliding, but most of these doors and windows have complex structures and need to cooperate with a motor or manual plugging and unplugging of a pin to achieve the switching between the swinging and the sliding.

The technical problem to be solved by the present invention is to provide an in-and-out swinging and sliding door and window that has a simple structure and is convenient to use.

SUMMARY OF THE INVENTION

In order to overcome shortcomings of the related art, an object of the present invention is to provide an in-and-out swinging and sliding door and window, which has characteristics of simple structure and convenient use and can also achieve functions of in-and-out swinging and sliding of a sash.

Technical solutions adopted by the present invention include the following aspects. An in-and-out swinging and sliding door and window includes: a frame; a sash assembly and a rail assembly which are mounted on the frame, the rail assembly including a fixed rail fixedly connected to the frame and a movable rail rotatably connected to the frame, the movable rail being provided with a first guide rail, the fixed rail being provided with a second guide rail corresponding to the first guide rail, and the sash assembly including a first sash fixedly connected to the movable rail and a second sash slidably connected to the first guide rail and the second guide rail; and a locking mechanism.

The locking mechanism includes a movable lock box mounted on one end of the movable rail close to the fixed rail and an opening and closing assembly mounted on the movable lock box, the movable lock box is provided with a first lock hole communicating with

the first guide rail, the opening and closing assembly includes a trigger member and a blocking member in transmission fit, the trigger member has one end built into the movable lock box and the other end extending toward the fixed rail and protruding from the movable lock box, a first reset member is disposed between the trigger member and the movable lock box, the
5 blocking member has one end built into the movable lock box and the other end extending toward the first lock hole, and a second reset member is disposed between the blocking member and the movable lock box.

When the movable rail is docked with the fixed rail, the fixed rail drives the trigger member to retract into the movable lock box, thereby driving the blocking member to withdraw
10 from the first lock hole, and when the movable rail is separated from the fixed rail, the first reset member drives one end of the trigger member to extend out of the movable lock box, and the second reset member drives one end of the blocking member to extend into the first lock hole.

In some embodiments, the locking mechanism further includes a fixed lock box
15 mounted on one end of the fixed rail close to the movable rail, the fixed lock box is provided with a second lock hole communicating with the second guide rail, the fixed lock box is provided with a first guide surface and a second guide surface on one side close to the movable lock box, the first guide surface has one end connected to the second guide surface and the other end extending toward one side surface of the fixed rail, a distance between the first guide
20 surface and the movable lock box gradually increases from one end close to the second guide surface to the other end, the second guide surface has the other end extending toward the other side surface of the fixed rail, and a distance between the second guide surface and the movable lock box gradually increases from one end close to the first guide surface to the other end.

In some embodiments, the first guide surface and the second guide surface are
25 connected by a positioning groove, and the positioning groove fits with a top portion of the

trigger member.

In some embodiments, the locking mechanism further includes an anti-falling assembly including an anti-falling block and an anti-falling groove that are inserted into each other.

5 The anti-falling block is disposed on one side of the fixed lock box close to the movable lock box, and the anti-falling groove is disposed on one side of the movable lock box close to the fixed lock box, or

 the anti-falling block is disposed on one side of the movable lock box close to the fixed lock box, and the anti-falling groove is disposed on one side of the fixed lock box close
10 to the movable lock box.

In some embodiments, the anti-falling groove is disposed on one side of the movable lock box away from the first lock hole, the movable lock box is provided with a clearance groove corresponding to the anti-falling block on one side close to the first lock hole, and the fixed lock box is provided with a cover plate corresponding to the clearance groove, or

15 the anti-falling groove is disposed on one side of the fixed lock box away from the second lock hole, the fixed lock box is provided with a clearance groove corresponding to the anti-falling block on one side close to the second lock hole, and the movable lock box is provided with a cover plate corresponding to the clearance groove.

In some embodiments, the locking mechanism further includes a security assembly
20 including an anti-slipping member and an anti-slipping groove which fit with each other, and when the movable rail is docked with the fixed rail, the anti-slipping member is embedded in the anti-slipping groove, and when an external force greater than a preset value is applied, the anti-slipping member is withdrawn from the anti-slipping groove, and the movable rail is separated from the fixed rail.

25 The anti-slipping member is loosely connected to one side of the movable lock box

close to the fixed lock box, and the anti-slipping groove is disposed on one side of the fixed lock box close to the movable lock box, or

the anti-slipping member is loosely connected to one side of the fixed lock box close to the movable lock box, and the anti-slipping groove is disposed on one side of the movable lock box close to the fixed lock box.

In some embodiments, the security assembly further includes a third reset member, the anti-slipping member has one end movably connected to the fixed lock box and the other end protruding toward the movable lock box from the fixed lock box, and the third reset member keeps the other end of the anti-slipping member protruding from the fixed lock box.

In some embodiments, the security assembly further includes a first magnetic member and a second magnetic member, the anti-slipping member has one end movably connected to the fixed lock box and the other end protruding toward the movable lock box from the fixed lock box, the first magnetic member is built into the anti-slipping member, the second magnetic member and the first magnetic member are disposed opposite to each other on the movable lock box, and the first magnetic member and the second magnetic member are magnetically attracted to each other such that the anti-slipping member and the anti-slipping groove are kept in engagement.

In some embodiments, a top portion of the second sash is connected to a hanging pulley that is slidably connected to the first guide rail and the second guide rail.

In some embodiments, the trigger member and the blocking member are in transmission fit through an inclined surface.

The present invention has the following beneficial effects. In the in-and-out swinging and sliding door and window of the present application, when the movable rail and the fixed rail are docked in place, the fixed rail presses the trigger member back into the movable lock box to drive the blocking member to withdraw from the first lock hole, and the first guide rail

communicates with the second guide rail, and thus the second sash can slide freely in the first guide rail and the second guide rail, and at this time the door and window is in a sliding state. When the first sash and the second sash overlap with each other, the first sash, the second sash, and the movable rail can be rotated around the frame, at this time the door and window is in a swinging state, and after the movable rail is separated from the fixed rail, when the second reset member is driven, the blocking member extends into the first lock hole, so that it is possible to prevent the second sash from sliding out of the first guide rail and causing a safety accident, and thus the reliability of the door and window can be improved.

The trigger member is retracted into the movable lock box by docking the movable rail with the fixed rail, and then drives the blocking member to withdraw from the first lock hole, and therefore no matter whether the movable rail starts to rotate from an inside or outside of the frame to dock with the fixed rail, the trigger member can be driven to retract, that is, the in-and-out swinging of the door and window can be achieved, and switching between an in-and-out swinging state and a sliding state does not require the use of a motor or manual plugging and unplugging of a pin, so that the door and window is easy to operate, has a simple and compact structure, and has a variety of opening methods to meet different needs of users.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic structural diagram of an in-and-out swinging and sliding door and window in a sliding state according to a preferred embodiment of the present invention.

FIG. 2 is a schematic structural diagram of a cross-section of the in-and-out swinging and sliding door and window shown in FIG. 1 taken along a line A-A.

FIG. 3 is a schematic structural diagram of the in-and-out swinging and sliding door and window shown in FIG. 1 in a swinging state.

FIG. 4 is a schematic structural diagram of a locking mechanism in the in-and-out

swinging and sliding door and window shown in FIG. 1.

FIG. 5 is a schematic structural diagram of the locking mechanism shown in FIG. 4 from another perspective.

FIG. 6 is a schematic structural diagram of the locking mechanism shown in FIG. 4 in
5 a separated state.

FIG. 7 is a schematic structural diagram of a partial cross-section of a movable lock box and an opening and closing assembly in the locking mechanism shown in FIG. 6.

FIG. 8 is a schematic structural diagram of the opening and closing assembly shown in FIG. 7.

10 FIG. 9 is a schematic structural diagram of a partial cross-section of a fixed lock box in the locking mechanism shown in FIG. 6.

FIG. 10 is a schematic structural diagram of a locking mechanism having another structure in the in-and-out swinging and sliding door and window according to the present application.

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DETAILED DESCRIPTION OF THE INVENTION

The technical solutions in the embodiments of the present invention will be clearly and completely described below with reference to the accompanying drawings in the embodiments of the present invention. Obviously, the described embodiments are merely part
20 of the embodiments of the present invention, not all of the embodiments. Based on the embodiments of the present invention, all other embodiments obtained by those having ordinary skills in the art without creative work fall within the protection scope of the present invention.

It should be noted that when an element is referred to as "fixed to" another element,
25 the element can be directly on the other element or an intervening element may be present.

When an element is considered to be "connected to" another element, the element can be directly connected to the other element or an intervening element may be present at the same time. When the number of elements is referred to as "a plurality", the element may be any number of two or more. The terms "vertical", "horizontal", "left", "right" and similar
5 expressions used herein are only for illustrative purposes and are not intended to represent the only embodiment.

Unless defined otherwise, all technical and scientific terms used herein have the same meanings as those commonly understood by those skilled in the art. The terms used in the specification of the present invention are only for the purpose of describing specific
10 embodiments and are not intended to limit the present invention. The term "and/or" used herein includes any and all combinations of one or more of the related listed items.

As shown in FIGS. 1 to 10, an in-and-out swinging and sliding door and window 100 according to a preferred embodiment of the present invention includes a frame 10, and a sash assembly 30, a rail assembly 20, and a locking mechanism 40 which are mounted on the frame
15 10. The rail assembly 20 includes a fixed rail 22 fixedly connected to the frame 10 and a movable rail 21 rotatably connected to the frame 10, the movable rail 21 is provided with a first guide rail 211, the fixed rail 22 is provided with a second guide rail 221 corresponding to the first guide rail 211, and the sash assembly 30 includes a first sash 31 fixedly connected to the movable rail 21 and a second sash 32 slidably connected to the first guide rail 211 and the
20 second guide rail 221. The locking mechanism 40 is used for controlling docking or separation of the movable rail 21 and the fixed rail 22. The locking mechanism 40 includes a movable lock box 41 mounted on one end of the movable rail 21 close to the fixed rail 22 and an opening and closing assembly 43 mounted on the movable lock box 41. The movable lock box 41 is provided with a first lock hole 411 communicating with the first guide rail 211. The opening
25 and closing assembly 43 includes a trigger member 431 and a blocking member 433 in

transmission fit. The trigger member 431 has one end built into the movable lock box 41 and the other end extending toward the fixed rail 22 and protruding from the movable lock box 41. A first reset member 432 is disposed between the trigger member 431 and the movable lock box 41. The blocking member 433 has one end built into the movable lock box 41 and the other end extending toward the first lock hole 411. A second reset member 434 is disposed between the blocking member 433 and the movable lock box 41. When the movable rail 21 is docked with the fixed rail 22, the fixed rail 22 drives the trigger member 431 to retract into the movable lock box 41, thereby driving the blocking member 433 to withdraw from the first lock hole 411. When the movable rail 21 is separated from the fixed rail 22, the first reset member 432 drives one end of the trigger member 431 to extend out of the movable lock box 41, and the second reset member 434 drives one end of the blocking member 433 to extend into the first lock hole 411.

In the in-and-out swinging and sliding door and window 100 of the present application, when the movable rail 21 and the fixed rail 22 are docked in place, the fixed rail 22 presses the trigger member 431 back into the movable lock box 41 to drive the blocking member 433 to withdraw from the first lock hole 411, and the first guide rail 211 communicates with the second guide rail 221, and thus the second sash 32 can slide freely in the first guide rail 211 and the second guide rail 221, and at this time the door and window is in a sliding state. When the first sash 31 and the second sash 32 overlap with each other, the first sash 31, the second sash 32, and the movable rail 21 can be rotated around the frame 10, at this time the door and window is in a swinging state, and after the movable rail 21 is separated from the fixed rail 22, when the second reset member 434 is driven, the blocking member 433 extends into the first lock hole 411, so that it is possible to prevent the second sash 32 from sliding out of the first guide rail 211 and causing a safety accident, and thus the reliability of the door and window can be improved. The trigger member 431 is retracted into the movable lock box 41 by docking

the movable rail 21 with the fixed rail 22, and then drives the blocking member 433 to withdraw from the first lock hole 411, and therefore no matter whether the movable rail 21 starts to rotate from an inside or outside of the frame 10 to dock with the fixed rail 22, the trigger member 431 can be driven to retract, that is, the in-and-out swinging of the door and window can be achieved, and switching between the in-and-out swinging state and the sliding state does not require the use of a motor or manual plugging and unplugging of a pin, so that the door and window is easy to operate, has a simple and compact structure, and has a variety of opening methods to meet different needs of users.

As shown in FIG. 2, the movable rail 21 is rotatably connected to the frame 10 through a rotating shaft 212. In order to improve the stability of the first sash 31 when the first sash 31 is swung, a bottom portion of the first sash 31 is connected to the frame 10 through a ground hinge 33. In this way, there are two hinge points between the first sash 31 and the frame 10, which can bear a larger weight and make a door and window structure more stable. In other embodiments, a hinge may be disposed between a side surface of the first sash 31 and the frame 10 to further improve the bearing capacity of the door and window.

It should be noted that although the first sash 31 and the second sash 32 shown in the drawings of the present application both include jambs, the first sash 31 and the second sash 32 may be a jambless pure glass structure.

As shown in FIG. 2, a top portion of the second sash 32 is connected to a hanging pulley 321 that is slidably connected to the first guide rail 211 and the second guide rail 221. The first guide rail 211 fits with the second guide rail 221 by the hanging pulley 321 to reduce resistance of the second sash 32 when the second sash is sliding, and limit a sliding track of the second sash 32, so that the door and window is slid more smoothly and a user experience is improved.

Preferably, in order to further prevent the first sash 31 and the second sash 32 from

sliding relative to each other in the swinging state and causing an impact on the blocking member 433, thereby affecting a use experience of the door and window, an anti-separation mechanism can be provided between the first sash 31 and the second sash 32, for example, a magnetic strip is provided between the first sash 31 and the second sash 32 to prevent the first sash 31 and the second sash 32 from sliding relative to each other in the swinging state by magnetic attraction, and it is also possible to prevent the first sash 31 and the second sash 32 from separating by providing a relevant engagement member or a plug-in member.

As shown in FIGS. 6 and 9, the locking mechanism 40 further includes a fixed lock box 42 mounted on one end of the fixed rail 22 close to the movable rail 21, the fixed lock box 42 is provided with a second lock hole 421 communicating with the second guide rail 221, and is provided with a first guide surface 435 and a second guide surface 436 on one side close to the movable lock box 41, and the first guide surface 435 has one end connected to the second guide surface 436 and the other end extending toward one side surface of the fixed rail 22. A distance between the first guide surface 435 and the movable lock box 41 gradually increases from one end close to the second guide surface 436 to the other end, the second guide surface 436 has the other end extending toward the other side surface of the fixed rail 22, and a distance between the second guide surface 436 and the movable lock box 41 gradually increases from one end close to the first guide surface 435 to the other end. By providing the first guide surface 435 and the second guide surface 436, when the movable rail 21 and the fixed rail 22 are close to or separated from each other, the end of the trigger member 431 protruding from the movable lock box 41 keeps in contact with the first guide surface 435 or the second guide surface 436, so that the trigger member 431 gradually retracts or extends, thereby preventing the trigger member 431 from getting stuck and causing damage to the door and window.

Further, in order to reduce a friction between the trigger member 431 and the first guide surface 435 and a friction between the trigger member 431 and the second guide surface

436 so as to reduce noise and extend the service life of the door and window, an end portion of the end of the trigger member 431 protruding from the movable lock box 41 is an outwardly protruding arc surface or inclined surface, so that when the trigger member 431 comes into contact with the first guide surface 435 or the second guide surface 436, the contact is a line contact, which can reduce the friction.

Preferably, the first guide surface 435 and the second guide surface 436 are connected by a positioning groove 437, and the positioning groove 437 fits with a top portion of the trigger member 431. When the movable rail 21 and the fixed rail 22 are docked in place, the end of the trigger member 431 protruding from the movable lock box 41 just falls into the positioning groove 437, which can improve positioning accuracy when the movable rail 21 and the fixed rail 22 are docked. Optionally, the positioning groove 437 has a shape matching an end surface of the end of the trigger member 431 protruding from the movable lock box 41, and is preferably a "U"-shaped groove or a "V"-shaped groove.

In the present embodiment, the blocking member 433 enters and is withdrawn from the first lock hole 411 from a side surface of the first lock hole 411. In other embodiments, the blocking member 433 may enter and be withdrawn from the first lock hole 411 from a top portion of the first lock hole 411, that is, specific positions of the blocking member 433 and the trigger member 431 on the movable lock box 41 can be flexibly set according to a spatial layout of the movable lock box 41.

In the present embodiment, the trigger member 431 and the blocking member 433 are in transmission fit through an inclined surface. The transmission fit through the inclined surface can change a direction of a force, so that the trigger member 431 can be retracted away from the fixed rail 22 to drive the blocking member 433 to withdraw from the first lock hole 411.

Specifically, as shown in FIGS. 7 and 8, in the present embodiment, the end of the trigger member 431 built into the movable lock box 41 is provided with a first inclined surface

4311, and the end of the blocking member 433 built into the movable lock box 41 is provided with a second inclined surface 4331 that fits with the first inclined surface 4311. In other embodiments, other transmission methods may be used to achieve the same function. For example, a rack is provided at the end of the trigger member 431 and the end of the blocking member 433 that are built in the movable lock box 41, and the rack between the two is driven by a gear or a worm to achieve inward withdrawal of the trigger member 431 so as to drive the blocking member 433 to withdraw from the first lock hole 411. It is also possible to connect the end of the blocking member 433 built in the movable lock box 41 with the movable lock box 41 through a flexible member, and then allow the end of the trigger member 431 built in the movable lock box 41 to abut against the flexible member, and the trigger member 431 retracts into the movable lock box 41 to drive the flexible member to bend, thereby driving the blocking member 433 to withdraw from the first lock hole 411.

In the present embodiment, the first reset member 432 and the second reset member 434 are both compression springs. In other embodiments, the first reset member 432 and the second reset member 434 may be elastic members such as tension springs, spring plates, and high-strength rubber that can achieve the same function.

As shown in FIGS. 5 and 6, in order to improve the docking accuracy of the fixed rail 22 and the movable rail 21, the locking mechanism 40 further includes an anti-falling assembly 44 including an anti-falling block 441 and an anti-falling groove 442 that are inserted into each other.

The anti-falling block 441 is disposed on one side of the fixed lock box 42 close to the movable lock box 41, and the anti-falling groove 442 is disposed on one side of the movable lock box 41 close to the fixed lock box 42, or

the anti-falling block 441 is disposed on one side of the movable lock box 41 close to the fixed lock box 42, and the anti-falling groove 442 is disposed on one side of the fixed lock

box 42 close to the movable lock box 41.

By the fitting of the anti-falling block 441 and the anti-falling groove 442, the docking accuracy between the movable rail 21 and the fixed rail 22 can be improved, and a support point can also be provided for the first sash 31, the second sash 32, and the movable rail 21, thereby improving stress of the first sash 31, the second sash 32, and the movable rail 21, avoiding a phenomenon of falling due to an own gravity, improving the reliability of the door and window, and extending the service life of the door and window.

In the present embodiment, the first guide surface 435, the positioning groove 437, and the second guide surface 436 are disposed on an inner side of the anti-falling groove 442, and the trigger member 431 protrudes from the anti-falling block 441, so that a structure of the locking mechanism 40 can be more compact, which is conducive to reducing a volume of the locking mechanism 40. In other embodiments, when a space in the fixed lock box 42 or the movable lock box 41 is sufficient, the anti-falling block 441 and the trigger member 431 may be separately disposed at different positions.

Furthermore, both ends of the anti-falling block 441 are provided with outwardly protruding arc-shaped or acute-angled introduction surfaces, that is, widths of the both ends of the anti-falling block 441 are smaller than a width of a middle part. This arrangement can facilitate the anti-falling block 441 to be inserted into the anti-falling groove 442, and can also reduce assembly accuracy requirements during installation and production processes of the door and window.

Preferably, the anti-falling groove 442 is disposed on one side of the movable lock box 41 away from the first lock hole 411, the movable lock box 41 is provided with a clearance groove 443 corresponding to the anti-falling block 441 on one side close to the first lock hole 411, and the fixed lock box 42 is provided with a cover plate 444 corresponding to the clearance groove 443, or

the anti-falling groove 442 is disposed on one side of the fixed lock box 42 away from the second lock hole 421, the fixed lock box 42 is provided with a clearance groove 443 corresponding to the anti-falling block 441 on one side close to the second lock hole 421, and the movable lock box 41 is provided with a cover plate 444 corresponding to the clearance groove 443.

By providing the clearance groove 443, it is possible to prevent the anti-falling block 441 from interfering with the corresponding movable lock box 41 or fixed lock box 42 during the docking or separation of the movable rail 21 and the fixed rail 22. By providing the cover plate 444, the cover plate 444 can cover the clearance groove 443 when the movable rail 21 and the fixed rail 22 are docked in place, thereby improving the aesthetics of the door and window.

In order to further improve the reliability of the in-and-out swinging and sliding door and window 100, the locking mechanism 40 further includes a security assembly 45 including an anti-slipping member 451 and an anti-slipping groove 452 which fit with each other, and when the movable rail 21 is docked with the fixed rail 22, the anti-slipping member 451 is embedded in the anti-slipping groove 452. When an external force greater than a preset value is applied, the anti-slipping member 451 is withdrawn from the anti-slipping groove 452, and the movable rail 21 is separated from the fixed rail 22.

The anti-slipping member 451 is loosely connected to one side of the movable lock box 41 close to the fixed lock box 42, and the anti-slipping groove 452 is disposed on one side of the fixed lock box 42 close to the movable lock box 41, or

the anti-slipping member 451 is loosely connected to one side of the fixed lock box 42 close to the movable lock box 41, and the anti-slipping groove 452 is disposed on one side of the movable lock box 41 close to the fixed lock box 42.

By the fitting between the anti-slipping member 451 and the anti-slipping groove 452,

the movable rail 21 can be prevented from being easily separated from the fixed rail 22 after the two are docked. Only when a force greater than a binding force of the anti-slipping member 451 and the anti-slipping groove 452 is received, the movable rail 21 can be separated from the fixed rail 22, and therefore the safety of the door and window is improved.

5 In the present embodiment, the security assembly 45 further includes a third reset member 453, the anti-slipping member 451 has one end movably connected to the fixed lock box 42 and the other end protruding toward the movable lock box 41 from the fixed lock box 42, and the third reset member 453 keeps the other end of the anti-slipping member 451 protruding from the fixed lock box 42. When the movable rail 21 and the fixed rail 22 are
10 docked in place, an elastic force is applied by the third reset member 453 to the anti-slipping member 451, so that the anti-slipping member 451 and the anti-slipping groove 452 can be kept in engagement, and the movable rail 21 can be prevented from being easily separated from the fixed rail 22. Only when an external force on the movable rail 21 is greater than the elastic force of the third reset member 453, the movable rail 21 can be separated from the fixed rail
15 22, and therefore the safety of the door and window is improved. Optionally, the third reset member 453 is a compression spring, and the anti-slipping member 451 is a steel ball. In other embodiments, the third reset member 453 may be an elastic member that can achieve the same function, and the anti-slipping member 451 may be a cylinder or a polygon prism, but the end protruding from the fixed lock box 42 is required to be an outwardly protruding arc surface or
20 inclined surface, and the anti-slipping member 451 may also be directly configured as a ball screw.

 In the present embodiment, the anti-slipping groove 452 is disposed on a side surface of the anti-falling block 441, so that the structure of the locking mechanism 40 can be more compact. In other embodiments, the anti-slipping groove 452 and the anti-falling block 441
25 may be separately disposed as long as the structure allows. In the present embodiment, the anti-

slipping member 451 is disposed on the side surface of the anti-falling block 441, that is, the anti-slipping member 451 is arranged parallel to an end surface of the movable lock box 41. In other embodiments, the anti-slipping member 451 may be disposed on an end surface of the anti-falling block 441, that is, the anti-slipping member 451 is arranged perpendicular to the end surface of the movable lock box 41.

In order to facilitate the anti-slipping member 451 to be inserted into the anti-slipping groove 452 or the anti-slipping member 451 to withdraw from the anti-slipping groove 452, the anti-slipping groove 452 is preferably a "U"-shaped groove or a "V"-shaped groove.

Furthermore, in order to adjust a compression amount of the third reset member 453 to change the binding force between the anti-slipping member 451 and the anti-slipping groove 452, the third reset member 453 is also provided with an adjusting member 454 at one end away from the anti-slipping member 451, and the adjusting member 454 is threadedly connected to the fixed lock box 42. The compression amount of the third reset member 453 can be adjusted by adjusting a depth of the adjusting member 454 screwed into the fixed lock box 42.

As shown in FIG. 10, in another solution for the locking mechanism 40 of the in-and-out swinging and sliding door and window 100 according to the present application, the third reset member 453 is replaced with a first magnetic member 455 and a second magnetic member 456. The security assembly 45 further includes the first magnetic member 455 and the second magnetic member 456, the anti-slipping member 451 has one end movably connected to the fixed lock box 42 and the other end protruding toward the movable lock box 41 from the fixed lock box 42, the first magnetic member 455 is built into the anti-slipping member 451, the second magnetic member 456 and the first magnetic member 455 are disposed opposite to each other on the movable lock box 41, and the first magnetic member 455 and the second magnetic member 456 are magnetically attracted to each other such that the anti-slipping member 451

and the anti-slipping groove 452 are kept in engagement. When the movable rail 21 and the fixed rail 22 are docked in place, the first magnetic member 455 and the second magnetic member 456 are magnetically attracted to each other such that the anti-slipping member 451 and the anti-slipping groove 452 are kept in engagement, thereby preventing the movable rail 21 from being easily separated from the fixed rail 22. Only when an applied external force is greater than a magnetic force of attraction between the first magnetic member 455 and the second magnetic member 456, the movable rail 21 can be separated from the fixed rail 22. The above security assemblies 45 can be used alone or in combination.

Optionally, both the first magnetic member 455 and the second magnetic member 456 may be permanent magnets, or one of the first magnetic member 455 and the second magnetic member 456 may be a magnet and the other may be an iron block.

In the sliding state, the movable rail 21 and the fixed rail 22 are docked in place, and the fixed lock box 42 presses the trigger member 431 back into the movable lock box 41 to drive the blocking member 433 to withdraw from the first lock hole 411, and the first lock hole 411, the second lock hole 421, the first guide rail 211, and the second guide rail 221 communicate with each other, and the second sash 32 can slide freely in the first guide rail 211 and the second guide rail 221. At this time, the door and window is in the sliding state. In the swinging state, the second sash 32 is first pushed to overlap with the first sash 31, and then the first sash 31, the second sash 32, and the movable rail 21 can be rotated around the rotating shaft 212 and the ground hinge 33 toward the inside or outside of the frame 10. At this time, the door and window is in the swinging state. After the movable rail 21 is separated from the fixed rail 22, when the second reset member 434 is driven, the blocking member 433 extends into the first lock hole 411, so that the second sash 32 can be prevented from sliding out of the first guide rail 211 and causing the safety accident, and the reliability of the door and window can be improved.

Finally, it should be noted that the above description is only a preferred example of the present invention and is not intended to limit the present invention. Although the present invention has been described in detail with reference to the above embodiments, it is still possible for those skilled in the art to modify the technical solutions described in the above
5 embodiments, or to replace some of the technical features by equivalents. Any modification, equivalent replacements, improvement, and the like made within the spirit and principle of the present invention shall fall within the protection scope of the present invention.

What is claimed is:

1. An in-and-out swinging and sliding door and window comprising:

a frame;

5 a sash assembly and a rail assembly which are mounted on the frame, the rail assembly including a fixed rail fixedly connected to the frame and a movable rail rotatably connected to the frame, the movable rail being provided with a first guide rail, the fixed rail being provided with a second guide rail corresponding to the first guide rail, and the sash assembly including a first sash fixedly connected to the movable rail and a second sash slidably connected to the
10 first guide rail and the second guide rail; and

a locking mechanism, wherein

the locking mechanism includes a movable lock box mounted on one end of the movable rail close to the fixed rail and an opening and closing assembly mounted on the movable lock box, the movable lock box is provided with a first lock hole communicating with
15 the first guide rail, the opening and closing assembly includes a trigger member and a blocking member in transmission fit, the trigger member has one end built into the movable lock box and the other end extending toward the fixed rail and protruding from the movable lock box, a first reset member is disposed between the trigger member and the movable lock box, the blocking member has one end built into the movable lock box and the other end extending
20 toward the first lock hole, and a second reset member is disposed between the blocking member and the movable lock box, and

when the movable rail is docked with the fixed rail, the fixed rail drives the trigger member to retract into the movable lock box, thereby driving the blocking member to withdraw from the first lock hole, and when the movable rail is separated from the fixed rail, the first
25 reset member drives one end of the trigger member to extend out of the movable lock box, and

the second reset member drives one end of the blocking member to extend into the first lock hole.

2. The in-and-out swinging and sliding door and window according to claim 1, wherein

the locking mechanism further includes a fixed lock box mounted on one end of the
5 fixed rail close to the movable rail, the fixed lock box is provided with a second lock hole communicating with the second guide rail, the fixed lock box is provided with a first guide surface and a second guide surface on one side close to the movable lock box, the first guide surface has one end connected to the second guide surface and the other end extending toward
10 one side surface of the fixed rail, a distance between the first guide surface and the movable lock box gradually increases from one end close to the second guide surface to the other end, the second guide surface has the other end extending toward the other side surface of the fixed rail, and a distance between the second guide surface and the movable lock box gradually increases from one end close to the first guide surface to the other end.

3. The in-and-out swinging and sliding door and window according to claim 2, wherein

15 the first guide surface and the second guide surface are connected by a positioning groove, and the positioning groove fits with a top portion of the trigger member.

4. The in-and-out swinging and sliding door and window according to claim 2, wherein

the locking mechanism further includes an anti-falling assembly including an anti-falling block and an anti-falling groove that are inserted into each other,
20 the anti-falling block is disposed on one side of the fixed lock box close to the movable lock box, and the anti-falling groove is disposed on one side of the movable lock box close to the fixed lock box, or

the anti-falling block is disposed on one side of the movable lock box close to the fixed lock box, and the anti-falling groove is disposed on one side of the fixed lock box close
25 to the movable lock box.

5. The in-and-out swinging and sliding door and window according to claim 4, wherein

the anti-falling groove is disposed on one side of the movable lock box away from the first lock hole, the movable lock box is provided with a clearance groove corresponding to the anti-falling block on one side close to the first lock hole, and the fixed lock box is provided with a cover plate corresponding to the clearance groove, or

the anti-falling groove is disposed on one side of the fixed lock box away from the second lock hole, the fixed lock box is provided with a clearance groove corresponding to the anti-falling block on one side close to the second lock hole, and the movable lock box is provided with a cover plate corresponding to the clearance groove.

6. The in-and-out swinging and sliding door and window according to claim 2, wherein

the locking mechanism further includes a security assembly including an anti-slipping member and an anti-slipping groove which fit with each other, and when the movable rail is docked with the fixed rail, the anti-slipping member is embedded in the anti-slipping groove, and when an external force greater than a preset value is applied, the anti-slipping member is withdrawn from the anti-slipping groove, and the movable rail is separated from the fixed rail,

the anti-slipping member is loosely connected to one side of the movable lock box close to the fixed lock box, and the anti-slipping groove is disposed on one side of the fixed lock box close to the movable lock box, or

the anti-slipping member is loosely connected to one side of the fixed lock box close to the movable lock box, and the anti-slipping groove is disposed on one side of the movable lock box close to the fixed lock box.

7. The in-and-out swinging and sliding door and window according to claim 6, wherein

the security assembly further includes a third reset member, the anti-slipping member has one end movably connected to the fixed lock box and the other end protruding toward the movable lock box from the fixed lock box, and the third reset member keeps the other end of

the anti-slipping member protruding from the fixed lock box.

8. The in-and-out swinging and sliding door and window according to claim 6, wherein

the security assembly further includes a first magnetic member and a second magnetic member, the anti-slipping member has one end movably connected to the fixed lock box and the other end protruding toward the movable lock box from the fixed lock box, the first magnetic member is built into the anti-slipping member, the second magnetic member and the first magnetic member are disposed opposite to each other on the movable lock box, and the first magnetic member and the second magnetic member are magnetically attracted to each other such that the anti-slipping member and the anti-slipping groove are kept in engagement.

9. The in-and-out swinging and sliding door and window according to claim 1, wherein

a top portion of the second sash is connected to a hanging pulley that is slidably connected to the first guide rail and the second guide rail.

10. The in-and-out swinging and sliding door and window according to claim 1, wherein

the trigger member and the blocking member are in transmission fit through an inclined surface.