

CONCEALED HINGE AND CONCEALED GLASS DOOR HINGE WITH SLOW AND CONSTANT CLOSING SPEED

BACKGROUND OF THE INVENTION

1. Field of the Invention

5 The present invention relates to a hinge, especially to a concealed hinge or a concealed glass door hinge that can automatically and smoothly close the door at a slow and constant speed.

2. Description of the Prior Arts

 A concealed hinge is hidden in the door and door frame so the concealed hinge
10 will not protrude out of the door and frame surface, thereby allowing a hidden door design with smooth and good-looking appearance and avoiding exposed construction being damaged by deliberate force or moving objects outside the door and frame surface. Thus, using the concealed hinge is a wise choice for appealing appearance and durable structure.

15 With reference to Figs. 27, a conventional concealed hinge has a first base 91, a second base 92, a pivotal-connecting assembly 93, and a resetting assembly 94. The first base 91 and the second base 92 are respectively mounted in the door frame and the door. The pivotal-connecting assembly 93 connects the first base 91 and the second base 92 so that the first base 91 and the second base 92 can pivot relative to each other via the
20 pivotal-connecting assembly 93. The resetting assembly 94 has a connecting rod 941 and an elastic unit 942. An end of the connecting rod 941 is mounted through the second base 92 and is connected to the pivotal-connecting assembly 93. The other end of the connecting rod 941 forms an abutting segment. The elastic unit 942 abuts between the second base 92 and the abutting segment of the connecting rod 941.

25 When the door is being open, which means the first base 91 is pivoted relative to the second base 92 via the pivotal-connecting assembly 93 to open, the pivotal-

connecting assembly 93 pulls the connecting rod 941 and moves the connecting rod 941 relative to the second base 92, and the abutting segment of the connecting rod 941 is moved toward the second base 92 and compresses the elastic unit 942. Therefore, when external force is not applied to the door, the elastic unit 942 pushes the abutting segment of the connecting rod 941 away from the second base 92 and pulls the pivotal-connecting assembly 93 reversely via the connecting rod 941, such that the first base 91 and the second base 92 are reset to the original position, thereby achieving the automatic closing function.

With reference to Figs. 27 and 31, in order to automatically close a heavy door, the elastic unit 942 should have sufficient elasticity. However, if the force applied by the elastic unit 942 is too large, the door will be closed at a fast speed, which might injure the user who might not notice the fast closing speed of the door. Besides, since the connecting rod 941 and the elastic unit 942 are directly mounted in an accommodating hole that is formed on the door frame or the door, the abutting segment of the connecting rod 941 might scratch the inner surface of the accommodating hole, and the elastic unit 942 might also scratch the inner surface of the accommodating hole due to deformation and curving during closing and opening the door, which both make noise. Particularly, if the door or the door frame is made of wood, the scratching makes sawdust which will further rub with the elastic unit 942, thereby making bigger noise and reducing the service life of the hinge. In summary, the conventional concealed hinge confronts abrasion on the door, the door frame, and the elastic unit 942 so the conventional concealed hinge is not durable, and the elastic unit 942 closes the door with an instant force and at a fast speed such that user might be injured during the operational process.

The followings are three other options other than the above mentioned conventional concealed hinge:

With reference to Figs. 28 and 32, the first option is an exposed hydraulic door

closer 960 with a positioning assembly 961. If the user mounts the exposed hydraulic door closer 960 with the positioning assembly 961 on the door and the door frame, since the exposed hydraulic door closer 960 with the positioning assembly 961 is completely exposed from the door and the door frame, it can be easily damaged by deliberate force or objects that are moving outside the wall surface. Having a damaged exposed hydraulic door closer will cause the door to be inoperable. In other words, the exposed hydraulic door closer 960 with the positioning assembly 961 reduces the durability of the product as well as the structural strength.

The second option is a concealed hydraulic door closer 962 with a positioning assembly 963.

With reference to Fig. 29, for a wood door or a metal door, the concealed hydraulic door closer 962 with the positioning assembly 963 should be mounted on the door and the door frame, and the concealed hydraulic door closer 962 and the supporting arm 964 are exposed from the door and the door frame. Therefore, the intended flat and smooth appearance will no longer sustain due to the supporting arm 964. Besides, a damage rate of the concealed hydraulic door closer 962 with the positioning assembly 963 now on the market is high, causing unnecessary troubles for consumers.

With reference to Fig. 33, for a glass door, two mounting holes must be formed through the glass door in order to assemble the door closer, and thus the structural strength of the glass door will be decreased. Further, the door closer is mounted on the glass door by two screw rods mounted through the two mounting holes and screwed with nuts or a board 965 with screw holes, and when positioning the opening angle, the supporting arm 964 is exposed from the door and the door frame. Therefore, the intended flat and smooth appearance cannot sustain due to the supporting arm 964. Besides, a damage rate of the concealed hydraulic door closer 962 with the positioning assembly 963 now on the market is high, causing unnecessary troubles for consumers.

With reference to Figs. 30 and 34, the third option is installing the door by a hydraulic floor hinge 966. However, when installing the door by the hydraulic floor hinge 966, the user must dig a rectangular hole in the floor and then embed the hydraulic floor hinge 966 below the flooring, so it is a cumbersome construction, difficult to install and hard to maintain and make adjustments on the alignment of the door during installation. Besides, since the hydraulic floor hinge 94 is usually thick, the rectangular hole must be deep enough and thus the rebar might be exposed, such that the structural strength of the floor will be damaged and the flat appearance of the floor cannot be restored.

Furthermore, both the exposed door closer and the concealed door closer are not on the same pivotal axis with the door hinge, and during installation these accumulated pivotal differentiation are often overcome by adjusting the hydraulic door closer with a faster and larger closing force. By doing so, user would require to use a larger force to operate the door and cause operational inconvenience for elderly, physical impaired & children. With the above mentioned installation and accumulated pivotal differentiation will cause long term structural, product durability damages as well as damages caused by moving objects or via external force. The above mentioned issues cause mechanical twisting and vibration which inevitably are transmitted to the edge of the glass door and thus the glass door might chip and shatter. Therefore, applying the exposed door or a concealed door closer on the glass door is not durable and may cause danger to the end user.

In other words, wood, metal or glass doors with attachment of exposed door closer are prone to external damages due to the exposed hardware components. On the other hand, wood, metal or glass doors with attachment of concealed door closer causes a large amount of door and framing damages due to door and frame preparations which are required for installation. With such damage in framing and door construction it also reduces the durability, sound insulation and fire resistance of the door and frame

structure. Furthermore, it also causes durability of door hinge and door closer as door closers and door hinge are running on different pivotal axis and also further worsened by the accumulated pivotal differentiation during installation process and positioning of the door hinge and door closer.

5 The high damage rate and uneasy installation of alignment, large amount of structural damage due to the door and frame preparation as well as accumulated pivotal differentiation of the hidden concealed hydraulic door closer with the positioning assembly currently sold on the market causes unnecessary trouble for consumers.

 In summary, in order to ensure the door hinge and self-closing device are running
10 on the same operational axis so as to ensure end user operational safety, durability of product, eliminating the chance of external damage due to hardware protrusion, minimal damage to the framing and door structure, creating an aesthetic appealing appearance to the door and framing, and most of all resolving a non-constant fast closing problem which a concealed hinge and a door closer are described above.

15 To overcome the shortcomings, the present invention provides a concealed hinge and concealed glass door hinge with slow and constant closing speed which are running on the same pivotal axis to mitigate or obviate the aforementioned problems.

SUMMARY OF THE INVENTION

 The main objective of the present invention is to provide a concealed hinge and
20 concealed glass door hinge with slow and constant closing speed, wherein the resetting assembly has a slow closing function that makes the elastic unit pull back the pivotal-connecting assembly slowly and smoothly, thereby avoiding hurting people due to a fast closing speed. Besides, by the resetting casing wrapping the elastic unit and connecting rod, the elastic unit and the connecting rod will not scratch the inner surface of the
25 accommodating hole of the door or the door frame when operating the door, so the noise is eliminated and the durability is increased.

The concealed hinge with slow and constant closing speed is adapted to be mounted in a door frame and a door. The concealed hinge with slow and constant closing speed has a first base, a second base, a pivotal-connecting assembly, and a resetting assembly. The first base is adapted to be mounted in the door frame. The second base is adapted to be mounted in the door. The pivotal-connecting assembly is connected to the first base and the second base. The first base and the second base are capable of pivoting relative to each other via the pivotal-connecting assembly. The pivotal-connecting assembly has a connecting block located in the second base. When the first base and the second base pivot relative to each other, the connecting block moves relative to the second base. The resetting assembly has a resetting casing, a connecting rod, a connecting unit, an elastic unit, two oil-sealing rings, and a damping oil. The resetting casing is adapted to be mounted in the door and has a front end and a rear end. The front end is securely mounted on the second base. The connecting rod is moveably mounted in the resetting casing and has a connecting end located outside the front end of the resetting casing and connected to the connecting block of the pivotal-connecting assembly. The connecting unit is located in the resetting casing and is connected to the connecting rod. When the first base and the second base pivot relative to each other, the connecting block of the pivotal-connecting assembly is capable of moving the connecting rod relative to the resetting casing and is capable of moving the connecting unit toward the front end of the resetting casing via the connecting rod. The elastic unit is mounted in the resetting casing, is connected to the connecting unit, and is configured to move the connecting unit toward the rear end of the resetting casing. The elastic unit is capable of moving the connecting rod via the connecting unit and moving the connecting block of the pivotal-connecting assembly via the connecting rod to pivot the first base and the second base relative to each other via the pivotal-connecting assembly. The two oil-sealing rings are sleeved on the connecting unit and tightly attached to an inner annular surface of the

resetting casing radially outward. The damping oil is filled in a space formed among the two oil-sealing rings, the connecting unit, and the resetting casing.

By the connecting end of the connecting rod located outside the front end of the resetting casing and connected to the pivotal-connecting assembly, the pivotal-connecting
5 assembly is capable of moving the connecting rod relative to the resetting casing and moving the connecting unit toward the front end of the resetting casing via the connecting rod, and the elastic unit is connected to the connecting unit and configured to move the connecting unit toward the rear end of the resetting casing, when a user makes the door or the glass door pivot relative to the door frame, the first base and the second
10 base pivot relative to each other via the pivotal-connecting assembly, and the pivotal-connecting assembly pulls the connecting rod and applies force on the elastic unit via the connecting unit. Thus, after the user releases the door, the elastic unit can move the connecting rod toward the rear end of the resetting casing via the connecting unit, and move the pivotal-connecting assembly via the connecting rod, such that the first base and
15 the second base reversely pivot relative to each other and are reset, thereby achieving the function of slowly closing the door at a constant speed.

In addition, by configuring the resetting casing, making the two oil-sealing rings sleeved on the outer annular surface of the connecting unit and closely fit the inner annular surface of the resetting casing radially outward, and filling the space formed
20 among the two oil-sealing rings, the connecting unit, and the resetting casing with damping oil, when the elastic unit moves the connecting unit toward the rear end of the resetting casing, the two oil-sealing rings and damping oil will rub against the resetting casing, such that the elastic unit is restricted to move the connecting unit slowly and the elastic unit slowly pivots and resets the first base and the second base via the connecting
25 rod and the pivotal-connecting assembly. Thus, the present invention slows down the closing speed and therefore prevents hurting people.

Moreover, by mounting the resetting casing in the door or the door frame and mounting the elastic unit, the connecting rod, and the connecting unit in the resetting casing, during the operation of the door, the elastic unit, the connecting rod, and the connecting unit move in the resetting casing and are prevented from scratching the door or the door frame, so that the noise can be eliminated and the durability can be increased.

The present invention effectively slows down the automatic closing speed of the door and the closing speed can be adjusted as required by the user, so the door will not be instantaneously closed, and the user will not have psychological pressure when passing through the door and does not have to worry about being hurt by the instantaneously closing door. (Since the conventional door closer always closes the door fast, the door panel is likely to pinch or hurt the user, so the user has to keep pushing against the door panel when passing the door, which is inconvenient.)

Other objectives, advantages and novel features of the invention will become more apparent from the following detailed description when taken in conjunction with the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

Fig. 1 is a perspective view of a concealed hinge with slow and constant closing speed in accordance with the present invention;

Fig. 2 is an exploded view of the concealed hinge in Fig. 1;

Fig. 3 is a top view of the concealed hinge in Fig. 1, showing the first base and the second base respectively mounted in the door and the door frame and pivoting 0 degree;

Fig. 4 is an operational top view of the concealed hinge in Fig. 1, showing the first base and the second base respectively mounted in the door and the door frame and pivoting from 0 degree to 90 degrees;

Fig. 5 is another operational top view of the concealed hinge in Fig. 1, showing

the first base and the second base respectively mounted in the door and the door frame and pivoting from 90 degrees to 180 degrees;

Fig. 6 is a side view in cross-section of the concealed hinge in Fig. 1, shown as the state in Fig. 3;

5 Fig. 7 is another side view in cross-section of the concealed hinge in Fig. 1, shown as the state in Fig. 4;

Fig. 8 is still another side view in cross-section of the concealed hinge with slow and constant closing speed function in Fig. 1, showing as the state in Fig. 5;

Fig. 9 is an exploded view of another embodiment of the concealed hinge in Fig. 1, showing the embodiment having a disc spring configured in the resetting assembly;

Fig. 10 is a side view in cross-section of the embodiment in Fig. 9;

Fig. 11 is a perspective view of a concealed glass door hinge in accordance with the present invention;

Fig. 12 is an operational perspective view of the concealed glass door hinge in Fig. 11, showing the first base and the second base pivoting relative to each other;

Fig. 13A is an exploded view of the concealed glass door hinge in Fig. 11, showing the resetting assembly, part of the pivotal-connecting assembly, and the second base;

Fig. 13B is a partial enlarged view of Fig. 13A;

20 Fig. 14 is another exploded view of the concealed glass door hinge in Fig. 11, showing part of the pivotal-connecting assembly and the first base;

Fig. 15 is still another exploded view of the concealed glass door hinge in Fig. 11, showing the first base and the glass door;

Figs. 16, 17, and 18 are operational top views of the concealed glass door hinge in Fig. 11, showing the glass door pivoting relative to the door frame;

Figs. 19, 20, and 21 are side views in cross-section of the concealed glass door

hinge in Fig. 11, showing the pivotal-connecting assembly and the resetting assembly in the three states respectively in Figs. 16, 17, and 18;

Fig. 22 is a top view in cross-section of the concealed glass door hinge in Fig. 11, showing the positioning protrusion and the pivotal-connecting casing;

5 Fig. 23 is an exploded view of the concealed glass door hinge in accordance with the present invention in another embodiment, showing the glass door clamped instead of mounted through;

Fig. 24 is a side view in cross-section of the concealed glass door hinge in Fig. 23, showing the glass door clamped instead of mounted through;

10 Fig. 25 is an exploded view of the concealed glass door hinge in accordance with the present invention in still another embodiment, showing the resetting assembly having multiple disc springs;

Fig. 26 is a side view in cross-section of the concealed glass door hinge in Fig. 25, showing the resetting assembly having multiple disc springs;

15 Fig. 27 is a perspective view of a conventional concealed hinge;

Fig. 28 is a perspective view of a conventional exposed hydraulic door closer with a positioning assembly mounted on the door and the door frame;

Fig. 29 is a perspective view of a conventional concealed hydraulic door closer with a positioning assembly mounted on the door and the door frame;

20 Fig. 30 is a side view in cross-section of a conventional hydraulic floor hinge mounted on a door and a door frame;

Fig. 31 is a perspective view of a conventional concealed glass door hinge mounted on the glass door and the door frame;

25 Fig. 32 is a perspective view of a conventional exposed hydraulic door closer with a positioning assembly mounted on the glass door and the door frame;

Fig. 33 is a perspective view of a conventional concealed hydraulic door closer

with a positioning assembly mounted on the glass door and the door frame; and

Fig. 34 is a side view in cross-section of a conventional hydraulic floor hinge mounted on a glass door and a door frame.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

5 With reference to Figs. 1, 2, and 3, a concealed hinge with slow and constant closing speed in accordance with the present invention is adapted to be mounted in a door frame A1 and a door A2. The concealed hinge comprises a first base 10, a second base 20, a pivotal-connecting assembly 30, and a resetting assembly 40.

10 The first base 10 and the second base 20 are respectively mounted in the door frame A1 and the door A2. Specifically, in this embodiment, the first base 10 is mounted in the door frame A1 and the second base 20 is mounted in the door A2, but in other embodiments, the first base 10 can also be mounted in the door A2 and the second base 20 can also be mounted in the door frame A1.

15 The pivotal-connecting assembly 30 is connected to the first base 10 and the second base 20. The first base 10 and the second base 20 are capable of pivoting relative to each other via the pivotal-connecting assembly 30. The pivotal-connecting assembly 30 has a connecting block 31 located in the second base 20. When the first base 10 and the second base 20 pivot relative to each other, the connecting block 31 moves relative to the second base 20. In other words, the connecting block 31 moves along with the
20 movement of the first base 10 and the second base 20 pivoting relative to each other via the pivotal-connecting assembly 30.

 With reference to Figs. 2 and 6, the resetting assembly 40 has a resetting casing 41, a front cover 42, at least one fixing unit 43, a rear cover 44, a connecting rod 45, a connecting unit 46, an elastic unit 47, two oil-sealing rings 48, and a damping oil 49.

25 The resetting casing 41 has a front end 411 and a rear end 412. The front end 411 is securely mounted on the first base 10 or the second base 20 and is adapted to be

mounted correspondingly in the door frame A1 or the door A2. Specifically, in this embodiment, the front end 411 of the resetting casing 41 is securely mounted on the second base 20, and since the second base 20 is mounted in the door A2, the resetting casing 41 is also mounted in the door A2. But in other embodiments, the front end 411 of the resetting casing 41 can also be mounted on the first base 10, and thus the resetting casing 41 is mounted in the door frame A1 since the first base 10 is mounted in the door frame A1.

The front cover 42 seals the front end 411 of the resetting casing 41 and is securely mounted on the second base 20 via the front end 411 of the resetting casing 41.

In other embodiments, the resetting casing 41 can also be securely mounted on the first base 10 via the front cover 42. In this embodiment, an amount of the fixing unit 43 is two, and each of the two fixing units is a screw. Thus, the front cover 42 is fixed on the second base 20 by the two fixing units 43 screwed with the second base 20. The rear cover 44 seals the rear end 412 of the resetting casing 41. But in other embodiments, the resetting assembly 40 can also be implemented without the front cover 42, the fixing unit 43, and the rear cover 44, and in such embodiment the front end 411 of the resetting casing 41 will be directly mounted on the first base 10 or the second base 20.

The connecting rod 45 is moveably mounted in the resetting casing 41 and has a connecting end 451 located outside the front end 411 of the resetting casing 41 and connected to the connecting block 31 of the pivotal-connecting assembly 30. Specifically, in this embodiment, the connecting end 451 of the connecting rod 45 is moveably mounted through the front cover 42 and is moveably mounted through the second base 20 and then further screwed with the connecting block 31 of the pivotal-connecting assembly 30. Additionally, the connecting end 451 of the connecting rod 45 can be mounted through the connecting block 31. By the connecting end 45 of the connecting rod 45 screwed with the connecting block 31 of the pivotal-connecting assembly 30 and

being allowed to move through the connecting block 31, the user can adjust the relative position between the connecting rod 45 and the connecting block 31 by rotating the connecting rod 45 to adjust the preload of the elastic unit 47. In other words, the user can adjust the initial deformation of the elastic unit 47 before the door A2 pivots relative to the door frame A1, so as to adjust the force of the elastic unit 47 to automatically close the door. But in other embodiments, the pivotal-connecting assembly 30 can also be implemented without the connecting block 31, and in such case the connecting rod 45 is securely mounted on the pivotal-connecting assembly 30. Further, an annular flange segment 452 is formed on another end of the connecting rod 45 opposite to the connecting end 451.

The connecting unit 46 is located inside the resetting casing 41 and is connected to the connecting rod 45. When the first base 10 and the second base 20 pivot relative to each other via the pivotal-connecting assembly 30, the connecting block 31 of the pivotal-connecting assembly 30 moves the connecting rod 45 relative to the resetting casing 41 and moves the connecting unit 46 toward the front end 411 of the resetting casing 41 via the connecting rod 45. Specifically, when the first base 10 and the second base 20 pivot relative to each other to open, the pivotal-connecting assembly 30 pulls the connecting rod 45 and moves the connecting block 31 via the connecting rod 45 to make the connecting rod 45 and the connecting block 31 move toward the front end 411 of the resetting casing 41. During the opening movement, a part of the connecting rod 45 protruding out of the resetting casing 41 and mounted through the second base 20 becomes longer as the opening angle gets bigger. On the contrary, when the first base 10 and the second base 20 pivot relative to each other to close, the pivotal-connecting assembly 30 pushes the connecting rod 45 to move the connecting rod 45 toward the rear end 412 of the resetting casing 41. Besides, in this embodiment, the connecting unit 46 is sleeved on the connecting rod 45 and abuts the annular flange segment 452, so when the

connecting rod 45 is pulled by the pivotal-connecting assembly 30, the annular flange segment 452 pushes the connecting unit 46 toward the front end 411 of the resetting casing 41. But in other embodiments, the connecting rod 45 and the connecting unit 46 can also be fixed to each other or be implemented integrally. Furthermore, in this embodiment, an annular surface of the connecting unit 46 forms, but not limited to, two annular grooves 461 and an oil-accommodating groove 462.

The elastic unit 47 is mounted in the resetting casing 41, is connected to the connecting unit 46, and is configured to move the connecting unit 46 toward the rear end 412 of the resetting casing 41. Specifically, in this embodiment, the elastic unit 47 is a compression spring abutting between the front cover 42 and the connecting unit 46. But in an embodiment that does not have the front cover 42, the elastic unit 47 can also abut directly between the second base 20 (or the first base 10) and the connecting unit 46. The elastic unit 47 can also be an extension spring connected between the rear cover 44 and the connecting unit 46, so that the same effect can be achieved. The elastic unit 47 can move the connecting rod 45 via the connecting unit 46 and move the connecting block 31 of the pivotal-connecting assembly 30 via the connecting rod 45, so that the first base 10 and the second base 20 can be pivoted by the pivotal-connecting assembly 30.

Specifically, when the door A2 is opened, the first base 10 is pivoted relative to the second base 20, and the pivotal-connecting assembly 30 pulls the connecting rod 45 and moves the connecting unit 46 toward the front end 411 of the resetting casing 41, and the connecting unit 46 compresses the elastic unit 47. Therefore, if the door A2 is released, the elastic unit 47 will push the connecting unit 46 to move the connecting rod 45 toward the rear end 412 of the resetting casing 41, and thus the pivotal-connecting assembly 30 will be pulled to reversely pivot and reset the first base 10 and the second base 20 in order to automatically close the door A2 smoothly and slowly.

The two oil-sealing rings 48 are sleeved on the connecting unit 46 and tightly

attached to an inner annular surface of the resetting casing 41 radially outward to seal. Specifically, in this embodiment, the two oil-sealing rings 48 are respectively mounted in the two annular grooves 461 formed on the outer annular surface of the connecting unit 46.

5 The damping oil 49 is filled in a space formed among the two oil-sealing rings 48, the connecting unit 46, and the resetting casing 41. Specifically, in this embodiment, the damping oil 49 is filled in the oil-accommodating groove 462 formed on the outer annular surface of the connecting unit 46.

 Besides, one connecting unit 46, two oil-sealing rings 48, and a sufficient amount
10 of damping oil 49 are defined as a damping assembly. The present invention can have multiple said damping assemblies. In other words, the resetting assembly 40 can be implemented with more than one connecting unit 46, more than two oil-sealing rings 48, and more than one sufficient amount of damping oil 49 on the connecting rod 45 to increase the friction to the resetting casing 41, thereby further slowing down the closing
15 speed of the door A2.

 With reference to Figs. 3, and 6, when the first base 10 is mounted in the door frame A1, the second base 20 is mounted in the door A2, and the door A2 and the door frame A1 have not been pivoted yet, the connecting unit 46 is located at a position near the rear end 412 in the resetting casing 41 and has not compressed the elastic unit 47 yet.
20 With reference to Figs. 4, and 7, when the door A2 is opened and is pivoted relative to the door frame A1 at an angle θ of 90 degrees, the first base 10 and the second base 20 pivot relative to each other to 90 degrees, the connecting block 31 of the pivotal-connecting assembly 30 moves a distance in the second base 20 and pulls the connecting rod 45 to move in the resetting casing 41, such that the pivotal-connecting assembly 30 moves the
25 connecting unit 46 toward the front end 411 of the resetting casing 41 to compress the elastic unit 47 via the annular flange segment 452 of the connecting rod 45. With

reference to Figs. 5, and 8, when the door A2 is further pivoted relative to the door frame A1 at another angle θ of 90 degrees (which means the door A2 has been pivoted 180 degrees), the connecting block 31 of the pivotal-connecting assembly 30 moves a further distance in the second base 20, and the connecting block 31 further pulls the connecting rod 45 to move in the resetting casing 41, such that the pivotal-connecting assembly 30 further moves the connecting unit 46 toward the front end 411 of the resetting casing 41 to further compress the elastic unit 47 via the annular flange segment 452 of the connecting rod 45.

After then, if the user releases the door A2, the elastic unit 47 will push the connecting unit 46 toward the rear end 412 of the resetting casing 41 and push the connecting rod 45 by the connecting unit 46 abutting the annular flange segment 452 to pull the connecting block 31 of the pivotal-connecting assembly 30 and make the first base 10 and the second base 20 reversely pivot sequentially from the state in Fig. 5 via the state in Fig. 4 to the state in Fig. 3, and complete the closing. During the process, the two oil-sealing rings 48 mounted on the outer annular surface of the connecting unit 46 and the damping oil 49 filled between the two oil-sealing rings 48 will rub the inner annular surface of the resetting casing 41 to slow down the speed of the elastic unit 47 pushing the connecting unit 46, thereby closing the door A2 slowly and smoothly and preventing hurting people.

With reference to Figs. 9, and 10, in a preferred embodiment, the resetting assembly has multiple disc springs 470 mounted in the resetting casing 41, arranged along a direction from the front end of the resetting casing 41 to the rear end of the resetting casing 41, and abutting between the elastic unit 47 and the front cover 42. In other words, the elastic unit 47 abuts the disc springs 470 and abuts the front cover 42 via the disc springs 470. When the door is opened to approaching 90 degrees, the elastic unit will be applied with a larger force due to torque and moment arm, so by the configuration

of the disc springs 470, the instant force to close the door can be increased.

By the connecting end 451 of the connecting rod 45 located outside the front end 411 of the resetting casing 41 and connected to the pivotal-connecting assembly 30, the pivotal-connecting assembly 30 being capable of moving the connecting rod 45 relative to the resetting casing 41 and moving the connecting unit 46 toward the front end 411 of the resetting casing 41 via the connecting rod 45, and the elastic unit 47 connected to the connecting unit 46 and configured to move the connecting unit 46 toward the rear end 412 of the resetting casing 41, when a user makes the door A2 pivot relative to the door frame A1, the first base 10 and the second base 20 pivot relative to each other via the pivotal-connecting assembly 30 and the pivotal-connecting assembly 30 pulls the connecting rod 45 and applies force on the elastic unit 47 via the connecting unit 46. Thus, after the user releases the door A2, the elastic unit 47 can move the connecting rod 45 toward the rear end 412 of the resetting casing 41 via the connecting unit 46, and move the pivotal-connecting assembly 30 via the connecting rod 45, such that the first base 10 and the second base 20 reversely pivot relative to each other and are reset, thereby achieving the function of slowly closing the door at a constant speed.

In addition, by configuring the resetting casing 41, making the two oil-sealing rings 48 sleeved on the outer annular surface of the connecting unit 46 and closely fit the inner annular surface of the resetting casing 41 radially outward, and filling the space formed among the two oil-sealing rings, the connecting unit, and the resetting casing 41 with damping oil 49, when the elastic unit 47 moves the connecting unit 46 toward the rear end 412 of the resetting casing 41, the two oil-sealing rings 48 and damping oil 49 will rub against the resetting casing 41, such that the elastic unit 47 is restricted to move the connecting unit 46 slowly and the elastic unit 47 slowly pivots and resets the first base 10 and the second base 20 via the connecting rod 46 and the pivotal-connecting assembly 30. Thus, the present invention slows down the closing speed and therefore

prevents hurting people.

Moreover, by mounting the resetting casing 41 in the door A2 or the door frame A1 and mounting the elastic unit 47, the connecting rod 45, and the connecting unit 46 in the resetting casing 41, during the operation of the door, the elastic unit 47, the connecting rod 45, and the connecting unit 46 move in the resetting casing 41 and are prevented from scratching the door A2 or the door frame A1, so that the noise can be eliminated and the durability can be increased.

The structures of the concealed glass door hinge and the concealed hinge described above are substantially the same but with a few differences. The following gives a complete description of the concealed glass door hinge, including the same parts as well as the different parts. Some of the components mentioned below are named and labeled as those in the concealed hinge, but only refer to the components in the concealed glass door hinge and are not related to the components in the abovementioned concealed hinge.

With reference to Figs. 11, 12, and 16, the concealed glass door hinge with slow and constant closing speed in accordance with the present invention is adapted to be mounted in a door frame A1, and is adapted to be connected to a glass door A3. The concealed glass door hinge has a first base 10A, a second base 20A, a pivotal-connecting assembly 30A, and a resetting assembly 40.

With reference to Figs. 15 and 22. The first base 10A is adapted to be connected to the glass door A3. Specifically, in this embodiment, the first base 10A has a front door fixing segment 11, a rear door fixing segment 12, a front anti-slip unit 13, a rear anti-slip unit 14, a pressing unit 15, two pressing screw rods 16, and a penetrating screw rod 17.

The front door fixing segment 11 is adapted to be located at a side of the glass door A3. The rear door fixing segment 12 is adapted to be located at another side of the glass door A3 and has three screw holes 121. The front anti-slip unit 13 is adapted to be

located between the front door fixing segment 11 and the glass door A3, and is adapted to abut a side surface of the glass door A3. The rear anti-slip unit 14 is adapted to be located between the glass door A3 and the rear door fixing segment 12, and is adapted to abut another side surface of the glass door A3. The pressing unit 15 is located between the rear anti-slip unit 14 and the rear door fixing segment 12, and has two pressing grooves 151. The two pressing screw rods 16 are respectively screwed with two of the three screw holes 121 of the rear door fixing segment 12, and respectively protrude into and abut the two pressing groove 151 of the pressing unit 15. The two pressing screw rods 16 are capable of moving relative to the rear door fixing segment 12 by rotating to push the pressing unit 15 toward the front door fixing segment 11 so as to tightly abut the pressing unit 15, the rear anti-slip unit 14, the glass door A3, the front anti-slip unit 13, and the front door fixing segment 11 to each other. The penetrating screw rod 17 is screwed with the other one of the three screw holes 121 of the rear door fixing segment 12, is sequentially mounted through the rear door fixing segment 12, the pressing unit 15, the rear anti-slip unit 14, the glass door A3, and the front anti-slip unit 13, and is mounted in and assembled with the front door fixing segment 11.

By the configurations of the components described above, the front door fixing segment 11 and the rear door fixing segment 12 can tightly clamp and fix the glass door A3 via the pressing screw rod 16, the pressing unit 15, the front anti-slip unit 13, and the rear anti-slip unit 14, and can be assembled with the glass door A3 by the penetrating screw rod 17 mounted through the glass door A3.

The structure of the first base 10A connected to the glass door A3 is not limited thereto. With reference to Figs. 23 and 24, in other embodiments, the first base 10B can be implemented without the penetrating screw rod but with three pressing screw rods 16B, and the pressing unit 15B can also be implemented with three pressing grooves 151B. In this case, the three pressing screw rods 16B respectively protrude into and abut

the three pressing grooves 151B of the pressing unit 15B, and the three pressing screw rods 16B all push the pressing unit 15B toward the front door fixing segment 11B. In other words, in the embodiment shown in Figs. 23 and 24, there is no need to form a hole on the glass door A3, thereby preventing decreasing the structural strength.

5 With reference to Figs. 13A, 13B, 16, and 22, the second base 20A is adapted to be mounted in the door frame A1. Specifically, in this embodiment, the second base 20A has two positioning protrusions 21. Each of the positioning protrusions 21 has an abutting flat surface 21.

 With reference to Figs. 13A, 13B and 14, the pivotal-connecting assembly 30A is
10 connected to the first base 10A and the second base 20A. The first base 10A and the second base 20A are capable of pivoting relative to each other via the pivotal-connecting assembly 30A. The pivotal-connecting assembly 30A has a connecting block 31 located in the second base 20A. When the first base 10A and the second base 20A pivot relative to each other, the connecting block 31 moves relative to the second base 20A.

15 Specifically, in this embodiment, the pivotal-connecting assembly 30A has two screw rods 32, two sliding blocks 33, two pivotal-connecting units 34, and two pivotal-connecting casings 35. The first base 10A has two pivotal-connecting segments 18. The connecting block 31 is clamped between the two pivotal-connecting segments 18, and the two pivotal-connecting segments 18 extend into the second base 20A from a front
20 opening of the second base 20A. The two sliding blocks 33 are respectively mounted into an upper sliding groove and a lower sliding groove from an upper sliding groove opening and a lower sliding groove opening formed on a rear side of the second base 20A. The two screw rods 32 are mounted into the second base 20A respectively through a top hole and a bottom hole. The upper screw rod 32 is first mounted through the upper sliding
25 block 33, and then mounted through the upper pivotal-connecting segment 18, and at last downwardly screwed with the connecting block 31. The lower screw rod 32 is first

mounted through the lower sliding block 33, and then mounted through the lower pivotal-connecting segment 18, and at last upwardly screwed with the connecting block 31. In other words, the two screw rods 32 are screwed with the connecting block 31 respectively on two opposite sides. Thus, when the first base 10A and the second base 20A pivot
 5 relative to each other, the two pivotal-connecting segments 18 of the first base 10A will move the two screw rods 32 and the connecting block 31 relative to the second base 20A. Two ends of each of the pivotal-connecting units 34 are respectively pivotally connected to the first base 10A and the second base 20A, such that the first base 10A and the second base 20A can pivot relative to each other via the two pivotal-connecting units 34. The two
 10 pivotal-connecting casings 35 are respectively sleeved on the two screw rods 32.

With reference to Figs. 13A, 13B and 19, the resetting assembly 40 has a resetting casing 41, a front cover 42, at least one fixing unit 43, a rear cover 44, a connecting rod 45, a connecting unit 46, an elastic unit 47, two oil-sealing rings 48, and a damping oil 49.

15 The resetting casing 41 has a front end 411 and a rear end 412. The front end 411 is securely mounted on the second base 20A, and the resetting casing 41 is adapted to be mounted in the door frame A1. The front cover 42 seals the front end 411 of the resetting casing 41, and the front end 411 of the resetting casing 41 is securely mounted on the second base 20A via the front cover 42. In this embodiment, an amount of the fixing unit
 20 43 is two. Each of the two fixing units 43 is a screw, and the front cover 42 is fixed on the second base 20A by the fixing unit 43 screwed through. The rear cover 44 seals the rear end 412 of the resetting casing 41. But in other embodiments, the resetting assembly 40 can be implemented without the front cover 42, the fixing unit 43, and the rear cover 44, and in that case the front end 411 of the resetting casing 41 will be directly mounted
 25 securely on the second base 20A.

The connecting rod 45 is moveably mounted in the resetting casing 41 and has a

connecting end 451 located outside the front end 411 of the resetting casing 41 and connected to the connecting block 31 of the pivotal-connecting assembly 30. Specifically, in this embodiment, the connecting end 451 of the connecting rod 45 is moveably mounted through the front cover 42 and is moveably mounted through the second base 20 and then further screwed with the connecting block 31 of the pivotal-connecting assembly 30. Additionally, the connecting end 451 of the connecting rod 45 can be mounted through the connecting block 31. By the connecting end 45 of the connecting rod 45 screwed with the connecting block 31 of the pivotal-connecting assembly 30 and being allowed to move through the connecting block 31, the user can adjust the relative position between the connecting rod 45 and the connecting block 31 by rotating the connecting rod 45 to adjust the preload of the elastic unit 47. In other words, the user can adjust the initial deformation of the elastic unit 47 before the door A2 pivots relative to the door frame A1, so as to adjust the force of the elastic unit 47 to automatically close the door. But in other embodiments, the pivotal-connecting assembly 30 can also be implemented without the connecting block 31, and in such case the connecting rod 45 is securely mounted on the pivotal-connecting assembly 30. Further, an annular flange segment 452 is formed on another end of the connecting rod 45 opposite to the connecting end 451.

The connecting unit 46 is located inside the resetting casing 41 and is connected to the connecting rod 45. When the first base 10 and the second base 20 pivot relative to each other via the pivotal-connecting assembly 30, the connecting block 31 of the pivotal-connecting assembly 30 moves the connecting rod 45 relative to the resetting casing 41 and moves the connecting unit 46 toward the front end 411 of the resetting casing 41 via the connecting rod 45. Specifically, when the first base 10 and the second base 20 pivot relative to each other to open, the pivotal-connecting assembly 30 pulls the connecting rod 45 and moves the connecting block 31 via the connecting rod 45 to make

the connecting rod 45 and the connecting block 31 move toward the front end 411 of the resetting casing 41. During the opening movement, a part of the connecting rod 45 protruding out of the resetting casing 41 and mounted through the second base 20 becomes longer as the opening angle gets bigger. On the contrary, when the first base 10 and the second base 20 pivot relative to each other to close, the pivotal-connecting assembly 30 pushes the connecting rod 45 to move the connecting rod 45 toward the rear end 412 of the resetting casing 41. Besides, in this embodiment, the connecting unit 46 is sleeved on the connecting rod 45 and abuts the annular flange segment 452, so when the connecting rod 45 is pulled by the pivotal-connecting assembly 30, the annular flange segment 452 pushes the connecting unit 46 toward the front end 411 of the resetting casing 41. But in other embodiments, the connecting rod 45 and the connecting unit 46 can also be fixed to each other or be implemented integrally. Furthermore, in this embodiment, an annular surface of the connecting unit 46 forms, but not limited to, two annular grooves 461 and an oil-accommodating groove 462.

The elastic unit 47 is mounted in the resetting casing 41, is connected to the connecting unit 46, and is configured to move the connecting unit 46 toward the rear end 412 of the resetting casing 41. Specifically, in this embodiment, the elastic unit 47 is a compression spring abutting between the front cover 42 and the connecting unit 46. But in an embodiment that does not have the front cover 42, the elastic unit 47 can also abut directly between the second base 20 and the connecting unit 46. The elastic unit 47 can also be an extension spring connected between the rear cover 44 and the connecting unit 46, so that the same effect can be achieved. The elastic unit 47 can move the connecting rod 45 via the connecting unit 46 and move the connecting block 31 of the pivotal-connecting assembly 30 via the connecting rod 45, so that the first base 10 and the second base 20 can be pivoted by the pivotal-connecting assembly 30. Specifically, when the door A2 is opened, the first base 10 is pivoted relative to the second base 20, and the

pivotal-connecting assembly 30 pulls the connecting rod 45 and moves the connecting unit 46 toward the front end 411 of the resetting casing 41, and the connecting unit 46 compresses the elastic unit 47. Therefore, if the door A2 is released, the elastic unit 47 will push the connecting unit 46 to move the connecting rod 45 toward the rear end 412 of the resetting casing 41, and thus the pivotal-connecting assembly 30 will be pulled to reversely pivot and reset the first base 10 and the second base 20 in order to automatically close the door A2 smoothly and slowly with a constant closing speed.

The two oil-sealing rings 48 are sleeved on the connecting unit 46 and tightly attached to an inner annular surface of the resetting casing 41 radially outward to seal. Specifically, in this embodiment, the two oil-sealing rings 48 are respectively mounted in the two annular grooves 461 formed on the outer annular surface of the connecting unit 46.

The damping oil 49 is filled in a space formed among the two oil-sealing rings 48, the connecting unit 46, and the resetting casing 41. Specifically, in this embodiment, the damping oil 49 is filled in the oil-accommodating groove 462 formed on the outer annular surface of the connecting unit 46.

Besides, one connecting unit 46, two oil-sealing rings 48, and a sufficient amount of damping oil 49 are defined as a damping assembly. The present invention can have multiple said damping assemblies. In other words, the resetting assembly 40 can be implemented with more than one connecting unit 46, more than two oil-sealing rings 48, and more than one sufficient amount of damping oil 49 mounted on the connecting rod 45 to increase the friction to the resetting casing 41, thereby further slowing down the closing speed of the door A2.

With reference to Figs. 16, and 19, when the first base 10AA is connected to the glass door A3, and the second base 20A is mounted in the door frame A1, and the glass door A3 and the door frame A1 have not been pivoted yet, the connecting unit 46 is

located at a position near the rear end 412 in the resetting casing 41 and has not compressed the elastic unit 47 yet. With reference to Figs. 17, and 20, when the glass door A3 is opened and is pivoted relative to the door frame A1 to an angle θ of 33 degrees, the first base 10A and the second base 20A pivot relative to each other to 33
5 degrees, the connecting block 31 of the pivotal-connecting assembly 30A moves a distance in the second base 20A and pulls the connecting rod 45 to move in the resetting casing 41, such that the pivotal-connecting assembly 30A moves the connecting unit 46 toward the front end 411 of the resetting casing 41 to compress the elastic unit 47 via the annular flange segment 452 of the connecting rod 45. With reference to Figs. 15, and 18,
10 when the glass door A3 is further pivoted relative to the door frame A1 to another angle θ of 90 degrees, the connecting block 31 of the pivotal-connecting assembly 30A moves a further distance in the second base 20A, and the connecting block 31 further pulls the connecting rod 45 to move in the resetting casing 41, such that the pivotal-connecting assembly 30A further moves the connecting unit 46 toward the front end 411 of the
15 resetting casing 41 to further compress the elastic unit 47 via the annular flange segment 452 of the connecting rod 45.

After then, if the user releases the glass door A3, the elastic unit 47 will push the connecting unit 46 toward the rear end 412 of the resetting casing 41 and push the connecting rod 45 by the connecting unit 46 abutting the annular flange segment 452 to
20 pull the connecting block 31 of the pivotal-connecting assembly 30A and make the first base 10A and the second base 20A reversely pivot sequentially from the state in Fig. 21 via the state in Fig. 20 to the state in Fig. 19, and complete the closing. During the process, the two oil-sealing rings 48 mounted on the outer annular surface of the connecting unit 46 and the damping oil 49 filled between the two oil-sealing rings 48 will
25 rub the inner annular surface of the resetting casing 41 to slow down the speed of the elastic unit 47 pushing the connecting unit 46, thereby closing the glass door A3 slowly

and smoothly and preventing hurting people.

With reference to Figs. 25, and 26, in a preferred embodiment, the resetting assembly has multiple disc springs 470 mounted in the resetting casing 41, arranged along a direction from the front end of the resetting casing 41 to the rear end of the resetting casing 41, and abutting between the elastic unit 47 and the front cover 42. In other words, the elastic unit 47 abuts the disc springs 470 and abuts the front cover 42 via the disc springs 470. When the door is opened to approach 33 degrees, the elastic unit will be applied with a larger force due to torque and moment arm, so by the configuration of the disc springs 470, the instant force to close the door can be increased.

By the connecting end 451 of the connecting rod 45 located outside the front end 411 of the resetting casing 41 and connected to the pivotal-connecting assembly 30A, the pivotal-connecting assembly 30A being capable of moving the connecting rod 45 relative to the resetting casing 41 and moving the connecting unit 46 toward the front end 411 of the resetting casing 41 via the connecting rod 45, and the elastic unit 47 connected to the connecting unit 46 and configured to move the connecting unit 46 toward the rear end 412 of the resetting casing 41, when a user makes the glass door A3 pivot relative to the door frame A1, the first base 10A and the second base 20A pivot relative to each other via the pivotal-connecting assembly 30A and the pivotal-connecting assembly 30A pulls the connecting rod 45 and applies force on the elastic unit 47 via the connecting unit 46.

Thus, after the user releases the glass door A3, the elastic unit 47 can move the connecting rod 45 toward the rear end 412 of the resetting casing 41 via the connecting unit 46, and move the pivotal-connecting assembly 30A via the connecting rod 45, such that the first base 10A and the second base 20A reversely pivot relative to each other and are reset, thereby achieving the function of slowly closing the door at a constant speed.

In addition, by configuring the resetting casing 41, making the two oil-sealing rings 48 sleeved on the outer annular surface of the connecting unit 46 and closely fit the

inner annular surface of the resetting casing 41 radially outward, and filling the space formed among the two oil-sealing rings, the connecting unit, and the resetting casing 41 with damping oil 49, when the elastic unit 47 moves the connecting unit 46 toward the rear end 412 of the resetting casing 41, the two oil-sealing rings 48 and damping oil 49 will rub against the resetting casing 41, such that the elastic unit 47 is restricted to move the connecting unit 46 slowly and the elastic unit 47 slowly pivots and resets the first base 10A and the second base 20A via the connecting rod 46 and the pivotal-connecting assembly 30A. Thus, the present invention slows down the closing speed and therefore prevents hurting people.

Moreover, by mounting the resetting casing 41 in the glass door A3 or the door frame A1 and mounting the elastic unit 47, the connecting rod 45, and the connecting unit 46 in the resetting casing 41, during the operation of the door, the elastic unit 47, the connecting rod 45, and the connecting unit 46 move in the resetting casing 41 and are prevented from scratching the glass door A3 or the door frame A1, so that the noise can be eliminated and the durability can be increased.

Even though numerous characteristics and advantages of the present invention have been set forth in the foregoing description, together with details of the structure and features of the invention, the disclosure is illustrative only. Changes may be made in the details, especially in matters of shape, size, and arrangement of parts within the principles of the invention to the full extent indicated by the broad general meaning of the terms in which the appended claims are expressed.

WHAT IS CLAIMED IS:

1. A concealed hinge with slow and constant closing speed adapted to be mounted in a door frame and a door; the concealed hinge comprising:

a first base adapted to be mounted in the door frame;

5 a second base adapted to be mounted in the door;

a pivotal-connecting assembly connected to the first base and the second base; the first base and the second base being capable of pivoting relative to each other via the pivotal-connecting assembly; the pivotal-connecting assembly having

a connecting block located in the second base; wherein when the first base
10 and the second base pivot relative to each other, the connecting block moves relative to the second base; and

a resetting assembly having

a resetting casing adapted to be mounted in the door and having

a front end securely mounted on the second base; and

15 a rear end;

a connecting rod moveably mounted in the resetting casing and having

a connecting end located outside the front end of the resetting casing
and connected to the connecting block of the pivotal-connecting assembly;

a connecting unit located in the resetting casing and connected to the
20 connecting rod; wherein when the first base and the second base pivot relative to each other, the connecting block of the pivotal-connecting assembly is capable of moving the connecting rod relative to the resetting casing and is capable of moving the connecting unit toward the front end of the resetting casing via the connecting rod;

an elastic unit mounted in the resetting casing, connected to the connecting
25 unit, and configured to move the connecting unit toward the rear end of the resetting casing; the elastic unit being capable of moving the connecting rod via the connecting

unit and moving the connecting block of the pivotal-connecting assembly via the connecting rod to pivot the first base and the second base relative to each other via the pivotal-connecting assembly;

two oil-sealing rings sleeved on the connecting unit and tightly attached to
5 an inner annular surface of the resetting casing radially outward; and

a damping oil filled in a space formed among the two oil-sealing rings, the connecting unit, and the resetting casing.

2. The concealed hinge as claimed in claim 1, wherein the connecting end of the connecting rod is screwed with the connecting block such that the connecting rod is
10 capable of moving axially relative to the connecting block via rotating relative to the connecting block.

3. The concealed hinge as claimed in claim 1 or 2, wherein
the resetting assembly has

a front cover sealing the front end of the resetting casing;
15 the front end of the resetting casing is securely mounted on the second base via the front cover; and

the connecting end of the connecting rod is moveably mounted through the front cover.

4. The concealed hinge as claimed in claim 3, wherein
20 the resetting assembly has

at least one fixing unit; and
the front cover is securely mounted on the second base via the at least one fixing unit.

5. The concealed hinge as claimed in claim 3, wherein the elastic unit is a
25 compression spring abutting between the front cover and the connecting unit.

6. The concealed hinge as claimed in claim 5, wherein the resetting assembly has

multiple disc springs mounted in the resetting casing, arranged along a direction from the front end of the resetting casing to the rear end, and located between the elastic unit and the front cover.

7. The concealed hinge as claimed in claim 1 or 2, wherein the elastic unit is a
5 compression spring abutting between the second base and the connecting unit.

8. The concealed hinge as claimed in claim 1 or 2, wherein the resetting assembly
has
a rear cover sealing the rear end of the resetting casing.

9. The concealed hinge as claimed in claim 1 or 2, wherein
10 an annular flange segment is formed on another end of the connecting rod
opposite to the connecting end; and
the connecting unit is sleeved on the connecting rod and abuts the annular flange
segment.

10. The concealed hinge as claimed in claim 1 or 2, wherein
15 two annular grooves are formed on an outer annular surface of the connecting
unit;
an oil-accommodating groove is formed on the outer annular surface of the
connecting unit;

the two oil-sealing rings are respectively mounted in the two annular grooves;
20 and
the damping oil is filled in the oil-accommodating groove.

11. A concealed hinge with slow and constant closing speed adapted to be
mounted in a door frame and a door; the concealed hinge comprising:

a first base adapted to be mounted in the door;
25 a second base adapted to be mounted in the door frame;
a pivotal-connecting assembly connected to the first base and the second base;

the first base and the second base being capable of pivoting relative to each other via the pivotal-connecting assembly; the pivotal-connecting assembly having

a connecting block located in the second base; wherein when the first base and the second base pivot relative to each other, the connecting block moves relative to the second base; and

a resetting assembly having

a resetting casing adapted to be mounted in the door frame and having

a front end securely mounted on the second base; and

a rear end;

a connecting rod moveably mounted in the resetting casing and having

a connecting end located outside the front end of the resetting casing and connected to the connecting block of the pivotal-connecting assembly;

a connecting unit located in the resetting casing and connected to the connecting rod; wherein when the first base and the second base pivot relative to each other, the connecting block of the pivotal-connecting assembly is capable of moving the connecting rod relative to the resetting casing and is capable of moving the connecting unit toward the front end of the resetting casing via the connecting rod;

an elastic unit mounted in the resetting casing, connected to the connecting unit, and configured to move the connecting unit toward the rear end of the resetting casing; the elastic unit being capable of moving the connecting rod via the connecting unit and moving the connecting block of the pivotal-connecting assembly via the connecting rod to pivot the first base and the second base relative to each other via the pivotal-connecting assembly;

two oil-sealing rings sleeved on the connecting unit and tightly attached to an inner annular surface of the resetting casing radially outward; and

a damping oil filled in a space formed among the two oil-sealing rings, the

connecting unit, and the resetting casing.

12. A concealed glass door hinge with slow and constant closing speed adapted to be mounted in a door frame and is adapted to be connected to a glass door; the concealed glass door hinge comprising:

5 a first base adapted to be connected to the glass door;

a second base adapted to be mounted in the door frame;

a pivotal-connecting assembly connected to the first base and the second base; the first base and the second base being capable of pivoting relative to each other via the pivotal-connecting assembly; the pivotal-connecting assembly having

10 a connecting block located in the second base; wherein when the first base and the second base pivot relative to each other, the connecting block moves relative to the second base; and

a resetting assembly having

a resetting casing adapted to be mounted in the door frame and having

15 a front end securely mounted on the second base; and

a rear end;

a connecting rod moveably mounted in the resetting casing and having

a connecting end located outside the front end of the resetting casing and connected to the connecting block of the pivotal-connecting assembly;

20 a connecting unit located in the resetting casing and connected to the connecting rod; wherein when the first base and the second base pivot relative to each other, the connecting block of the pivotal-connecting assembly is capable of moving the connecting rod relative to the resetting casing and is capable of moving the connecting unit toward the front end of the resetting casing via the connecting rod;

25 an elastic unit mounted in the resetting casing, connected to the connecting unit, and configured to move the connecting unit toward the rear end of the resetting

casing; the elastic unit being capable of moving the connecting rod via the connecting unit and moving the connecting block of the pivotal-connecting assembly via the connecting rod to pivot the first base and the second base relative to each other via the pivotal-connecting assembly;

5 two oil-sealing rings sleeved on the connecting unit and tightly attached to an inner annular surface of the resetting casing radially outward; and

 a damping oil filled in a space formed among the two oil-sealing rings, the connecting unit, and the resetting casing.

13. The concealed glass door hinge as claimed in claim 12, wherein

10 the pivotal-connecting assembly has

 two screw rods respectively screwed with two sides of the connecting block; wherein when the first base and the second base pivot relative to each other, the two screw rods move relative to the second base along with the connecting block; and

 two pivotal-connecting casings respectively sleeved on the screw rods;

15 the second base has

 two positioning protrusions; each of the two positioning protrusions having an abutting flat surface;

 when the first base and the second base are relatively pivoted to an angle of 90 degrees between the glass door and the door frame , the two pivotal-connecting casings
20 tightly abut the abutting flat surfaces of the two positioning protrusions respectively, such that the two positioning protrusions position the two screw rods via the two pivotal-connecting casings and stop the connecting block from moving relative to the second base, thereby making the first base and the second base unable to pivot relative to each other.

25 14. The concealed glass door hinge as claimed claim 12 or 13, wherein the first base has

a front door fixing segment adapted to be located at a side of the glass door;

a rear door fixing segment adapted to be located at another side of the glass door
and having

three screw holes;

5 a front anti-slip unit adapted to be located between the front door fixing segment
and the glass door and adapted to abut a side surface of the glass door;

a rear anti-slip unit adapted to be located between the glass door and the rear door
fixing segment and adapted to abut another side surface of the glass door;

a pressing unit located between the rear anti-slip unit and the rear door fixing
10 segment and having

two pressing grooves;

two pressing screw rods respectively screwed with two of the three screw holes
of the rear door fixing segment and respectively protruding into and abutting the two
pressing grooves of the pressing unit; the two pressing screw rods being capable of
15 moving relative to the rear door fixing segment by rotating to push the pressing unit
toward the front door fixing segment so as to tightly abut the pressing unit, the rear anti-
slip unit, the glass door, the front anti-slip unit, and the front door fixing segment to each
other;

a penetrating screw rod screwed with the other one of the three screw holes of the
20 rear door fixing segment, sequentially mounted through the rear door fixing segment, the
pressing unit, the rear anti-slip unit, the glass door, and the front anti-slip unit, and
mounted in and assembled with the front door fixing segment.

15. The concealed glass door hinge as claimed in claim 12 or 13, wherein the first
base has

25 a front door fixing segment adapted to be located at a side of the glass door;

a rear door fixing segment adapted to be located at another side of the glass door

and having

three screw holes;

a front anti-slip unit adapted to be located between the front door fixing segment and the glass door and adapted to abut a side surface of the glass door;

5 a rear anti-slip unit adapted to be located between the glass door and the rear door fixing segment and adapted to abut another side surface of the glass door;

a pressing unit located between the rear anti-slip unit and the rear door fixing segment and having

three pressing grooves;

10 three pressing screw rods respectively screwed with the three screw holes of the rear door fixing segment, mounted through the rear door fixing segment, and respectively abutting the three pressing grooves of the pressing unit; the three pressing screw rods being capable of moving relative to the rear door fixing segment by rotating to push the pressing unit toward the front door fixing segment so as to tightly abut the pressing unit,
15 the rear anti-slip unit, the glass door, the front anti-slip unit, and the front door fixing segment to each other.