

ELECTRIC MORTICE LOCK FOR USE IN DOOR ASSEMBLY, DOOR ASSEMBLY, AND VENDING MACHINE

CROSS-REFERENCE TO RELATED APPLICATIONS

5 This application is based on and claims priority to Chinese Patent Application No. 201810638714.3, filed on June 20, 2018, the entire content of which is incorporated herein by reference.

TECHNICAL FIELD

10 The present application relates to the field of electric mortice locks, and more particularly to an electric mortice lock for a door body assembly, a door body assembly, and a vending machine.

BACKGROUND

15 In the related art, a triggering device is provided near a lock tongue of an electric mortice lock, and a control device controls the lock tongue to extend out of a lock body and cooperate with a lock hole according to a state of the triggering device. In actual installation, the lock tongue is provided closer to a door-opening side compared to the triggering device. In a door closing process, the triggering device is triggered in advance, but at this time, the lock tongue is not aligned with the lock hole, so it is necessary to set a lock release delay function of the electric mortice lock to
20 release the lock reliably. The structure of the existing electric mortice lock and the installation structure have low reliability, increased waiting time of users, and rising cost.

SUMMARY

25 The present disclosure aims to solve at least one of the problems in the related art. For this, an objective of the present disclosure is to provide an electric mortice lock for a door body assembly, and the electric mortice lock effectively ensures accurate and safe lock release without delay during a door closing process.

 The present disclosure also provides a door body assembly having the electric mortice lock.

30 The present disclosure also provides a vending machine having the above door body assembly.

 With an electric mortice lock for a door body assembly according to embodiments of a first

aspect of the present disclosure, the door body assembly includes a door frame and a door body, and a first end of the door body is pivotally arranged on the door frame. The electric mortice lock includes: a lock body arranged on one of the door frame and the door body, and provided with a retractable lock tongue; a lock piece arranged on the other of the door frame and the door body, and provided with a lock hole suitable to cooperate with the lock tongue; a triggering device arranged on at least one of the door body assembly and the electric mortice lock, and configured to be triggered when the lock tongue is aligned with the lock hole; and a control device electrically connected to the triggering device and the lock tongue, and configured to control the lock tongue to extend out of the lock body when the triggering device is triggered.

With the electric mortice lock for the door body assembly according to the embodiments of the present disclosure, by configuring the triggering device to be triggered when the locking tang is aligned with the lock hole, and by controlling, with the control device, the lock tongue to extend out of the lock body when the triggering device is triggered, in the door closing process, the lock tongue is controlled to extend out of the lock body only when the lock hole is aligned with the lock tongue, so as to ensure accurate and safe lock release in the door closing process, or avoid interference that causes the lock tongue not to fall into the lock hole. Thus, the security and reliability of the electric mortice lock can be improved, economic loss caused by unreliable lock release during use can be avoided effectively, and maintenance costs can be reduced.

At the same time, since when the triggering device of the present disclosure is triggered, the control device immediately controls the lock tongue to extend out of the lock body and extend into the lock hole to cooperate with the lock hole, compared with electric mortice locks in the related art, any delay system can be omitted, the cost of the electric mortice lock can be greatly reduced, and users' waiting time can be shortened, so that the users can experience fast closing and opening of the door.

According to some embodiments of the present disclosure, the triggering device is located at a side of the lock tongue away from a first end of the door body.

According to some embodiments of the present disclosure, the triggering device includes a detecting device and a detected device, and the triggering device is triggered when the detecting device detects the detected device.

In some embodiments of the present disclosure, one of the detecting device and the detected device is arranged on the lock body, while the other of the detecting device and the detected device

is arranged on the lock piece.

Specifically, the one of the detecting device and the detected device is arranged at one end of the lock body in a length direction, and the lock tongue is arranged at the other end of the lock body in the length direction.

5 In some embodiments of the present disclosure, in a width direction of the lock piece, a center of the other of the detecting device and the detected device is offset toward an outer side of a center line of the lock piece.

In other embodiments of the present disclosure, one of the detecting device and the detected device is arranged on the door frame, while the other of the detecting device and the detected
10 device is arranged on the door body.

In some optional embodiments of the present disclosure, the detecting device is a proximity switch, and the detected device is a magnet.

In some further embodiments of the present disclosure, the electric mortice lock further includes a shielding member arranged at a side of the detecting device adjacent to the detected
15 device.

In some optional embodiments of the present disclosure, the detecting device is an infrared sensor.

According to other embodiments of the present disclosure, the triggering device includes a mechanical switch arranged on the door frame, and the triggering device is triggered when the
20 door body contacts the mechanical switch.

In some embodiments of the present disclosure, a center axis of the lock tongue coincides with a center axis of the lock hole when the lock tongue is aligned with the lock hole.

A door body assembly according to embodiments of a second aspect of the present disclosure includes the electric mortice lock according to the embodiments of the first aspect of the present
25 disclosure.

For the door body assembly according to the embodiments of the second aspect of the present disclosure, by arranging the electric mortice lock according to the embodiments of the first aspect of the present disclosure, in the door closing process, after the lock hole is aligned with the lock tongue, the lock tongue is controlled to extend out of the lock body, so as to ensure accurate and
30 safe lock release in the door closing process, or avoid interference that causes the lock tongue not to fall into the lock hole. Thus, the security and reliability of the electric mortice lock can be

improved, economic loss caused by unreliable lock release during use can be avoided effectively, and maintenance costs can be reduced. At the same time, any delay system can be omitted, the cost of the electric mortice lock can be greatly reduced, and users' waiting time can be shortened, so that the users can experience fast closing and opening of the door.

5 A vending machine according to embodiments of a third aspect of the present disclosure includes the door body assembly according to the embodiments of the above second aspect of the present disclosure.

For the vending machine according to the embodiments of the third aspect of the present disclosure, by arranging the door body assembly according to the embodiments of the second
10 aspect of the present disclosure, it is possible to ensure accurate and safe lock release in the door closing process, or avoid interference causes the lock tongue not to fall into the lock hole. Thus, the security and reliability of the electric mortice lock can be improved, economic loss caused by unreliable lock release during use can be avoided effectively, and maintenance costs can be reduced. At the same time, any delay system can be omitted, the cost of the electric mortice lock
15 10 can be greatly reduced, and users' waiting time can be shortened, so that the users can experience fast closing and opening of the door.

Additional aspects and advantages of the present disclosure will be presented in part in the following description, become apparent in part from the following description, or be learned from the practice of the present disclosure.

BRIEF DESCRIPTION OF THE DRAWINGS

The above and/or additional aspects and advantages of the present disclosure will become apparent and more readily appreciated from the following description of embodiments with reference to the drawings, in which:

25 Fig. 1 is a schematic view of a vending machine according to an embodiment of the present disclosure, in which a door body is in an open state;

Fig. 2 is a schematic view of a vending machine according to an embodiment of the present disclosure, in which a door body is in a closed state;

Fig. 2a is an enlarged view of part A circled in Fig. 2;

30 Fig. 3 is a sectional view of a lock body of the electric mortice lock shown in Fig. 2;

Fig. 4 is a sectional view of a lock piece of the electric mortice lock shown in Fig. 2;

Fig. 5 is a schematic view of a vending machine according to another embodiment of the present disclosure, in which a door body is in a closed state;

Fig. 5a is an enlarged view of part B circled in Fig. 5.

Reference numerals:

5 vending machine 100, door body 101, door frame 102, hinge 103,
electric mortice lock 10, lock body 11, lock tongue 111, lock piece 12, lock hole 121,
triggering device 2, detecting device 21, detected device 22,
shielding member 3.

10 DETAILED DESCRIPTION

Embodiments of the present disclosure will be described in detail below, and the examples of the embodiments will be illustrated in the drawings. The same or similar elements and the elements having same or similar functions are denoted by like reference numerals throughout the description. The embodiments described herein with reference to the drawings are illustrative and
15 used to generally understand the present disclosure. The embodiments shall not be constructed to limit the present disclosure.

An electric mortice lock 10 for a door body assembly according to embodiments of the present disclosure will be described below with reference Figs. 1 to 5. The door body assembly can be used in a vending machine 100, but is not limited thereto.

20 As shown in Figs. 1 and 2, the door body assembly includes a door frame 102 and a door body 101. A first end of the door body 101 is pivotally arranged on the door frame 102 to open or close the door body 101. For example, the first end of the door body 101 is connected to the door frame 102 through a hinge 103, such that the structure is simple and convenient to install.

The electric mortice lock 10 for the door body assembly according to the embodiments of the
25 disclosure includes a lock body 11, a lock piece 12, a triggering device 2, and a control device.

The lock body 11 is suitable to be arranged on one of the door frame 102 and the door body 101, while the lock piece 12 is suitable to be arranged on the other of the door frame 102 and the door body 101. Specifically, when the lock body 11 is arranged on the door frame 102, the lock piece 12 can be arranged on the door body 101; when the lock body 11 is arranged on the door
30 body 101, the lock piece 12 can be arranged on the door frame 102. For example, as shown in Fig. 2, the lock piece 12 is arranged on a top of the door body 101, and the lock body 11 is arranged on

the door frame 102 and corresponding to the lock piece 12.

The lock body 11 is provided with a retractable lock tongue 111, and the lock piece 12 is provided with a lock hole 121 suitable to cooperate with a lock tongue 111. For example, referring to Figs. 2 to 4, both the lock body 11 and the lock piece 12 may be formed in a substantially rectangular shape. The lock tongue 111 may be formed in a cylindrical shape, and the lock hole 121 may be formed as a circular hole. Optionally, a diameter of a section of the lock tongue 111 is smaller than a diameter of the lock hole 121. Therefore, it is convenient for the lock tongue 111 to extend into the lock hole 121 and cooperate with the lock hole 121 to lock the door body 101 on the door frame 102.

The triggering device 2 is arranged on the door body assembly and/or the electric mortice lock 10, and the triggering device 2 is configured to be triggered when the lock tongue 111 is aligned with the lock hole 121. The control device is electrically connected to the triggering device 2 and electrically connected to the lock tongue 111, and the control device is configured to control the lock tongue 111 to extend out of the lock body 11 when the triggering device 2 is triggered.

Specifically, the triggering device 2 can be provided only on the door body assembly, or the triggering device 2 can be provided only on the electric mortice lock 10, or the triggering device 2 can be provided on both the door body assembly and the electric mortice lock 10. For example, as shown in Fig. 2, the triggering device 2 is arranged on the electric mortice lock 10. As another example, as shown in Fig. 5, the triggering device 2 is arranged on the door body assembly.

For example, in a door closing process, the triggering device 2 can be triggered when the lock tongue 111 is aligned with the lock hole 121, and at this time, the control device controls the lock tongue 111 to extend out of the lock body 11, such that the lock tongue 111 can extend into the lock hole 121 to cooperate with the lock hole 121.

Therefore, with the electric mortice lock 10 for the door body assembly according to the embodiments of the present disclosure, by configuring the triggering device 2 to be triggered when the locking tang 111 is aligned with the lock hole 121, and by controlling, with the control device, the lock tongue 111 to extend out of the lock body 11 when the triggering device 2 is triggered, in the door closing process, the lock tongue 111 is controlled to extend out of the lock body 11 only when the lock hole 121 is aligned with the lock tongue 111, so as to ensure accurate and safe lock release in the door closing process, or avoid interference that causes the lock tongue 111 not to fall into the lock hole 121. Thus, the security and reliability of the electric mortice lock 10 can be

improved, economic loss caused by unreliable lock release during use can be avoided effectively, and maintenance costs can be reduced.

At the same time, since when the triggering device 2 of the present disclosure is triggered, the control device immediately controls the lock tongue 111 to extend out of the lock body 11 and extend into the lock hole 121 to cooperate with the lock hole 121, compared with electric mortice locks 10 in the related art, any delay system can be omitted, the cost of the electric mortice lock 10 can be greatly reduced, and users' waiting time can be shortened, so that the users can experience fast closing and opening of the door.

According to some embodiments of the present disclosure, the triggering device 2 is located at a side of the lock tongue 111 away from the first end of the door body 101. For example, referring to Figs. 2 and 5, the first end of the door body 101 is located at a right side of the lock tongue 111, and the triggering device 2 is located at a left side of the lock tongue 111. Therefore, the triggering device 2 can be closer to a door-opening side compared with the lock tongue 111, such that during the door closing process, it can be ensured that the triggering device 2 will be triggered only when the lock tongue 111 is aligned with the lock hole 121, and will not be triggered in advance during a process of aligning the lock tongue 111 with the lock hole 121. Thus, any delay system can be omitted, the cost of the electric mortice lock 10 can be greatly reduced, users' waiting time can be shortened, allowing the users to experience fast closing and opening of the door, and accurate and safe lock release of the electric mortice lock 10 in the door closing process can be ensured.

According to some embodiments of the present disclosure, the triggering device 2 includes a detecting device 21 and a detected device 22, and the triggering device 2 is triggered when the detecting device 21 detects the detected device 22.

For example, in some optional embodiments of the present disclosure, the detecting device 21 is a proximity switch, and the detected device 22 is a magnet. Optionally, the detecting device 21 may be a reed switch or a Hall switch. During the door closing process, the detecting device 21 can detect the detected device 22 when a distance between the detecting device 21 and the detected device 22 reaches a preset distance, and transmit a signal to the control device which controls the lock tongue 111 to extend out of the lock body 11.

Further, the electric mortice lock 10 further includes a shielding member 3, and the shielding member 3 is arranged at a side of the detecting device 21 adjacent to the detected device 22.

Optionally, the shielding member 3 may be an iron member. Therefore, influence of coils of the electric mortice lock 10 on the detection accuracy of the detecting device 21 can be reduced.

As another example, in another optional embodiment of the present disclosure, the detecting device 21 is an infrared sensor. Therefore, the detecting device 21 can also transmit the signal to the control device when detecting the detected device 22, and the lock tongue 111 is controlled by the control device to extend out of the lock body 11.

According to some embodiments of the present disclosure, one of the detecting device 21 and the detected device 22 is arranged on the lock body 11, while the other of the detecting device 21 and the detected device 22 is arranged on the lock piece 12. Specifically, when the detecting device 21 is arranged on the lock body 11, the detected device 22 may be arranged on the lock piece 12. When the detecting device 21 is arranged on the lock piece 12, the detected device 22 is arranged on the lock body 11. Therefore, the triggering device 2 can be integrated on the electric mortice lock 10, which simplifies the assembly steps of the electric mortice lock 10 and improves the assembly efficiency.

Specifically, the one of the detecting device 21 and the detected device 22 is arranged at one end of the lock body 11 in a length direction, and the lock tongue 111 is arranged at the other end of the lock body 11 in the length direction. For example, referring to Fig. 2, the detected device 22 is arranged at a left end of the lock body 11, and the lock tongue 111 is arranged at a right end of the lock body 11. Therefore, during the door closing process, it can be further ensured that only when the lock tongue 111 is aligned with the lock hole 121, the triggering device 2 will be triggered, instead of being triggered in advance during the process of aligning the lock tongue 111 with the lock hole 121. Thus, any delay system can be omitted, the cost of the electric mortice lock 10 can be greatly reduced, users' waiting time can be shortened, allowing the users to experience fast closing and opening of the door, and accurate and safe lock release of the electric mortice lock 10 in the door closing process can be ensured.

In some embodiments of the present disclosure, in a width direction of the lock piece 12, a center of the other one of the detecting device 21 and the detected device 22 is offset toward an outer side of a center line of the lock piece 12. Specifically, when the detecting device 21 is arranged on the lock piece 12, a center of the detecting device 21 is offset toward the outer side of the center line of the lock piece 12. When the detected device 22 is arranged on the lock piece 12, a center of the detected device 22 is offset toward the outer side of the center line of the lock piece

12.

For example, referring to Fig. 4, the center line of the lock piece 12 is a center line extending along a length direction of the lock piece 12. The detected device 22 is arranged on the lock piece 12, and the center of the detected device 22 is located at a side of the above center line of the lock piece 12 away from the door frame 102. Thus, the accuracy of lock release can be further improved.

In some other embodiments of the present disclosure, one of the detecting device 21 and the detected device 22 is arranged on the door frame 102, while the other of the detecting device 21 and the detected device 22 is arranged on the door body 101. Specifically, when the detecting device 21 is arranged on the door frame 102, the detected device 22 may be arranged on the door body 101. When the detecting device 21 is arranged on the door body 101, the detected device 22 is arranged on the door frame 102. Thus, the triggering device 2 can be separated from the lock body 11 and the lock piece 12 of the electric mortice lock 10, and the sizes of the lock piece 12 and lock body 11 can be reduced, such that the installation position of the electric mortice lock 10 can be selected more flexibly according to actual needs, and the installation of the electric bolt lock 10 can become more flexible.

According to some other embodiments of the present disclosure, the triggering device 2 includes a mechanical switch (not shown) arranged on the door frame 102, and when the door body 101 contacts the mechanical switch, the triggering device 2 is triggered. Optionally, the mechanical switch may be a micro-switch. Specific operating principles of the micro-switch are well known to those skilled in the related art, and will not be detailed here.

Therefore, during the door closing process, when the door body 101 moves to a predetermined position that allows the lock tongue 111 to be aligned with the lock hole 121, the door body 101 will contact the mechanical switch to trigger the triggering device 2, the mechanical switch is turned on or turned off, and then the control device controls the lock tongue 111 to extend out of the lock body 11 and extend into the lock hole 121 to cooperate with the lock hole 121.

In some embodiments of the present disclosure, when the lock tongue 111 is aligned with the lock hole 121, a center axis of the lock tongue 111 coincides with a center axis of the lock hole 121. Thus, it can be ensured that the lock tongue 111 can extend into the lock hole 121 to cooperate with the lock hole 121, which further improves the accuracy of lock release of the electric mortice

lock 10.

Other configurations and operations of the electric mortice lock 10 according to the embodiments of the present disclosure are known to those of ordinary skill in the art, and will not be detailed here.

5 A door body assembly according to embodiments of a second aspect of the present disclosure includes the electric mortice lock 10 according to the embodiments of the first aspect of the present disclosure.

10 For the door body assembly according to the embodiments of the second aspect of the present disclosure, by arranging the electric mortice lock 10 according to the embodiments of the first aspect of the present disclosure, in the door closing process, after the lock hole 121 is aligned with the lock tongue 111, the lock tongue 111 is controlled to extend out of the lock body 11, so as to ensure accurate and safe lock release in the door closing process, or avoid interference that causes the lock tongue 111 not to fall into the lock hole 121. Thus, the security and reliability of the electric mortice lock 10 can be improved, economic loss caused by unreliable lock release during
15 use can be avoided effectively, and maintenance costs can be reduced. At the same time, any delay system can be omitted, the cost of the electric mortice lock 10 can be greatly reduced, and users' waiting time can be shortened, so that the users can experience fast closing and opening of the door.

20 A vending machine 100 according to embodiments of a third aspect of the present disclosure includes the door body assembly according to the embodiments of the second aspect of the present disclosure.

25 For the vending machine 100 according to the embodiments of the third aspect of the present disclosure, by arranging the door body assembly according to the embodiments of the second aspect of the present disclosure, it is possible to ensure accurate and safe lock release in the door closing process, or avoid interference causes the lock tongue 111 not to fall into the lock hole 121. Thus, the security and reliability of the electric mortice lock 10 can be improved, economic loss caused by unreliable lock release during use can be avoided effectively, and maintenance costs can be reduced. At the same time, any delay system can be omitted, the cost of the electric mortice lock 10 can be greatly reduced, and users' waiting time can be shortened, so that the users can
30 experience fast closing and opening of the door.

In the description of the present disclosure, relative terms such as "central," "longitudinal,"

“lateral,” “length,” “width,” “thickness,” “upper,” “lower,” “front,” “rear,” “left,” “right,” “vertical,” “horizontal,” “top,” “bottom,” “inner,” “outer,” and the like should be construed to refer to the orientation or position as then described or as shown in the drawings under discussion. These relative terms are for convenience and simplification of description and do not indicate or imply that the device or element referred to must have a particular orientation, or be constructed and operated in a particular orientation, so these terms shall not be construed to limit the present disclosure.

In the description of the present specification, reference throughout this specification to “an embodiment,” “some embodiments,” “an exemplary embodiment”, “an example,” “a specific example,” or “some examples” means that a particular feature, structure, material, or characteristic described in connection with the embodiment or example is included in at least one embodiment or example of the present disclosure. In the specification, the appearances of the above-mentioned terms are not necessarily referring to the same embodiment or example of the present disclosure. Furthermore, the particular features, structures, materials, or characteristics may be combined in any suitable manner in one or more embodiments or examples.

Although embodiments of the present disclosure have been shown and described, it shall be appreciated by those skilled in the art that various changes, modifications, alternatives, and variations can be made in the embodiments without departing from principles and purposes of the present disclosure. The scope of the present disclosure is defined by claims or their equivalents.

WHAT IS CLAIMED IS:

1. An electric mortice lock for a door body assembly, the door body assembly comprising a door frame and a door body, and a first end of the door body being suitable to be pivotally
5 arranged on the door frame, wherein the electric mortice lock comprises:

a lock body suitable to be arranged on one of the door frame and the door body, and provided with a retractable lock tongue;

a lock piece suitable to be arranged on the other of the door frame and the door body, and provided with a lock hole suitable to cooperate with the lock tongue;

10 a triggering device suitable to be arranged on at least one of the door body assembly and the electric mortice lock, and configured to be triggered when the lock tongue is aligned with the lock hole; and

a control device electrically connected to the triggering device and the lock tongue, and configured to control the lock tongue to extend out of the lock body when the triggering device is
15 triggered,

wherein the triggering device comprises a detecting device and a detected device, and the triggering device is triggered when the detecting device detects the detected device;

when the triggering device is located at a first side of the lock tongue away from the first end of the door body, in a width direction of the electric mortice lock, one of the detecting device and
20 the detected device, which is on the door frame, has a center offset toward an outer side of the door body assembly; and

when the triggering device is located at a second side of the lock tongue close to the first end of the door body, in the width direction of the electric mortice lock, one of the detecting device and the detected device, which is on the door body, has a center offset toward the outer side of the door
25 body assembly.

2. The electric mortice lock according to claim 1, wherein one of the detecting device and the detected device is suitable to be arranged on the lock body, while the other of the detecting device and the detected device is suitable to be arranged on the lock piece.

3. The electric mortice lock according to claim 2, wherein the one of the detecting device and
30 the detected device is suitable to be arranged at one end of the lock body in a length direction, and the lock tongue is suitable to be arranged at the other end of the lock body in the length direction.

4. The electric mortice lock according to any one of claims 1 to 3, wherein one of the detecting device and the detected device is suitable to be arranged on the door frame, while the other of the detecting device and the detected device is suitable to be arranged on the door body.

5 5. The electric mortice lock according to any one of claims 1 to 4, wherein the detecting device is a proximity switch, and the detected device is a magnet.

6. The electric mortice lock according to claim 5, further comprising a shielding member arranged at a side of the detecting device adjacent to the detected device.

7. The electric mortice lock according to any one of claims 1 to 4, wherein the detecting device is an infrared sensor.

10 8. The electric mortice lock according to any one of claims 1 to 7, wherein a center axis of the lock tongue coincides with a center axis of the lock hole when the lock tongue is aligned with the lock hole.

9. A door body assembly, comprising the electric mortice lock according to any one of claims 1 to 8.

15 10. A vending machine, comprising the door body assembly according to claim 9.