Claims

1. A battery replacement device unlocking apparatus, characterized in that the battery replacement device unlocking apparatus includes:

an driving element, a transmission mechanism and an unlocking bar;

the driving element is connected with the transmission mechanism, the transmission mechanism is connected with the unlocking bar;

the driving element drives the transmission mechanism to move, and the transmission mechanism drives the unlocking bar to expand and retract.

2. The battery replacement device unlocking apparatus according to claim 1, characterized in that the transmission mechanism includes a transmission rod, a driving column, a driven column, a connecting element and a guide portion;

one end of the transmission rod is connected with the driving element, and the other end of the transmission rod is connected with the driving column, the connecting element is respectively connected to the driving column and the driven column, and the guide portion is provided with a driven column guide hole extending in the axial direction of the unlocking bar, the driven column passes through the driven column guide hole and slides in the guide column guide hole, the guide portion is provided with an unlocking bar guide hole, the unlocking bar passes through the unlocking bar guide hole;

the connecting element rotates around the axis of the driving column, the connecting element rotates around the axis of the driven column, and the unlocking bar rotates around the axis of the driven column.

3. The battery replacement device unlocking apparatus according to claim 2, characterized in that a driving column guide hole extending in the axial direction of the transmission rod is further provided on the guide portion, and the driving column passes through the driving column guide hole and slides in the driving column guide hole.

4. The battery replacement device unlocking apparatus according to claim 3, characterized in that the guide portion has a first plate body, a second plate body and a third plate body, and the second plate body is connected between the first plate body and the third plate body, the driving column guide hole is formed on the first plate body and/or the third plate body, and the driven column guide hole is formed on the first plate body and/or the third plate body, the unlocking bar guide hole is formed on the second plate body.

5. The battery replacement device unlocking apparatus according to at least one of claims 2-4, characterized in that the transmission rod includes an active element, a force transmission element and a driven element, the active element is connected with the driving element, and the driven element is connected with the driving column, the force transmission element is movably connected with the active element, and the force

transmission element is fixedly connected with the driven element.

6. The battery replacement device unlocking apparatus according to claim 5, characterized in that

the force transmission element includes a force transmission piece, a force transmission spring and two fixing pieces, and two ends of the force transmission piece are respectively connected to the active element and the driven element, the two fixing pieces are fixed on the force transmission piece and connected to both ends of the force transmission spring, the force transmission spring extends in the axial direction of the transmission rod, the force transmission piece is provided with a through hole, and the through hole is located between the two fixing pieces;

the active element includes a driving piece and a clamping column, and the driving piece sequentially penetrates through the two fixing pieces and is disposed in the force transmission spring, the clamping column is connected to the driving piece and is located between the two fixing pieces, one end of the clamping column extends into the through hole, and the other end of the clamping column is clamped between the two spirals of the force transmission spring; the driving piece slides in the axial direction of the transmission rod, and the clamping column slides in the through hole.

7. The battery replacement device unlocking apparatus according to claims 5 or 6, characterized in that the driven element includes a driven piece and two supporting pieces, the driven piece is connected to the force transmission element, and the two supporting pieces are respectively connected to two sides of the driven piece along the axial direction of the driving column, and the two supporting pieces are respectively connected to the driving column.

8. The battery replacement device unlocking apparatus according to at least one of claims 1-7, characterized in that the battery replacement device unlocking apparatus further includes a box body, and one end of the unlocking bar connected to the transmission mechanism is located in the box body, the other end of the unlocking bar penetrates out of the box body.

9. The battery replacement device unlocking apparatus according to claim 8, characterized in that the box body includes a movable box, a buffer element and a fixed box, the fixed box is fixed, and the movable box is movably connected inside the box through the buffer element.

10. The battery replacement device unlocking apparatus according to claim 9, characterized in that the buffer element is a buffer spring that extends in the axial direction of the unlocking bar.

11. The battery replacement device unlocking apparatus according to claims 9 or 10, characterized in that a slide rail is provided on the fixed box, the slide rail extends along the axial direction of the unlocking bar, and a slide member is provided on the movable box, the slide member slides on the slide rail.

~~12. The battery replacement device unlocking apparatus according to claim 11, characterized in that an end portion of the slide rail has an exit hole, and a diameter of the exit hole is larger than an inner diameter of the slide rail and an outer diameter of the slide member.~~

~~13. The battery replacement device unlocking apparatus according to at least one of claims 9-12, characterized in that an end of the transmission mechanism extending into the movable box is connected to the movable box through a connecting member, and a moving channel is arranged on the fixed box, a limit gap is formed on the movable box, the limit gap is in communication with the moving channel, and the transmission mechanism sequentially penetrates through the moving channel and the limit gap.~~

14. A battery replacement device, characterized in that the battery replacement device includes:

a battery tray;

~~the~~ a battery replacement device unlocking apparatus ~~according to any one of claims 1-13~~; the battery replacement device unlocking apparatus includes: an driving element, a transmission mechanism and an unlocking bar;

the driving element is connected with the transmission mechanism, the transmission mechanism is connected with the unlocking bar;

the driving element drives the transmission mechanism to move, and the transmission mechanism drives the unlocking bar to expand and retract;

a housing and a battery replacement device suction cup are provided on the battery tray, and the battery replacement device unlocking apparatus is provided in the housing, the battery replacement device suction cup is connected to the housing through the battery replacement device unlocking apparatus, the battery replacement device suction cup is sleeved on the unlocking bar, and the unlocking bar expands and retracts in the battery replacement device suction cup.

2. The battery replacement device according to claim 1, characterized in that the transmission mechanism includes a transmission rod, a driving column, a driven column, a connecting element and a guide portion;

one end of the transmission rod is connected with the driving element, and the other end of the transmission rod is connected with the driving column, the connecting element is respectively connected to the driving column and the driven column, and the guide portion is provided with a driven column guide hole extending in the axial direction of the unlocking bar, the driven column passes through the driven column guide hole and slides in the guide column guide hole, the guide portion is provided with an unlocking bar guide hole, the unlocking bar passes through the unlocking bar guide hole;

the connecting element rotates around the axis of the driving column, the connecting element rotates around the axis of the driven column, and the unlocking bar rotates

around the axis of the driven column.

3. The battery replacement device according to claim 2, characterized in that a driving column guide hole extending in the axial direction of the transmission rod is further provided on the guide portion, and the driving column passes through the driving column guide hole and slides in the driving column guide hole.

4. The battery replacement device according to claim 3, characterized in that the guide portion has a first plate body, a second plate body and a third plate body, and the second plate body is connected between the first plate body and the third plate body, the driving column guide hole is formed on the first plate body and/or the third plate body, and the driven column guide hole is formed on the first plate body and/or the third plate body, the unlocking bar guide hole is formed on the second plate body.

5. The battery replacement device according to at least one of claims 2-4, characterized in that the transmission rod includes an active element, a force transmission element and a driven element, the active element is connected with the driving element, and the driven element is connected with the driving column, the force transmission element is movably connected with the active element, and the force transmission element is fixedly connected with the driven element.

6. The battery replacement device according to claim 5, characterized in that

the force transmission element includes a force transmission piece, a force transmission spring and two fixing pieces, and two ends of the force transmission piece are respectively connected to the active element and the driven element, the two fixing pieces are fixed on the force transmission piece and connected to both ends of the force transmission spring, the force transmission spring extends in the axial direction of the transmission rod, the force transmission piece is provided with a through hole, and the through hole is located between the two fixing pieces;

the active element includes a driving piece and a clamping column, and the driving piece sequentially penetrates through the two fixing pieces and is disposed in the force transmission spring, the clamping column is connected to the driving piece and is located between the two fixing pieces, one end of the clamping column extends into the through hole, and the other end of the clamping column is clamped between the two spirals of the force transmission spring; the driving piece slides in the axial direction of the transmission rod, and the clamping column slides in the through hole.

7. The battery replacement device according to claim 5 or 6, characterized in that the driven element includes a driven piece and two supporting pieces, the driven piece is connected to the force transmission element, and the two supporting pieces are respectively connected to two sides of the driven piece along the axial direction of the driving column, and the two supporting pieces are respectively connected to the driving column.

8. The battery replacement device according to any one of claims 1-7, characterized in that the battery replacement device unlocking apparatus further includes a box body,

and one end of the unlocking bar connected to the transmission mechanism is located in the box body, the other end of the unlocking bar penetrates out of the box body.

9. The battery replacement device according to claim 8, characterized in that the box body includes a movable box, a buffer element and a fixed box, the fixed box is fixed, and the movable box is movably connected inside the box through the buffer element.

10. The battery replacement device according to claim 9, characterized in that the buffer element is a buffer spring that extends in the axial direction of the unlocking bar.

11. The battery replacement device according to claim 9 or 10, characterized in that a slide rail is provided on the fixed box, the slide rail extends along the axial direction of the unlocking bar, and a slide member is provided on the movable box, the slide member slides on the slide rail.

12. The battery replacement device according to claim 11, characterized in that an end portion of the slide rail has an exit hole, and a diameter of the exit hole is larger than an inner diameter of the slide rail and an outer diameter of the slide member.

13. The battery replacement device according to any one of claims 9-12, characterized in that an end of the transmission mechanism extending into the movable box is connected to the movable box through a connecting member, and a moving channel is arranged on the fixed box, a limit gap is formed on the movable box, the limit gap is in communication with the moving channel, and the transmission mechanism sequentially penetrates through the moving channel and the limit gap.

~~15~~14. A battery replacement device according to claim 1~~4~~, characterized in that a flange is provided on the end portion of the unlocking bar away from the transmission mechanism, and a boss is provided in the battery replacement device suction cup corresponding to the flange, the shape of the flange matches the shape of the boss.

~~16~~15. A battery replacement device according to claim~~s~~ 1~~4 or 15~~, characterized in that an end surface of the unlocking bar is flush with a surface of the battery replacement device suction cup.

~~17~~16. A battery box quick battery replacement system, characterized in that the battery box quick battery replacement system includes:

a battery box, a battery box fixing frame and the power replacement device according to any one of claims 1~~4~~-~~16~~15;

the battery box includes a locking tongue and an unlocking button, the unlocking button moves correspondingly with the locking tongue, and the unlocking button is correspondingly arranged with the unlocking bar;

the battery box fixing frame is provided with a locking portion, and the locking tongue and the locking portion are locked and matched;

the extending motion of the unlocking bar is used for pressing the unlocking button to

drive the locking tongue to disengage the locking portion and to unlock.

~~18~~17. A battery box quick battery replacement system according to claim ~~17~~16, characterized in that a battery box suction cup is sleeved on the unlocking button and the unlocking button expands and retracts in the battery box suction cup, the battery box suction cup and the battery replacement device suction cup are correspondingly arranged.