CLAIMS

What is claimed is:

1. A RFID-based intelligent medicine bottle control method comprising:

putting medicine bottles (700) attached with RFID electronic labels (701) and reflecting infrared rays, into a medicine bottle storage rack (100); a plurality of medicine bottle storage positions (101) set on the medicine bottle storage rack (100) for storing the medicine bottles (700);

moving a movable worktable (200) comprising an infrared sensor (201) and a RFID read and write device (202) sequentially along an arrangement direction of the medicine bottles (700) on the medicine bottle storage rack (100), when the movable worktable (200) moves to one of the plurality of medicine bottle storage positions (101) every time, detecting and recording a position of the medicine bottle storage position (101) on the medicine bottle storage rack (100);

when the movable worktable (200) reaches each of the plurality of medicine bottle storage positions (101), the infrared sensor (201) detects whether the medicine bottle (700) exists at the position according to a presence or an absence of an infrared reflection signal, if the medicine bottle (700) exists at the position, reading, by the RFID read and write device (202), coding information and medicine bottle information in the RFID electronic label (701) of the medicine bottle (700), and binding the coding information, the medicine bottle information and the position of the medicine bottle storage position (101) in a corresponding relationship and then storing in a database (500); and

repeating the previous step until the movable worktable (200) has completed all the medicine bottle storage positions (101) on the medicine bottle storage rack (100); and wherein

before putting the medicine bottles attached with the RFID electronic labels (101) into the medicine bottle storage rack (100), the method further comprises:

reading the coding information and the medicine bottle information in the RFID electronic label (701) on the medicine bottle (700) by the RFID read and write device (200) in advance, and then storing the coding information and the medicine bottle information in the database (500).

2. The RFID-based intelligent medicine bottle control method as claimed in claim 1, wherein the infrared sensor (201) is a reflective infrared sensor, when the reflective infrared sensor receives the infrared reflection signal, it is determined that the medicine bottle (700) exists at the position; and

   when the reflective infrared sensor (201) does not receive the infrared reflection signal, it is determined that no medicine bottle (700) exists at the position, and information of the position where there is no medicine bottle (700) is stored in the database.

3. The RFID-based intelligent medicine bottle control method as claimed in claim 1, wherein the method further comprises: the movable worktable (200) stops moving every time when the movable worktable (200) reaches each of the plurality of medicine bottle storage positions (101), and moves to a next of the plurality of medicine bottle storage positions (101) after reading the medicine bottle information at the position.

4. The RFID-based intelligent medicine bottle control method as claimed in claim 1, wherein the method further comprises:

setting labels: setting the RFID electronic labels (701) that store electronic codes therein on the medicine bottles (700);

information input: bringing the RFID read and write device (202) close to the medicine bottles (700) to read the electronic code in the RFID electronic label (701) of the medicine bottle (700), if the medicine bottle (700) exists at the position no electronic code in the database (500), binding the medicine bottle information of the medicine bottle (700) with the electronic code and then entering into the database (500) for storage; and

medicine bottles identification: bringing the RFID read and write device (202) close to the medicine bottle (700) to read the electronic code in the RFID electronic label (701) on the medicine bottle (700), if the electronic code exists in the database (500), retrieving the medicine bottle information corresponding to the electronic code from the database (500) for display, according to the electronic code.

5. The RFID-based intelligent medicine bottle control method as claimed in claim 4, wherein the medicine bottle information is also stored in the RFID electronic label (701), and when the information is entered, the RFID read and write device (200) directly reads the electronic code and the medicine bottle information in the RFID electronic label (701) and then automatically enters the electronic code and the medicine bottle information in the RFID electronic label (701) into the database (500), when the RFID read and write device

(202) is close to the medicine bottle (700).

6. A RFID-based intelligent medicine bottle control apparatus comprising: a medicine bottle storage rack (100), a movable worktable (200), a driving and position detection unit (300), a control host (400) and a database (500);

the medicine bottle storage rack (100) comprising a plurality of medicine bottle storage positions (101) at intervals along a moving direction thereof for storing medicine bottles (700) therein;

the movable worktable (200) configured to move sequentially along an arrangement direction of the medicine bottles (700) on the medicine bottle storage rack (100), both an infrared sensor (201) and an RFID read and write device (202) formed on the movable worktable (200), the infrared sensor (201) configured to transmit and receive infrared rays, and the RFID read and write device (202) configured to read coding information and medicine bottle information in RFID electronic labels (701) on the medicine bottles (700);

the driving and position detection unit (300) configured to drive the movable worktable (200) to move, and detect position parameters of the movable worktable (200); and

the control host (400) configured to control the driving and position detection unit (300) to further control movement of the movable worktable (200), and obtain position information after the movable worktable (200) reaches one of the plurality of medicine bottle storage positions (101), the control host (400) also configured to receive infrared signals fed back by the infrared sensor (201), the coding information and the medicine bottle information fed

back by the RFID read and write device (202), and bind the position information of the medicine bottle (700) with the coding information and the medicine bottle information, and then store in the database (500); and wherein

a lower part of each of the plurality of medicine bottle storage positions (101) of the medicine bottle storage rack (100) comprises a gap (1011) through the front and back to expose a bottom and a side of the medicine bottle (700) in the medicine bottle storage position (101);

the movable worktable (200) being an L-shaped configuration, the infrared sensor (201) fixed on a side of the L-shaped movable worktable (200), and the RFID read and write device (202) fixed on a bottom of the L-shaped movable worktable (200); and

the RFID electronic label (701) on the medicine bottle (700) arranged at the bottom of the medicine bottle (700).

7. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 6, wherein the infrared sensor (201) is a reflective infrared sensor configured to transmit the infrared rays to the medicine bottle (700) and receive the infrared rays reflected by the medicine bottle (700).

8. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 6, wherein black covering layers are formed on a bottom surface and a side surface of the medicine bottle storage rack (100).

9. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 6,

wherein the driving and position detection unit (300) comprises a stepping motor configured to drive the movable worktable (200) to move and feed back the position parameters of the movable worktable (200).

10. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 6, wherein the control apparatus further comprises a display (600) connected with the control host (400), and the database (500) set in the control host (400).

11. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 6, wherein the RFID read and write device (202) comprises an RFID read and write module (401), and an RFID ceramic antenna (402) connected with the RFID read and write module (401) and arranged above the RFID read and write module (401); the RFID read and write device (202) arranged on the movable worktable (200) that automatically or manually moves on the medicine bottle storage rack (100).

12. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 10, wherein the RFID read and write device (202) further comprises a Bluetooth /WIFI module wirelessly connected with the control host (400).

13. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 10, wherein the medicine bottle storage rack (100) further comprises:

a base (1) comprising a linear displacement module (2) that slidably provides with a shielding cover (3) with an upper opening thereof, an RFID main antenna (4) received in the shielding cover (3), and the base (1) further comprising a main control circuit board (5),

with a function of reading and writing RF signals, arranged on the base (1), the main control circuit board (5) electrically connected with the RFID main antenna (4); and

a medication box (6) arranged above the shielding cover (3), the plurality of medicine bottle storage positions (101) with a plurality of upper openings thereof arranged in the medication box (6), and configured to place the medicine bottles (700) thereon, the RFID electronic labels (701) arranged on the medicine bottles (700); a RFID secondary antenna (7) arranged on a bottom of each of the plurality of medicine bottle storage positions (101) and having the same frequency as the RFID main antenna (4) for relaying signals; a top of the RFID secondary antenna (7) in contact with the bottom of the medicine bottle (700), the RFID secondary antennas (7) in the plurality of medicine bottle storage positions (101) having different heights, so that a height of each medicine bottle (7) exposed out of the medicine bottle storage position (101) is the same.

14. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 13, wherein the RFID electronic label (701) is arranged at the bottom of the medicine bottle (700), and the top of the RFID secondary antenna (7) is in contact with the RFID electronic label (701) at the bottom of the medicine bottle (700).

15. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 13, wherein both the RFID main antenna (4) and the RFID secondary antenna (7) are selected from one of a ceramic antenna, a PCB antenna and a Rogers board antenna.

16. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 13,

wherein the linear displacement module (2) comprises a frame (21) protruding on the base (1), a sliding rail (22) fixed on the frame (21), and a sliding block (23) sliding back and forth on the sliding rail (22), the shielding cover (3) fixed on the sliding block (23) to slide together with the sliding block (23).

17. The RFID-based intelligent medicine bottle control apparatus as claimed in claim 13, wherein the linear displacement module (2) further comprises a driving device (24) arranged on the base (1) and connected with the sliding block (23) in a transmission way, and the driving device (24) configured to drive the sliding block (23) to move back and forth on the sliding rail (22).

18. A emergency cart comprising a RFID-based intelligent medicine bottle control apparatus, the apparatus comprising: a medicine bottle storage rack (100), a movable worktable (200), a driving and position detection unit (300), a control host (400) and a database (500);

the medicine bottle storage rack (100) comprising a plurality of medicine bottle storage positions (101) at intervals along a moving direction thereof for storing medicine bottles (700) therein;

the movable worktable (200) configured to move sequentially along an arrangement direction of the medicine bottles (700) on the medicine bottle storage rack (100), both an infrared sensor (201) and an RFID read and write device (202) formed on the movable worktable (200), the infrared sensor (201) configured to transmit and receive infrared rays, and the RFID read and write device (202) configured to read coding information and

medicine bottle information in RFID electronic labels (701) on the medicine bottles (700);

the driving and position detection unit (300) configured to drive the movable worktable (200) to move, and detect position parameters of the movable worktable (200); and

the control host (400) configured to control the driving and position detection unit (300) to further control movement of the movable worktable (200), and obtain position information after the movable worktable (200) reaches one of the plurality of medicine bottle storage positions (101), the control host (400) also configured to receive infrared signals fed back by the infrared sensor (201), the coding information and the medicine bottle information fed back by the RFID read and write device (202), and bind the position information of the medicine bottle (700) with the coding information and the medicine bottle information, and then store in the database (500) ; and wherein

a lower part of each of the plurality of medicine bottle storage positions (101) of the medicine bottle storage rack (100) comprises a gap (1011) through the front and back to expose a bottom and a side of the medicine bottle (700) in the medicine bottle storage position (101);

the movable worktable (200) being an L-shaped configuration, the infrared sensor (201) fixed on a side of the L-shaped movable worktable (200), and the RFID read and write device (202) fixed on a bottom of the L-shaped movable worktable (200); and

the RFID electronic label (701) on the medicine bottle (700) arranged at the bottom of the medicine bottle (700).