

SEMI-AUTOMATIC BIOLOGICAL EMBEDDING FREEZING STATION

FIELD OF TECHNOLOGY

[0001] The present invention mainly relates to the field of freezing equipment, in particular to a semi-automatic biological embedding freezing station.

BACKGROUND

[0002] The freezing table of the embedding machine is a device that cools down the loaded base film, solidifying materials such as paraffin by cooling to achieve the embedding effect.

[0003] Existing freezing tables of biological tissue embedding machines are all single-table with limited space. As the workload increases, technicians embed faster. Before the tissue blocks are frozen and demolded, the table is full, affecting the embedding efficiency. It is also easy for the tissue blocks to be removed before the embedding is completed.

SUMMARY

[0004] In view of the above-mentioned defects of the prior art, the present invention provides a semi-automatic biological embedding freezing station, comprising an embedding machine freezing table and a transport platform surrounding the embedding machine freezing table, characterized in that the transport platform comprises: an insulation board 3 surrounding the freezing table, a transport rack 1 for transporting the base film, and a placement table 2 for storing the base film;

[0005] The placement table 2 has a built-in roller path 21, which is composed of multiple groups of rollers driven by a small motor. The direction of the roller path 21 is from the entrance to the center of the placement table 2;

[0006] The transport frame 1 has a built-in conveyor belt 11, which includes a slow embedding belt attached to the freezing table of the embedding machine, a conveyor belt connecting the slow belt and the roller path 21, and the entire embedding belt takes more than 40 seconds.

[0007] Preferably, each of the embedded belts includes a support frame 111, a transmission roller 112 fixed to the middle of the support frame 111, a protective cover covering the outside of the transmission roller 112, a transmission gear fixed to both ends of the transmission roller 112 for transmission, and a motor rigidly connected to the transmission gear. Multiple motors are provided and connected to an external power supply through a distributor.

[0008] Preferably, the embedding belt is divided into a first embedding belt that is transmitted from the outside of the insulation plate 3 to the inside of the insulation plate 3 and a second embedding belt that is completely arranged in the insulation area surrounded by the insulation plate 3. The end point of the first embedding belt corresponds to the transmission starting point of the second embedding belt. The second embedding belt has multiple bending structures outside the transmission belt, and the distance from the freezing platform is less than 1.5 mm.

[0009] The conveyor belt is divided into a lifting belt and an adjustment belt. The height of one end of the lifting belt is lower than the end point of the second embedded belt, and the height of the other end is higher than the position of the adjustment belt. The starting point of the adjustment belt corresponds to one end of the conveyor belt, and the end point is connected to the placement table 2. The outer side of the lifting roller of the lifting belt is covered with a belt.

[0010] Preferably, the transmission gears at the bends of the second embedded belt are helical gears, and each bend is equipped with an auxiliary motor.

[0011] Preferably, bending protection plates are provided at the starting point and the bending point of the second embedding belt, and at the starting point of the adjustment belt.

[0012] Preferably, the roller path 21 of the placement platform 2 is composed of multiple sets of steering wheels, and a blocking plate is set at the end point.

[0013] Preferably, guardrails are provided around the placing platform 2.

[0014] Preferably, it further comprises a bottom film 4, wherein the bottom film 4 comprises a concave embedding area and a separation area located on the side wall;

[0015] Separation protrusions are provided on the side walls of the separation area.

[0016] or,

[0017] A counterweight ring is provided on the side wall of the separation area.

[0018] Preferably, the insulation board 3 includes an insulation cloth 32 and adjustment columns 31. The insulation cloth 32 is in the shape of a Chinese character "口" as a whole, and a plurality of adjustment columns 31 are distributed around the insulation cloth 32 by bonding.

[0019] Preferably, the adjustment column 31 has a built-in magnetic core, and the thermal insulation cloth 32 is thermal insulation cotton.

[0020] Beneficial effects of the present invention:

[0021] 1. Double-layer storage, can exceed the normal 70% or so, the freezing table automatically lifts

[0022] 2. Embedding only needs to be placed in a fixed position, which is simple and convenient and increases work efficiency

[0023] 3. Semi-enclosed freezing table, higher refrigeration efficiency and faster wax block demoulding.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] FIG. 1 is a schematic diagram of the installation structure of the present invention;

[0025] FIG. 2 is a schematic diagram of the transport structure of the present invention;

[0026] FIG. 3 is a schematic diagram of the structure of the conveyor belt of the present invention;

[0027] FIG. 4 is a schematic diagram of the second embedded tape structure of the present invention;

[0028] FIG. 5 is a schematic diagram of the structure of a placement table according to the present invention;

[0029] FIG. 6 is a schematic diagram of the base film structure of the present invention;

[0030] FIG. 7 is a schematic diagram of the structure of the thermal insulation board of the present invention;

[0031] FIG. 8 is a schematic diagram of the structure of the adjustment column of the present invention;

[0032] In the figure,

[0033] 1. Transport rack; 2. Placement table; 3. Insulation board; 11. Transport belt; 21. Roller path; 111. Support frame; 112. Transport roller; 31. Adjustment column; 32. Insulation cloth.

DESCRIPTION OF THE EMBODIMENTS

[0034] In order to enable those skilled in the art to better understand the technical solution of the present invention and to make the above-mentioned features, purposes and advantages of the present invention more clearly understood, the present invention is further described below in conjunction with examples. The examples are only used to illustrate the present invention and are not intended to limit the scope of the present invention.

[0035] As shown in Figures 1-2, the present invention includes: an embedding machine freezing table and a transportation platform surrounding the embedding machine freezing table, characterized in that the transportation platform includes: an insulation board 3 surrounding the freezing table, a transportation rack 1 for transporting the base film, and a placement table 2 for storing the base film;

[0036] The placement table 2 has a built-in roller path 21, which is composed of multiple groups of rollers driven by a small motor. The direction of the roller path 21 is from the entrance to the center of the placement table 2;

[0037] The transport frame 1 has a built-in conveyor belt 11, which includes a slow embedding belt attached to the freezing table of the embedding machine, a conveyor belt connecting the slow belt and the roller path 21, and the entire embedding belt takes more than 40 seconds.

[0038] During use, the prepared base film is placed on transport rack 1, where low-temperature embedding is completed during transport. Because curing efficiency on conveyor belt 11 is lower than when placed directly on a freezing table, the entire process must last at least 40 seconds to ensure effective curing. This means the embedding process takes longer than 40 seconds. The base film is then transferred from transport rack 1 to placement table 2, where it is conveyed via roller path 21 for placement.

[0039] Referring to Figure 3, the structure of the embedded belt is as follows: each embedded belt includes a support frame 111, a transmission roller 112 fixed to the middle of the support frame 111, a protective sleeve covering the outside of the transmission roller 112, a transmission gear fixed to both ends of the transmission roller 112 for transmission, and a motor rigidly connected to the transmission gear. Multiple motors are provided, and the motors are connected to an external power supply through a distributor.

[0040] After the distributor supplies power to the motor, the motor drives the transmission gear, and the transmission roller 112, which is detachably fixed to the transmission gear, rotates accordingly. During the rotation of the transmission roller 112, it also drives the nearby transmission gears to rotate together, thereby driving multiple transmission rollers 112 to rotate at the same time. In order to ensure the consistency of the rotation of the transmission roller 112, a steering wheel is set between two adjacent transmission gears.

[0041] Referring to Figures 1, 3, and 4, the embedding tape is divided into a first embedding tape that is transported from outside the insulation plate 3 to inside the insulation plate 3, and a second embedding tape that is completely disposed within the insulation zone formed by the insulation plate 3. The end point of the first embedding tape corresponds to the transport starting point of the second embedding tape. The second embedding tape has multiple bends outside the transport tape, and the distance from the freezing platform is less than 1.5 mm.

[0042] The conveyor belt is divided into a lifting belt and an adjustment belt. One end of the lifting belt is lower than the end point of the second embedded belt, and the other end is higher than the position of the adjustment belt. The starting point of the adjustment belt corresponds to one end of the conveyor belt, and the end point is connected to the placement platform 2. The lifting rollers of the lifting belt are covered with a belt. The structure of the lifting belt is the same as that of the first embedded belt, except that the lifting belt is arranged at an angle, and the lifting rollers are covered with a belt.

[0043] The first embedding tape is used for interaction between the internal and external environments, and the second embedding tape is used for transmission while ensuring the efficiency and results of embedding. In order to ensure the embedding effect, the second embedding tape needs to ensure and maintain a certain low temperature, so the distance from the freezing table cannot be too high. It can be fitted or a certain distance can be left. According to actual test results, the distance needs to be less than 1.5mm, and the best effect is between 0.5-1mm.

[0044] In order to ensure the transportation power, the transmission gears at the bends of the second embedded belt are helical gears, and each bend is equipped with an auxiliary motor.

[0045] In order to prevent the base film from being separated from the conveyor belt 11, bending protection plates are provided at the starting point and the bending point of the second embedding belt, as well as at the starting point of the adjustment belt.

[0046] Referring to Figure 5, the roller path 21 of the placement table 2 is composed of multiple sets of steering wheels, with a blocking plate at the end. The blocking plate and the steering wheels coordinate and adjust the positioning and alignment toward the center. In this embodiment, only the simplest arrangement is used. In practice, multiple rotations can be used to arrange more base films.

[0047] In order to prevent the base film from falling off the placement table 2, guardrails are provided around the placement table 2.

[0048] Referring to Figure 6, correspondingly, the bottom film 4 includes a concave embedding area and a separation area located on the sidewall;

[0049] Separation protrusions are set on the side walls of the separation area to increase the collision area and prevent overlap after collision

[0050] or,

[0051] A counterweight ring is set on the side wall of the separation area to make the bottom membrane stable through weight and prevent overlap after collision.

[0052] Based on the above, in normal use, 70-80 pieces can be embedded at a time through the bottom film, which will not affect the equipment. After excessive use, accumulation will be formed on the transport rack 1, but the embedding effect still exists, that is, the transport rack 1 operates normally, but it will be retained on the conveyor belt 11. After the front bottom film that has been frozen is taken away from the placement table 2, the rear bottom film will move forward in turn to complete the double-layer laying. In order to ensure that the retained bottom film will not overturn, stack, fall, etc., the friction coefficient of the protective cover is between 0.4-1, and it must also have good heat transfer capabilities, such as ceramics.

[0053] Referring to Figure 7, the insulation board 3 includes an insulation cloth 32 and adjustment columns 31. The insulation cloth 32 is in the shape of a Chinese character "口" as a whole. A plurality of adjustment columns 31 are distributed around the insulation cloth 32 by bonding to maintain cold air.

[0054] Referring to Figure 8, in order to ensure that the insulation board 3 fits the embedding machine, the adjustment column 31 is equipped with a magnetic core, and the insulation cloth 32 is insulation cotton.

[0055] The above embodiments are merely illustrative of the principles and effects of this patent application and are not intended to limit this patent application. Anyone skilled in the art may modify or alter the above embodiments without departing from the spirit and scope of this patent application. Therefore, all equivalent modifications or alterations made by persons of ordinary skill in the art without departing from the spirit and technical concepts disclosed in this patent application shall be covered by the claims of this patent application.