Claims

1. A device for breeding, comprising

a plurality of individual boxes which are to be arranged in a stack comprising a plurality of planes of boxes, said boxes each being filled with larvae and substrate which contains food, and

an observation system for obtaining observable information relating to amount of the substrate and status of the insects in each individual box, in order to output instructions to breed further insects, or to harvest, or dispose of, the insects in the individual boxes, and

a food dispensing system adapted to dispense the food automatically and individually into the relevant box,

wherein the device comprises

at least one stack of boxes, which is located on a chassis, and

a gantry, the gantry at least having a supply module, a cleaning module, an upward vertical transporter, a downward vertical transporter, an upper transverse transporter and a lower transverse transporter, and

wherein a guide system is provided for moving the gantry to the at least one stack of boxes, and wherein a conveying system is provided for conveying boxes from and to the at least one stack of boxes and, using the gantry, for cyclical restacking, and supplying and cleaning of the insects within the boxes, within the at least one stack of boxes, and

wherein the conveying system and the gantry are configured to load boxes into and unload boxes from the at least one stack of boxes, the supply module being divided into at least two containers, said containers each being equipped individually with at least one metering roller, at least one container being filled with substrate and at least one other container being filled with food, such that in the event of transport by the upper transverse transporter the substrate and subsequently food are dispensed into a box by an adjustable advancement of the at least one metering roller.

2. The device (**1**) according to claim 1, wherein the gantry (**6**) is constructed from a profile system (**9**) made of aluminum, and/or from a welded structure.

3. The device according to claim 1, wherein the upward vertical transporter of the gantry comprises opposingly, at least two drive units containing at least two linear belt drives and at least two lifting fingers on each drive, the lifting fingers being loadable during an upward movement, achieved by the drive, of the upward vertical transporter in order to absorb a weight, and wherein the lifting fingers are configured to be deflected outwards by insertion of a box from the conveyor belt through the passive chassis from below, in order to perform passively the hooking and unhooking for the transport of the boxes, by the upward vertical transporter.

4. The device according to claim 1, wherein the downward vertical transporter of the gantry opposingly, at least two drive units containing at least two linear belt drives and at least two lifting pin arms having at least two lifting pins connected to a roller, and a roller guide comprising deflection rockers configured to deflect the lifting pins of a lifting pin arm, connected to at least one roller, by a downward movement of the downward vertical transporter such that one box is held by the lifting pins, and said box is transported downward by the upward movement of the downward vertical transporter, the lifting pins connected to a roller being deflectable by a deflection rocker in the roller guide such that the downward vertical transporter is moved upward, without the lifting pins being extended, and thus no box is grasped, such that a further box by a linear belt drive, for the purpose of the downward movement of the downward vertical transporter, by the lifting pin arms and the lifting pins thereof that are connected to a roller, using the roller guide and the deflection rockers thereof.

5. The device according to claim 1, wherein the upper transverse transporter of the gantry comprises opposingly, at least one drive unit which a linear belt drive, a lifting arm having at least two lifting receptacles, a roller on the lifting arm which is coupled by means of a linear shaft, and a roller guide comprising at least two rockers, such that a movement of the lifting arm by a linear belt drive having a roller coupled via a linear shaft, along the roller guide, pivots the lifting arm out by a rocker on the roller guide such that a box is receivable and moveable from left to right and/or from right to left, such that at a further rocker of the roller guide a box, a lifting arm is deflected by a roller fastened to the lifting arm by a linear shaft, in order to deposit a box.

6. The device according to claim 1, wherein the lower transverse transporter of the gantry contains opposingly, a vertically oriented asymmetrical belt configured to be moved vertically by a horizontally oriented drive, the asymmetrical belt being of such a thickness, on one side, for grasping and moving a box from left to right and/or from right to left by horizontally oriented drive, on account of the vertical movement of the asymmetrical belt.

7. The device according to claim 1, wherein the gantry comprises servomotors, and wherein the active chassis contains a connection element fastened to the Bowden cables fastened to the lifting fingers, the connection element being actuatable by the servomotors on the gantry for deflecting the lifting fingers of the active chassis outwards by actuating the servomotors, so that a box that is ready for harvest is unloaded downward onto a conveyor belt, through the active chassis, by the downward vertical transporter (**13**).

8. The device according to claim 1, further comprising a detection unit in the gantry, wherein the detection unit comprises sensors and/or a camera, for determining the parameters required for insect breeding inside a box, and wherein a database is

configured to compare the images acquired by the camera, which reproduce the status of supply materials for the insects in a box, with reference data, in order to determine the relevant status of supply materials for the insects inside a box, for use of the information thus obtained for machine learning.

9. The device according to claim 1, wherein each of the boxes comprises a double base and at least one suction opening between the bases, the upper base of the double base being constructed as a grating-like base, such that waste inside the box falls through said grating-like base, and the cleaning module is configured to remove said waste through the suction opening between the double base.

10. The device according to claim 9, wherein the cleaning module comprises at least first and second suction devices, wherein at least the first suction device is configured to suction the waste through the suction opening of a box, between the double base, and wherein at least the second suction device is configured to suction out during the transport by the upper transverse transporter and/or take up using electrostatics and/or remove by air separation the skins of the larvae as well as any food residues and other waste present inside the box.

11. The device according to claim 10, wherein the boxes comprise an RFID chip or another passive electronic chip, and/or a barcode, and/or a 2D matrix, for storing and retrieving data in order to carry out instructions based on the storable and retrievable data.

12. The device according to claim 1, wherein a station is present for the gantry, in order to empty the cleaning module, and wherein the containers of the supply module are configured to be refilled with materials.

13. The device according to claim 1, wherein the stacks of boxes are configured to be lined up one behind the other, lengthways, as often as desired, and wherein said stacks of boxes lined up lengthways are configured to be lined up side-by-side, in order to optimally adapt the device to the local conditions in-order to make optimum use of the local conditions.

14. The device according to claim 13, wherein at least one conveyor belt is arranged orthogonally to the stacks of boxes in order to supply said stacks of boxes with new boxes comprising insects and supply materials from a store, and wherein said at least one conveyor belt is configured to transport boxes ready for harvest away from the stacks of boxes and into a store.

15. A method having the device according to claim 1, the method comprising: raising the lowest box of the stack, which is located on the passive chassis, by at least one box height, using the upward vertical transporter, at the same time, the downward

vertical transporter raises the second box from the bottom, from the stack of the active chassis, such that the bottom box of the stack on the active chassis is brought, using the lower transverse transporter, under the stack raised by the upward vertical transporter, and moving the second from bottom raised box, using the downward vertical transporter, by at least one box height, the uppermost box of the stack, which is raised by one box height, by the upward vertical transporter, likewise being brought over the stack of boxes, located on the active chassis, by an upper transverse transporter, during the transport of the box by the upper transverse transporter, the box comprising insects and the supply materials thereof being cleaned, and optionally equipped with corresponding supply materials, by a cleaning and supply module, and performing the described transport procedure until all the boxes (**2**) of the stacks on the passive chassis and the active chassis are cleaned and optionally equipped with corresponding supply materials, by a cleaning and supply module, and conveying a box ready for harvest, the readiness of a box for harvest being determined using a detection unit, during the cleaning and equipping with supply materials, through the stack of boxes, located on the active chassis, by the downward vertical transporter, until the box reaches the active chassis, the active chassis being deflected outwards, such that the box ready for harvest is unloaded onto the conveyor belt, through the active chassis, by the downward vertical transporter, and loading a new box comprising insects and supply materials, which is conveyed under the passive chassis by the conveyor belt, through the passive chassis by the upward vertical transporter, the passive chassis (**4**) being deflected outwards by the box, upon loading, into the stack of boxes located on the passive chassis, such that automated insect breeding is carried out.