feeding out the band-shaped cover film 110 above the substrate 104. The film feed-out mechanism 24 includes a feed-out roller 28a and a winding roller 28b (hereinafter, simply referred to as the "feed rollers" when the feed-out roller 28a and the winding roller 28b are not distinguished) arranged on two sides clamping the bonding stage 14. The cover film 110 is extended between the pair of feed rollers. The feed-out roller 28a rotates in a predetermined feed-out direction (a direction of an arrow A in FIG. 1), and thereby new cover films 110 are sequentially fed out. In addition, the winding roller 28b rotates in the same direction as the feed-out roller 28a in conjunction with the feed-out roller 28a, and thereby the used cover film 110 is wound up and recovered by the winding roller 28b. That is, the cover film 110 is fed by the rotation of the pair of feed rollers in the same direction.

[0036] Here, as described above, the pair of feed rollers is arranged on both sides of the bonding stage 14, and thus the cover film 110 crosses the substrate 104 in one direction. In addition, the cover film 110 is sufficiently wider than the width of the mounting section 106. Therefore, the cover film 110 can cover above one column of mounting sections 106 of the mounting sections 106 arranged in three rows and five columns, that is, the cover film 110 can cover above a plurality (three in the illustrated example) of the mounting sections 106.

[0037] The winding roller 28b is coupled to a drive source such as a motor or the like and is a drive roller that is rotated with the drive of the motor or the like. The feed-out roller 28a may be a drive roller that can be rotated independently of the winding roller 28b or a driven roller that is rotated with the rotation of the winding roller 28b. When the feed-out roller 28a is a driven roller, an urging member is desirably arranged, the urging member being capable of urging the feed-out roller 28a in a direction opposite to the feed-out direction in a manner that an appropriate tension can be applied to the cover film 110 to be extended therebetween. In addition, in any embodiment, a sensor that senses an amount of the cover film 110 wound around each feed roller

is desirably arranged near at least one of the two feed rollers. Then, according to a detection result of the sensor, a replacement time of the cover film 110 may be estimated, or a rotation speed of the feed roller may be adjusted. Particularly, a feed-out/winding distance (feeding amount) of the cover film 110 in one rotation of the feed rollers is changed corresponding to the amount of the cover film 110 wound around each feed roller (more precisely, the diameter of a film roll 110a formed by winding the cover film 110 around each feed roller). Thus, in order to appropriately control the feeding amount of the cover film 110, the tension of the cover film 110, and the like, the number of the rotation of the feed rollers is desirably adjusted corresponding to the amount of the cover film 110 wound around each feed roller.

[0038] The film arrangement mechanism 18 further includes a film movement mechanism 30 for moving the cover film 110 in the horizontal direction together with the film feed-out mechanism 24. The film movement mechanism 30 includes a pair of rails 32 extending in a first direction (in the illustrated example, the long direction of the rectangular substrate 104), and movement blocks 34 that slide along the rails 32. The pair of rails 32 is arranged on two sides clamping the bonding stage 14. The feed rollers are arranged on the movement blocks 34, and the feed rollers and the cover film 110 are moved in the first direction as the movement blocks 34 slide. Moreover, the two movement blocks 34 attached to the two rails 32 are moved in conjunction in a manner that relative positions of the feed-out roller 28a and the winding roller 28b are always fixed. The feed rollers are moved in the first direction by the film movement mechanism 30, and thereby the mounting sections 106 (the semiconductor chips 100) covered with the cover film 110 are sequentially changed. Moreover, the mechanism making the movement blocks 34 slide may be, for example, a mechanism in which a motor (rotary electric machine) and a ball spline are combined, or a mechanism using a direct-acting drive source such as a hydraulic cylinder or a linear motor.

[0039] The film arrangement mechanism 18 further includes a film elevating mechanism (not shown) for elevating and lowering the cover film 110 together with the film feed-out mechanism 24. The film elevating mechanism is not particularly limited as long as the mechanism can change the height of the feed rollers. Therefore, the film elevating mechanism may include, for example, cam members that are rotated in contact with rotation shafts of the feed rollers. In addition, as another embodiment, the film elevating mechanism may be configured to have a moving body that is connected to the rotation shafts of the feed rollers and movable in the vertical direction by a driving source such as a motor or a hydraulic cylinder. In any case, the film elevating mechanism positions the cover film 110 in a height direction with respect to the substrate 104 and the semiconductor chip 100.

[0040] The controller 20 controls the driving of the mounting head 12, the film arrangement mechanism 18 and the bonding stage 14 described above. The controller 20 includes, for example, a CPU that performs various calculations, and a memory that stores various data and programs. Detection results of various sensors are input to the controller 20, and the controller 20 controls the driving of each unit according to the detection results. More specifically, the controller 20 controls the movement of the mounting head 12, or controls the temperatures of heaters of the mounting head 12 and the bonding stage 14, the driving of the suction mechanism, and the like. In addition, the controller 20 also controls the driving of the film arrangement mechanism 18 in order to arrange the cover film 110 at an appropriate position.

[0041] Next, the flow of mounting the semiconductor chip 100 by the mounting apparatus 10 is described with reference to FIGS. 3 to 8. FIGS. 5 to 8 are schematic plan views showing situations during the mounting, FIGS. 5 and 6 show situations of the temporary press-attachment, and FIGS. 7 and 8 show situations of the final press-attachment. When the semiconductor chip 100 is mounted, the substrate 104 is placed on the bonding stage 14. The adhesive material 108

in many of the conventional mounting apparatuses 10, the cover film 110 is arranged on the mounting head 12. That is, the feed rollers for feeding the cover film 110 are attached to the mounting head 12. In this case, the weight of the mounting head 12 that requires a high-speed and high-precision movement is increased, causing problems that the movement mechanism for moving the mounting head 12 becomes large-sized and high-cost.

[0055] In addition, in the case of the configuration in which the cover film 110 is attached to the mounting head 12, the cover film 110 always covers the bottom surface of the mounting head 12. In this case, because the suction hole 22 of the mounting head 12 is covered with the cover film 110, the semiconductor chip 100 cannot be suction-held via the suction hole 22. Thus, in the conventional mounting apparatus 10, before the semiconductor chip 100 is suction-held, a hole is formed, using a needle 70 or the like, in the cover film 110 at a location corresponding to the suction hole 22. In addition, in the case of the configuration where the cover film 110 is attached to the mounting head 12, the cover film 110 is required to be fed each time the final press-attachment to one semiconductor chip 100 is completed. This hole-making process and the feed process take a long time, which causes an increase in the tact time. For example, as compared with the time required for bonding (the temporary press-attachment and the final press-attachment) once, the time required for the hole-making process and the feed process is several to ten times. In the conventional mounting apparatus 10, because this hole-making process occurs and the number of times of the feed process increases, the tact time of semiconductor apparatus manufacturing is increased.

[0056] On the other hand, as described above, the mounting apparatus 10 disclosed in the specification has the film arrangement mechanism 18 installed on the base 16. As a result, the mounting head 12 can be reduced in weight, and the mounting head 12 can be moved at a high speed and with high precision even with a relatively small and inexpensive movement mechanism.

120 in which a plurality of semiconductor chips 100 is temporarily press-attached and laminated in the thickness direction is formed in each mounting section 106. Thereafter, in a final press-attachment process, an upper surface of the temporary laminated body 120 is heated and pressed by the mounting head 12, and thereby the plurality of semiconductor chips 100 configuring the temporary laminated body 120 is finally press-attached at once. In this manufacturing embodiment, the cover film 110 may also be retracted to a retracted position at the time of the temporary press-attachment process, and the cover film 110 may also be arranged at an intermediate position between the semiconductor chip 100 to be finally press-attached and the mounting head 12 at the time of the final press-attachment process.

[0069] In addition, in the above, the configuration in which the mounting head 12 is moved in the horizontal direction is illustrated. However, a configuration may be employed in which the bonding stage 14 is moved in the horizontal direction instead of the mounting head 12. FIG. 16 is a diagram showing an example of a mounting apparatus 10 in which the bonding stage 14 is moved horizontally. In the example, the bonding stage 14 includes an XY table 48 that allows movement in a first direction (the long direction of the substrate 104) and movement in a second direction (the short direction of the substrate 104). In this case, the controller 20 drives the XY table 48 to move the bonding stage 14 horizontally in a manner that the mounting sections 106 to be temporarily press-attached and finally press-attached to are positioned below the mounting head 12. Then, the mounting head 12 is lowered directly downward, and thereby the semiconductor chips 100 are temporarily press-attached or finally press-attached to the mounting sections 106. Moreover, in this case, because the mounting head 12 is only elevated or lowered and is not moved horizontally, a supply mechanism for supplying a new semiconductor chip 100 or the like is desirably arranged in the mounting head 12. In addition, in this case, the film arrangement mechanism 18 is desirably installed on the bonding stage 14 so as to be capable of