Claims

1. Apparatus for removing at least one chip-type semiconductor component 10 from an adhesive film 12, wherein the semiconductor component 10 is arranged on a first main surface 120 of the film 12, comprising a removal device 20 for the semiconductor component 10 and comprising a lifting device 22 that can be arranged at a second main surface 122 of the film, wherein said lifting device 22 has a contact region 30 for arrangement with respect to the film 12, said contact region having, for its part, a plurality of suction cutouts 50, 52 and cutouts 42 for pin-type lifting means 40, wherein all the suction cutouts 50, 52 are jointly connected to a vacuum regulating device 60, 62, or at least two suction cutouts 50, 52 or groups of suction cutouts 50, 52 are connected to separate vacuum regulating devices 60, 62.

2. Apparatus according to Claim 1, wherein
the pin-type lifting means 40 have a pointed or convex end and these can pass through the contact region 30 of the lifting device 22.

3. Apparatus according to Claim 1, wherein
the suction cutouts 50, 52 are embodied as concentrically arranged trenches and alternatively or additionally as holes distributed on the contact region 30 partially uniformly or irregularly.

4. Apparatus according to Claim 1, wherein
the lifting device 22 has a thermal device 70 for changing the temperature of the adhesive film 10, wherein the temperature of the film 12 can be

decreased and/or increased by means of said thermal device 70.

5. Apparatus according to Claim 4, wherein the temperature are varied by at least 20°C.

6. Apparatus according to Claim 4, wherein the thermal device 70 is a Peltier element.

7. Method for operating an apparatus for removing at least one chip-type semiconductor component 10 from an adhesive film 12, comprising the following steps:
   - arranging the lifting device 22 with respect to the film 12, wherein a contact region 30 of the lifting device 22 bears against a second main surface 122 of the film 12, opposite a chip-type semiconductor component 10 that is arranged on a first main surface 120 and is to be lifted off;
   - applying to suction cutouts 50, 52 of the lifting device 22, by means of an assigned vacuum regulating device 60, 62, a constant value of a vacuum for all the suction cutouts 50, 52 or different values of the vacuum for different suction cutouts 50, 52 or groups of suction cutouts 50, 52;
   - partially deforming the film 12 in the contact region 30 by lifting the film 12 by means of lifting means 40, arranged in assigned cutouts 42 of the lifting device 22;
   - removing the at least one semiconductor component 10 from the film by means of a removal device 20.

8. Method for operating an apparatus according to Claim 7, wherein the vacuum is kept constant, or is adapted, during

the partial deformation of the film 12.

9. Method for operating an apparatus according to Claim 8, wherein
the vacuum is varied by not more than 10% during the partial deformation.

10. Method for operating an apparatus according to Claim 7, wherein
the vacuum of centrally arranged suction cutouts 52 is chosen to be less than that of outer suction cutouts 50.

11. Method for operating an apparatus according to Claim 7, wherein
the temperature of the film is partially varied via the contact region 30 by means of a thermal device 70.

12. Method for operating an apparatus according to Claim 11, wherein
the thermal device 70 is operated permanently or in pulsed fashion.

13. Method for operating an apparatus according to Claim 12, wherein
during pulsed operation of the thermal device 70, the latter is activated only after the lifting device 22 has been arranged with respect to the film 12.

CLAIMS

What is claimed is:

1. Apparatus for removing at least one chip-type semiconductor component from an adhesive film having first and second main surfaces, wherein the chip-type semiconductor component is arranged on the first main surface of the adhesive film, the apparatus comprising:

a removal device for removing the semiconductor component from the adhesive film, said removal device including

a lifting device configured to be arranged at the second main surface of the adhesive film, wherein said lifting device has a contact region for arrangement with respect to the adhesive film, said contact region having a plurality of first, suction, cutouts and second cutouts configured to receive pin-type lifting means;

said lifting device further including a Peltier element for changing the temperature of the adhesive film;

wherein at least some of said suction cutouts are connected to a vacuum regulating device.

2. The apparatus of claim **1**, wherein said contact region of said lifting device is configured to allow the passage therethrough of an end which is one of pointed and convex of one of the pin-type lifting means.

3. The apparatus of claim **1**, wherein said suction cutouts are concentrically arranged and formed as one of trenches and holes distributed on said contact region.

4. The apparatus of claim **3**, wherein said suction cutouts are arranged uniformly about said contact region.

5. The apparatus of claim **1**, wherein said Peltier element is capable of varying the temperature of the adhesive film by at least about 20° C.

6. A removal device for removing at least one chip-type semiconductor component from an adhesive film having first and second main surfaces, wherein the chip-type semiconductor component is arranged on the first main surface of the adhesive film, the removal device comprising:

a lifting device configured to be arranged at the second main surface of the adhesive film, wherein said lifting device has a contact region for arrangement with respect to the adhesive film, said contact region having, for its part, a plurality of first, suction, cutouts and second cutouts configured to receive pin-type lifting means;

said lifting device further including a Peltier element for changing the temperature of the adhesive film;

wherein at least some of said suction cutouts are connected to a vacuum regulating device.

7. The removal device of claim **6**, wherein said at least some of said suction cutouts are connected to a single vacuum regulating device.

8. The removal device of claim **7**, wherein all of said suction cutouts are connected to said single vacuum regulating device.

9. The removal device of claim **7**, wherein groups of said suction cutouts are connected to separate vacuum regulating devices.