

Description

This invention relates to a film peeling apparatus, and to a method using the apparatus, which can be effectively employed to peel a protective film from a substrate.

A similar apparatus is known from the DE-A-3 339 732, which discloses a method and an apparatus for peeling a film from its substrate, which allows preventing damage of the photoresistant layer and provides an effective processing. This is achieved by conveying printed circuit boards by means of conveyor rolls. Tapes coated with adhesive on the bottom side abutted from rolls and are pressed down by pressing rolls and thus applied to the edge part of the printed circuit board. Metal sheets serve to peel off the adhesive tapes together with the protective film, which then is wound upon rolls. The metal sheets are positioned in an angle of approximately 45° with respect to the conveying direction.

In a printed circuit board used in an electronic device such as a computer, a predetermined circuit is formed with copper on one or both sides of an insulated substrate. A printed circuit board of this type can be manufactured as follows: First, a laminate consisting of a photosensitive resin (photo-resist) layer and a translucent resin film (protective film) for protecting the photosensitive resin layer is thermally formed on the conductive layer of the insulated substrate under pressure. Thereafter, a circuit pattern film is laid over the laminate, and the photosensitive resin layer is exposed to light through the circuit pattern film and the translucent resin film for a predetermined period of time. After peeling the translucent resin film, the photosensitive resin layer thus exposed to light is subjected to developing to form an etching mask pattern. Then, the unnecessary parts of the conductive layer are removed by etching, and the remaining photosensitive resin is peeled off, to obtain a printed circuit board having the predetermined circuit pattern.

When, in the manufacture of the printed circuit board, the photosensitive resin layer exposed to light is developed, it is necessary to peel the photosensitive resin film off. The peeling operation is manually carried out. As the film is considerably thin, the printed circuit board may be damaged or broken if the force of peeling the photosensitive resin film off is not uniform. That is, the person peeling the film off must be clever with his fingers and skillful.

Therefore, it takes a relatively long time to peel the translucent resin film, and therefore the time required for manufacturing the printed circuit board is increased as much.

The above described problems and other problems to be solved by the invention and the features of the invention will become more apparent reading the following description in conjunction with the accompanying drawings.

The object of the invention is achieved with a film peeling apparatus for peeling a film from a substrate (1) with means for conveying said substrate (1) at the beginning of peeling of said film at a speed greater than the speed at which the initially peeled part of said film is conveyed, that apparatus comprising:

- film raising means for raising a part of said film from said substrate (1);
- a film peeling guide member (6B) onto which said part is attached and film peeling and conveying means (6), wherein
- the film peeling guide member (6B) is arranged substantially perpendicular to the direction of conveyance of said substrate (1) thereby setting the direction of peeling of said film;
- the film peeling and conveying means (6) comprising a stationary belt conveyor (6A) having said film peeling guide member (6B), and a movable belt conveyor (6C) for holding said film (1D) attached to said film peeling guide member (6B) to peel and convey said film (1D), the movable belt conveyor (6C) permitting a movement to approach or contact the stationary belt conveyor (6A) or the film peeling guide member (6B) for peeling said film.

Another embodiment of the present invention provides a film peeling apparatus for peeling a film from a substrate, the specific feature of which resides in that the apparatus is characterized in that said film peeling guide member (6B) is so arranged that there is a small gap between said film peeling guide member and said substrate (1).

Another embodiment of the present invention provides a film peeling apparatus for peeling a film from a substrate, the specific feature of which resides in that the apparatus is characterized in that the end position of said film peeling guide member (6B) is arcuate in section, having a small radius of curvature.

Another embodiment of the present invention provides a film peeling apparatus for peeling a film from a substrate, the specific feature of which resides in that the apparatus is characterized in that said film peeling guide member (6B) is angularly movable.

Another embodiment of the present invention provides a film peeling apparatus for peeling a film from a substrate, the specific feature of which resides in that the apparatus is characterized in that said film peeling guide member (6B) is linearly movable.

Another embodiment of the present invention provides a film peeling apparatus for peeling a film from a substrate, the specific feature of which resides in that the apparatus is characterized in that said film peeling guide member (6B) comprises a peeling mechanism for peeling said film with an adhesive member.

Provided according to another aspect of the invention is a method for peeling a film from a substrate using the apparatus according to the invention,

wherein at the beginning of peeling of the film the substrate (1) is conveyed at a speed greater than the speed at which the initially peeled part of said film is conveyed and wherein

- the film peeling guide member sets the direction of peeling said film raised to a predetermined angle;
- the film raising means (4) peel off a part of said film (1D) and stick said part onto said film peeling guide (6B);
- the film conveying means support said film stuck onto said film peeling guide member (6B) and remove said film (1D) out of said apparatus; and
- the guide member moving means cause said film peeling guide members (6B) to approach said substrate (1) and to move away from said substrate (1).

In the accompanying drawings:

Fig. 1 is a sectional view outlining the arrangement of a protective film peeling and conveying mechanism for a printed circuit board which is a first embodiment of this invention;

Fig. 2 is an enlarged perspective view showing essential components of the conveying mechanism in Fig. 1;

Fig. 3 is a diagram for a description of the principle of the embodiment;

Fig. 4 is an enlarged sectional view outlining the arrangement of essential components of the peeling and conveying mechanism;

Fig. 5 is a perspective view outlining the arrangement of the film peeling mechanism shown in Fig. 1;

Fig. 6 is a perspective view outlining essential components of stationary belt conveyors and film peeling guide members in Fig. 1;

Fig. 7 is an enlarged sectional view outlining the arrangement of essential components of one modification of the peeling and conveying mechanism of Fig. 1;

Fig. 8 is an enlarged sectional view outlining the arrangement of essential components of another modification of the peeling and conveying mechanism of Fig. 1;

Fig. 9 is a perspective view outlining arrangement of one modification of the film peeling guide member;

Fig. 10 is an enlarged sectional view outlining the arrangement of essential components of still another modification of the peeling and conveying mechanism of Fig. 8; and

Fig. 11 is a perspective view of the mechanism shown in Fig. 10.

The arrangement of Fig. 7, 8 and 10 is presented not as an embodiment of the invention, but as an ex-

ample useful for understanding it.

This invention will be described with reference to a device for peeling off the protective film of a printed circuit board to which the technical concept of the invention is applied.

In the accompanying drawings, like parts are designated by like reference numerals or characters.

Fig. 1 is a diagram outlining the arrangement of a mechanism of peeling and conveying the protective film of a printed circuit board which is one embodiment of the invention.

In the embodiment, the mechanism of peeling and conveying the protective film of a printed circuit board mainly comprises: conveying rollers 2 for conveying printed circuit boards 1; and conveyance control rollers 3. As shown in Fig. 2, in the printed circuit board, copper conductive layers 1B are formed on both sides of an insulated substrate 1A. On each of the copper conductive layers 1B, a laminated layer consisting of a photosensitive resin layer 1C and a translucent resin film (or protective film) 1D is formed. The photosensitive resin layer 1C has been exposed to have a predetermined wiring pattern.

The aforementioned conveying rollers 2 and conveyance control rollers 3 are so arranged that the printed circuit board 1 is conveyed in the direction of the arrow on a conveying path indicated by line A-A in Fig. 1.

The aforementioned protective film arising mechanism is to arise a part of the translucent resin film 1D when the top edge of the printed circuit board comes to a predetermined position as shown in Fig. 3. More specifically, an adhesive roller unit 4 is pushed against the translucent resin film 1D of the printed circuit board 1 so that it adheres to the resin film 1D, and under this condition the adhesive roller unit 4 is moved upwardly to positively arising a part of the translucent resin film 1D. Each adhesive roller unit 4, as shown in Fig. 4, comprises: a cylindrical roller on the cylindrical surface of which an adhesive material layer 4A is formed; and a movable arm 4C with a rotating shaft 4B. The arm 4C is used to move the adhesive roller 4 up and down by the rotation of a gear mechanism 5. As shown in Fig. 5, the arms 4C and interposed between movable conveying belts 6Cb.

When, as shown in Fig. 4, the arms 4C are moved in the direction of the arrow B so that the adhesive material layers 4A are brought into contact with the top end portion of the translucent resin films 1D. When, under this condition, the printed circuit board 1 is conveyed the direction of conveyance by the conveyance control rollers 3 while the arms 4C are swung in the direction of the arrow C, the adhesive material layers 4A pull up the translucent resin films 1D. In this case, the photosensitive resin layers 1C will never be peeled off the conductive layers 1B because the force of adhesion of the photosensitive resin layer 1C and the conductive layer 1B and that of the

insulating substrate 1A and the conductive layer 1B are larger than the force of adhesion of the translucent resin film 1D and the photosensitive resin layer 1C.

As is apparent from the above description, the adhesive roller units 4 simple in construction can raise parts of the translucent resin films 1D. In this case, the part of each translucent resin film 1D can be raised merely by abutting the respective adhesive roller unit 4 against the translucent resin film 1D. Therefore, no mechanical impact is applied to the printed circuit board, and the photosensitive resin layers 1C will never be damaged or broken.

As the adhesive roller units 4 are provided along the path of conveyance of the printed circuit board 1, the parts of the translucent resin films 1D can be automatically peeled therefrom.

Each peeling conveying mechanism 6, as shown in Figs. 1 and 4, comprises: a stationary belt conveyor 6A; a film peeling guide member 6B; a movable belt conveyor 6C; and a film removing conveying belt mechanism 6D.

As shown in Figs. 1, 4 and 6 (perspective view showing essential components), each stationary belt conveyor 6A comprises: a pair of rollers 6Aa and 6Aa', and an endless belt 6Ab laid over the rollers 6Aa and 6Aa'.

Each movable belt conveyor 6C, as shown in Figs. 1, 4 and 5, comprises: a pair of rollers 6Ca and 6Ca'; and an endless belt laid over these rollers 6Ca and 6Ca'. The movable belt conveyors 6C are so designed that each of the conveyors 6C is driven by an air cylinder 6Cc through the roller 6Ca to approach or contact the belt 6Ab of the stationary belt conveyor 6A or the film peeling guide member 6B. The movable belt conveyors 6C operate to positively hold on the film peeling guide members 6B the translucent resin films 1D peeled off by the adhesive rollers 4, respectively.

Each translucent resin film 1D peeled off by the adhesive roller 4 is held by the stationary belt conveyor 6A and the movable belt conveyor 6C (as indicated by the dotted lines in Fig. 4), and the pair of rollers 6Aa and 6Aa' and the pair of rollers 6Ca and 6Ca' are driven so that the translucent resin film is continuously peeled off and removed.

Each of the film peeling guide members 6B is provided in the housing of the film peeling device on the respective stationary belt conveyor 6A to support the belt 6Ab.

The film peeling guide member 6B is so designed that, in order to prevent the variation of the peeling position of the translucent resin film 1D, the variation of peeling stress thereof and to prevent the photosensitive resin layer 1C from being damaged or broken, guides the translucent resin film 1D in such a manner that the peeling angle of the latter 1D is obtuse with respect to the direction of conveyance of the printed

circuit board 1. That is, the speed of peeling and conveying the translucent resin film 1D is made equal to the speed of conveyance of the printed circuit board 1, whereas at the start of peeling the speed of conveyance of the printed circuit board is made higher than the speed of peeling and conveying the translucent resin film 1D, so that the peeling angle of the translucent resin film 1D is obtuse with respect to the direction of conveyance of the printed circuit board 1.

The end of each film peeling guide member 6B is spaced from the printed circuit board 1 to the extent that it is not rubbed by the printed circuit board 1.

The end of each film peeling guide member is arcuate, small in curvature, for instance not more than 3 mm.

The film peeling guide member 6B is designed as described above, to stabilize the peeling position and to apply uniform peeling stress to the translucent resin film 1D and the photosensitive resin layer 1C.

If the apparatus is so modified that shown in Fig. 7 the peeling angle of the translucent resin film 1D with respect to the direction of conveyance of the printed circuit board 1D is obtuse whereby the speed of peeling and conveying of the translucent resin film 1D is substantially equal to the speed of conveyance of the printed circuit board 1, more uniform stress can be applied to the translucent resin film 1D and the photosensitive resin layer 1C.

In addition, if each film peeling guide member 6B is so designed that, as shown in Fig. 8, the peeling angle θ (as viewed from the direction of conveyance of the board 1) of the translucent resin film 1D can be set to a value in a range of from an obtuse angle θ_1 to substantially right angles θ with respect to the direction of conveyance of the printed circuit board 1, a best peeling angle θ can be set according to the peeling and conveying speed and the peeling stress.

As each of the peeling and conveying mechanism 6 is made up of a stationary belt conveyor 6A, the film peeling guide member 6B and the movable belt conveyor 6C as was described above, the translucent resin film 1D raised by the adhesive roller 4 is guided by the film peeling guide member 6B and conveyed while being held by the stationary belt conveyor 6A and the movable belt conveyor 6C, so that it is moved out in the direction of the arrow "OUT" in Fig. 4, 7 or 8.

Each of the film removing conveying belt mechanisms 6D, as shown in Fig. 1, comprises a plurality of rollers 6Da and a pair of belts 6Db. The film removing conveying belt mechanism 6D is so designed as to remove the upper layer namely, the translucent resin film 1D of the printed circuit board 1.

In each of the movable belt conveyor 6C, instead of the air cylinder 6Cc an electromagnetic solenoid or hydraulic cylinder may be employed.

The film peeling devices are arranged in the path of conveyance of the printed circuit board 1 as descri-

bed above. The following operations are automatically carried out: raising a part of each translucent resin film 1D of the printed circuit board 1, peeling and conveying the translucent resin film 1D with the peeling and conveying mechanism 6, and positively removing the translucent resin film 1D thus peeled.

After the translucent resin films 1D have been peeled off the printed circuit board 1 by the above-described film peeling devices, the printed circuit board 1 is transferred by the conveyance control rollers 3 and the conveying rollers 2 to a developing unit where the photosensitive resin layers 1C are subjected to developing.

For instance, the film peeling guide member 6B may be replaced by one which is formed by arranging a plurality of bar-shaped members in the form of a duck-board as shown in Fig. 9. In this example, the top bar-shaped member is arcuate in section, being small in curvature radius.

While the inventions has been described with reference to the case where the films are peeled off the printed circuit board, it is obvious that the technical concept of the invention can be applied, for instance, to the case of removing protective films from dressed boards which are used as building materials.

The apparatus is so designed that a part of the film is raised from the substrate and the film thus raised is peeled and conveyed in a direction substantially perpendicular to the substrate. Therefore, uniform peeling stress is applied to the films such as the translucent resin films and the photosensitive resin layers and the peeling positions are stabilized. Accordingly, the difficulties that, during the operation of peeling the film such as the translucent resin films, the peeling position is shifted or the peeling stress is changed can be eliminated. In addition, the peeling can be automatically accomplished without damaging the photosensitive resin layers.

As the films can be peeled from the substrate readily and instantaneously, the time requires for peeling the film from the substrate can be reduced.

A modification of the film removing mechanism 6 will be explained which comprises: a stationary belt conveyor 6A; film peeling guide members 6B; a movable belt conveyor 6C; and a film removing conveying belt mechanism 6D.

The stationary belt conveyor 6A, as shown in Figs. 10 and 11 (a perspective view showing essential components), comprises a plurality of pairs of rollers 6Aa, and a plurality of belts 6Ab laid over the rollers 6Aa.

The movable belt conveyor 6C, as shown in Figs. 1 and 8, comprises a pair of rollers 6Ca, and a belt 6Cb laid over the rollers 6Ca. The movable belt conveyor 6C is so designed that it is swung about one of the rollers 6Ca by an air cylinder 6Cc so as to approach or contact the belts 6Ab of the stationary belt conveyor 6A or the film peeling guide members 6B.

The stationary belt conveyor 6A and the movable belt conveyor 6C are so designed that the movable belt conveyor 6C (at the position indicated by the dotted lines) supports the translucent resin film 1D in co-operation with the stationary belt conveyor 6A which has been partially peeled off by the fluid jetting mechanism 5, which the rollers 6Aa and the rollers 6Ca are driven, so that the translucent resin film 1D is peeled off and removed out of the peeler.

The aforementioned film peeling guide members 6B are provided on the frame of the film peeling device which is on the side of the stationary belt conveyor 6A, and are disposed between the belts 6Ab.

The film peeling guide members 6B are so designed in construction as to prevent the occurrence of the difficulties that, when the translucent resin film 1D is peeled off, the peeling position is varied, the peeling stress becomes non-uniform, and the photosensitive resin layer 1C is damaged or broken, and to guide the translucent resin film 1D in the film peeling direction. That is, the film peeling guide members 6B are so designed that the peeling angle θ of the translucent resin film 1D raised (which is the angle formed between the translucent resin film 1D which is to be peeled off and the same translucent resin film 1D which has been peeled off) is a right angle to an obtuse angle (90° to 150° , preferably about a right angle) with respect to the board 1.

Each of the film peeling guide members 6B is positioned close to the board 1 to the extent that its end does not rub the board 1, and the guide member 6B is moved in the direction of the arrow K so that, when the board 1 is conveyed, the photosensitive resin layer 1C may not be damaged.

The guide members 6B are moved, for instance, by a servo motor, an air cylinder or the like in synchronization with the peeling mechanism. Furthermore, the film peeling guide members 6B are so designed that they are moved when the translucent resin film 1D is supported by the stationary belt conveyor 6A and the movable belt conveyor 6C.

The film peeling device may be so modified that the peeling angle θ of the film peeling guide members 6B can be changed when necessary.

The end portion of each of the film peeling devices 6B is arcuate in section, or small in the radius of curvature, e.g., 3 mm or less in the radius of curvature as in the mechanism shown in Fig. 8.

The film peeling guide members 6B thus provided stabilize the peeling position, and allow the application of uniform peeling stress to the translucent resin film 1D and the photosensitive resin layer 1C.

As was described above, the positions of the film peeling guide members 6B can be changed. Therefore, the film peeling guide members 6B can be positioned closed to the board 1 so that the peeling means effectively acts on the entire peeling surface of the translucent resin film 1D from the end of the board 1

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to the film peeling guide members 6B, with the results that the initial peeling effect is improved, and the translucent resin film 1D can be positively stuck onto the film peeling guide members 6B. On the other hand, where the film peeling guide members 6B are moved away from the board 1, the photosensitive resin film 1C can be protected from damage when the board 1 is conveyed. Even if some of the gaps formed by the protruded pressing members 4A are unsatisfactory, the transparent resin film 1D can be peeled off without fail.

Each of the film removing mechanisms is made up of the stationary belt conveyor 6A, the film peeling guide members 6B, and the movable belt conveyor 6C as was described above. Therefore, the translucent resin film 1D partially peeled off by the peeling means is guided by the film and supported by the stationary belt conveyor 6A and the movable belt conveyor 6C, as a result of which the translucent resin film 1D is conveyed while being peeled off, and removed in the direction of removal, or in the direction of the arrow OUT.

Since the film conveying mechanism 6 are provided in the board conveyance path, the translucent resin films 1D peeled off by the peeling means can be positively and automatically removed from the peeler. Therefore, the time required for removing the translucent resin films from the board can be greatly shortened.

After the translucent resin films 1D are peeled off by means of the peeling means and the film conveying mechanism 6, the board 1 is delivered to a developing unit by the conveyance control rollers 3 and the conveying rollers 3, where the photosensitive resin layers 1C are subjected to developing.

Claims

1. Film peeling apparatus for peeling a film from a substrate (1) with means for conveying said substrate (1) at the beginning of peeling of said film at a speed greater than the speed at which the initially peeled part of said film is conveyed, that apparatus comprising:

- film raising means for raising a part of said film from said substrate (1);
- a film peeling guide member (6B) onto which said part is attached and film peeling and conveying means (6), wherein
- the film peeling guide member (6B) is arranged substantially perpendicular to the direction of conveyance of said substrate (1) thereby setting the direction of peeling of said film;
- the film peeling and conveying means (6) comprising a stationary belt conveyor (6A) having said film peeling guide member

(6B), and a movable belt conveyor (6C) for holding said film (1D) attached to said film peeling guide member (6B) to peel and convey said film (1D), the movable belt conveyor (6C) permitting a movement to approach or contact the stationary belt conveyor (6A) or the film peeling guide member (6B) for peeling said film.

2. Film peeling apparatus as claimed in claim 1, characterized in that said film peeling guide member (6B) is so arranged that there is a small gap between said film peeling guide member and said substrate (1).

3. Film peeling apparatus as claimed in claim 1, characterized in that the end portion of said film peeling guide member (6B) is arcuate in section, having a small radius of curvature.

4. Film peeling apparatus as claimed in claim 1, characterized in that said film peeling guide member (6B) is angularly movable.

5. Film peeling apparatus as claimed in claim 1, characterized in that said film peeling guide member (6B) is linearly movable.

6. Film peeling apparatus as claimed in claim 1, characterized in that said film peeling guide member (6B) comprises a peeling mechanism for peeling said film with an adhesive member.

7. Method for peeling a film from a substrate (1) using the apparatus according to anyone of the preceding claims, wherein at the beginning of peeling of the film the substrate (1) is conveyed at a speed greater than the speed at which the initially peeled part of said film is conveyed and wherein

- the film peeling guide member (6B) sets the direction of peeling said film raised to a predetermined angle;
- the film raising means (4) peel off a part of said film (1D) and stick said part onto said film peeling guide member (6B);
- the film conveying means support said film stuck onto said film peeling guide member (6B) and remove said film (1D) out of said apparatus; and
- the guide member moving means cause said film peeling guide members (6B) to approach said substrate (1) and to move away from said substrate (1).

Patentansprüche

1. Filmabschälvorrichtung zum Abschälen eines

to the film peeling guide members 6B, with the results that the initial peeling effect is improved, and the translucent resin film 1D can be positively stuck onto the film peeling guide members 6B. On the other hand, where the film peeling guide members 6B are moved away from the board 1, the photosensitive resin film 1C can be protected from damage when the board 1 is conveyed. Even if some of the gaps formed by the protruded pressing members 4A are unsatisfactory, the transparent resin film 1D can be peeled off without fail.

Each of the film removing mechanisms is made up of the stationary belt conveyor 6A, the film peeling guide members 6B, and the movable belt conveyor 6C as was described above. Therefore, the translucent resin film 1D partially peeled off by the peeling means is guided by the film and supported by the stationary belt conveyor 6A and the movable belt conveyor 6C, as a result of which the translucent resin film 1D is conveyed while being peeled off, and removed in the direction of removal, or in the direction of the arrow OUT.

Since the film conveying mechanism 6 are provided in the board conveyance path, the translucent resin films 1D peeled off by the peeling means can be positively and automatically removed from the peeler. Therefore, the time required for removing the translucent resin films from the board can be greatly shortened.

After the translucent resin films 1D are peeled off by means of the peeling means and the film conveying mechanism 6, the board 1 is delivered to a developing unit by the conveyance control rollers 3 and the conveying rollers 3, where the photosensitive resin layers 1C are subjected to developing.

Claims

1. Film peeling apparatus for peeling a film from a substrate (1) with means for conveying said substrate (1) at the beginning of peeling of said film at a speed greater than the speed at which the initially peeled part of said film is conveyed, that apparatus comprising:
 - film raising means for raising a part of said film from said substrate (1);
 - a film peeling guide member (6B) onto which said part is attached and film peeling and conveying means (6), wherein
 - the film peeling guide member (6B) is arranged substantially perpendicular to the direction of conveyance of said substrate (1) thereby setting the direction of peeling of said film;
 - the film peeling and conveying means (6) comprising a stationary belt conveyor (6A) having said film peeling guide member

(6B), and a movable belt conveyor (6C) for holding said film (1D) attached to said film peeling guide member (6B) to peel and convey said film (1D), the movable belt conveyor (6C) permitting a movement to approach or contact the stationary belt conveyor (6A) or the film peeling guide member (6B) for peeling said film.

2. Film peeling apparatus as claimed in claim 1, characterized in that said film peeling guide member (6B) is so arranged that there is a small gap between said film peeling guide member and said substrate (1).
3. Film peeling apparatus as claimed in claim 1, characterized in that the end portion of said film peeling guide member (6B) is arcuate in section, having a small radius of curvature.
4. Film peeling apparatus as claimed in claim 1, characterized in that said film peeling guide member (6B) is angularly movable.
5. Film peeling apparatus as claimed in claim 1, characterized in that said film peeling guide member (6B) is linearly movable.
6. Film peeling apparatus as claimed in claim 1, characterized in that said film peeling guide member (6B) comprises a peeling mechanism for peeling said film with an adhesive member.
7. Method for peeling a film from a substrate (1) using the apparatus according to anyone of the preceding claims, wherein at the beginning of peeling of the film the substrate (1) is conveyed at a speed greater than the speed at which the initially peeled part of said film is conveyed and wherein
 - the film peeling guide member (6B) sets the direction of peeling said film raised to a predetermined angle;
 - the film raising means (4) peel off a part of said film (1D) and stick said part onto said film peeling guide member (6B);
 - the film conveying means support said film stuck onto said film peeling guide member (6B) and remove said film (1D) out of said apparatus; and
 - the guide member moving means cause said film peeling guide members (6B) to approach said substrate (1) and to move away from said substrate (1).

Patentansprüche

1. Filmabschälvorrichtung zum Abschälen eines



Films von einem Substrat (1) mit einem Mittel zum Transportieren des Substrats (1) mit einer Geschwindigkeit, die zu Beginn des Abschälens größer ist als die Geschwindigkeit mit der der anfänglich abgeschälte Teil des Films transportiert wird, wobei die Vorrichtung aufweist:

- ein Filmanhebungsmittel zum Anheben eines Teils des Films von dem Substrat (1);
 - ein Filmabschäl-Führungsglied (6B), auf dem dieser Teil angebracht ist und ein Filmabschäl- und Transportglied (6), worin das Filmabschäl-Führungsglied (6B) im wesentlichen senkrecht zu der Transportrichtung des Substrats (1) angeordnet ist, wodurch die Richtung des Abschälens des Film festgelegt ist;
 - das Filmabschäl- und Transportglied (6) einen stationären Bandtransportierer (6A) mit dem Filmabschäl-Führungsglied (6B) und einen beweglichen Bandtransportierer (6C) zum Halten des Films (1) aufweist, der an dem Filmabschäl-Führungsglied (6B) angebracht ist, um den Film (1D) abzuschälen und zu transportieren, wobei der bewegliche Bandtransportierer (6C) eine Bewegung ermöglicht, um sich dem stationären Bandtransportierer (6A) oder dem Filmabschäl-Führungsglied (6B) zum Filmabschälen zu nähern oder zu kontaktieren.
2. Filmabschälvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Filmabschäl-Führungsglied (6B) so angeordnet ist, daß ein schmaler Spalt zwischen Filmabschäl-Führungsglied und dem Substrat (1) entsteht.
3. Filmabschälvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß der Endabschnitt des Filmabschäl-Führungsglieds (6B) im Querschnitt mit einem kleinen Krümmungsradius gekrümmt ist.
4. Filmabschälvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Filmabschäl-Führungsglied (6B) winkelig beweglich ist.
5. Filmabschälvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Filmabschäl-Führungsglied (6B) linear beweglich ist.
6. Filmabschälvorrichtung nach Anspruch 1, dadurch gekennzeichnet, daß das Filmabschäl-Führungsglied (6B) einen Abschälmechanismus mit einem adhäsiven Glied zum Abschälen des Films aufweist.
7. Verfahren zum Abschälen eines Films von einem Substrat (1) unter Verwendung der Vorrichtung

nach einem der vorangegangenen Ansprüche, worin zu Beginn des Abschälens des Films das Substrat (1) mit einer Geschwindigkeit transportiert wird, die größer ist als die Geschwindigkeit mit der der anfänglich abgeschälte Teil des Films transportiert wird und worin

- das Filmabschäl-Führungsglied (6B) die Richtung des Abschälens des zu einem vorbestimmten Winkel angehobenen Films festlegt;
- das Filmanhebungsmittel (4) einen Teil des Films (1D) abschält und diesen Teil auf das Filmabschäl-Führungsglied (6B) anheftet;
- das Filmtransportmittel den an dem Filmabschäl-Führungsglied (6B) angehefteten Film trägt und den Film aus der Vorrichtung entfernt; und
- das Bewegungsmittel des Führungsgliedes das Filmabschäl-Führungsglied (6B) veranlaßt sich dem Substrat (1) zu nähern und sich von dem Substrat (1) weg zu bewegen

Revendications

1. Dispositif de pelage de film, servant à séparer un film d'un substrat (1) par pelage, comprenant des moyens servant à transporter le substrat (1) au début du pelage du film à une vitesse supérieure à la vitesse à laquelle la partie initialement pelée du film est transportée, ce dispositif comprenant :
- des moyens de soulèvement de film, servant à soulever une partie du film vis-à-vis du substrat (1) ;
 - un organe de guidage de pelage de film (6B), dont ladite partie est rendue solidaire, et des moyens de pelage et de transport de film (6) ;
 - l'organe de guidage de pelage de film (6B) étant disposé d'une manière pratiquement perpendiculaire à la direction de transport du substrat (1), ce qui détermine la direction de pelage du film ;
 - les moyens de pelage et de transport de film (6) comprenant un transporteur à bande (6A) fixe, qui comporte l'organe de guidage de pelage de film (6B), et un transporteur à bande (6C) mobile servant à maintenir le film (1D) solidaire de l'organe de guidage de pelage de film (6B) de façon à peler et transporter le film (1D), le transporteur à bande (6C) étant susceptible d'un mouvement lui permettant de s'approcher ou de venir au contact du transporteur à bande (6A) fixe ou de l'organe de guidage de pelage de film (6B), en vue de peler le film.



2. Dispositif de pelage de film selon la revendication 1, caractérisé en ce que l'organe de guidage de pelage de film (6B) est agencé de façon qu'il existe un petit intervalle entre cet organe de guidage de pelage de film et le substrat (1). 5
3. Dispositif de pelage de film selon la revendication 1, caractérisé en ce que la partie d'extrémité de l'organe de guidage de pelage de film (6B) a une section arrondie présentant un petit rayon de courbure. 10
4. Dispositif de pelage de film selon la revendication 1, caractérisé en ce que l'organe de guidage de pelage de film (6B) est agencé de façon à pouvoir être animé d'un mouvement angulaire. 15
5. Dispositif de pelage de film selon la revendication 1, caractérisé en ce que l'organe de guidage de pelage de film (6B) est agencé de façon à pouvoir être animé d'un mouvement rectiligne. 20
6. Dispositif de pelage de film selon la revendication 1, caractérisé en ce que l'organe de guidage de pelage de film (6B) comprend un mécanisme de pelage servant à peler le film au moyen d'un élément adhésif. 25
7. Procédé permettant de peler un film d'un substrat (1) en utilisant un dispositif selon l'une quelconque des revendications précédentes, selon lequel, au début du pelage du film, le substrat (1) est transporté à une vitesse supérieure à la vitesse à laquelle la partie initialement pelée du film est transportée et selon lequel: 30
- l'organe de guidage de pelage de film (6B) sert à déterminer la direction de pelage du film soulevé à un angle préfixé;
 - les moyens de soulèvement de film (4) séparent une partie du film (1D) par pelage et font adhérer cette partie sur l'organe de guidage de pelage de film (6B); 40
 - les moyens de transport de film soutiennent le film maintenu de manière adhérente sur l'organe de guidage de pelage de film (6B) et extraient le film (1D) hors du dispositif; et 45
 - les moyens de déplacement de l'organe de guidage font s'approcher et s'éloigner l'organe de guidage de pelage de film (6B) du substrat (1). 50

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