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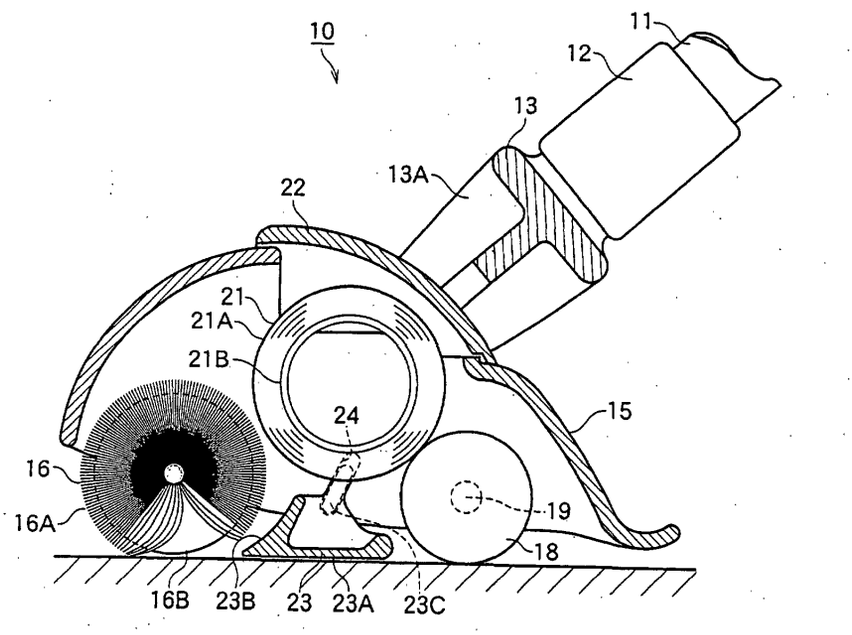
(54) **ADHESIVE ROLL FOR CLEANING DEVICE**

(57) In a cleaning device 10, a scraping up body 16 and the contact rotating body 18 being rotatably supported to a frame 15 in parallel; and an adhesive roll 21 astride the scraping up body 16 and the contact rotating body 18, being put on the scraping up body 16 and the contact rotating body 18 wherein an adhesive sheet 21A of the adhesive roll 21 is wound around a core 21B, and an initial outer diameter of the adhesive roll 21 is set to be equal to or less than 40mm.

FIG.2



EP 1 366 702 A1

Description

Technical Filed

[0001] The present invention relates to an adhesive roll for a cleaning device.

Background Art

[0002] As a cleaning device, there is a structure in which a brush body and an adhesive roll are independently provided and they independently collect dust (Japanese Utility Model Application Laid-open No. 59-139261). When cleaning by the adhesive roll, the adhesive roller is directly contacted and rotated on a carpet or flooring.

[0003] The background arts mentioned above have the following problems.

(1) The adhesive roll is structured such that an adhesive sheet is wound around a core having a diameter of about 38mm, an initial outer diameter of the adhesive roll is large such as about 60mm and it is impossible to make the cleaning device compact. Since the adhesive roll is directly in contact with a surface to be cleaned, not only dust but also implanted fabrics such as the carpet or the like are attached onto a surface of the adhesive roll due to picking off or the like, so that when a surface area of the adhesive roll is not large enough, an adhesive force becomes weak in a few moments and a floor area (a cleaning force maintaining area) which can be cleaned after a new adhesive sheet is exposed becomes too small, whereby it is necessary to increase the surface area by increasing the outer diameter of the adhesive roll in the manner mentioned above.

(2) In order to prevent the adhesive roll from being strongly adhered to the floor such as the flooring, the carpet, or the like, whereby the adhesive roll can not roll thereon due to the fact that the adhesive roll is directly in contact with the surface to be cleaned, and in order to prevent the implanted fabrics such as the carpet or the like from being picked off, an adhesive force of the adhesive sheet has a limit, so that it is impossible to increase the adhesive force too much. Accordingly, when dust covers the surface of the adhesive roll, the adhesive force is further reduced, so that even when increasing the surface area of the adhesive roll by the structure mentioned in the item (1) above, the cleaning force maintaining area after the new adhesive sheet is exposed is small.

(3) A horizontal width of the adhesive sheet along an axial direction of the adhesive roll is set to be narrow such as about 160 mm owing to the purpose of preventing the adhesive roll from being in strong contact with the floor surface so as to be rolled, and owing to an application of the cleaning device to small spaces. Accordingly, the floor area, which can be cleaned by one rotation of the adhesive roll, is little, and a cleaning efficiency is poor.

DISCLOSURE OF THE INVENTION

[0004] An object of the present invention is to increase a cleaning force maintaining area after a new adhesive sheet of an adhesive roll is exposed, while making a cleaning device compact.

[0005] Further, another object of the present invention is to make an adhesive force of the adhesive roll strong without injuring a surface to be cleaned, thereby increasing the cleaning force maintaining area after the new adhesive sheet is exposed.

[0006] Further, another object of the present invention is to increase a floor area that can be cleaned by one rotation of the adhesive roll, thereby improving a cleaning efficiency.

[0007] In accordance with the present invention, there is provided an adhesive roll for a cleaning device comprising: a frame, a scraping up body, a contact rotating body, and an adhesive roll. The scraping up body and the contact rotating body are rotatably supported to the frame in parallel, and the adhesive roll astride the scraping up body and the contact rotating body is arranged on the scraping up body and the contact rotating body. An initial outer diameter of the adhesive roll is set to be equal to or less than 40 mm.

[0008] Furthermore, the present invention relates to an adhesive roll for a cleaning device comprising: a frame, a scraping up body, a contact rotating body, and an adhesive roll. The scraping up body and the contact rotating body are rotatably supported to the frame in parallel, and the adhesive roll astride the scraping up body and the contact rotating body is placed on the scraping up body and the contact rotating body. An amount of application of an adhesive agent on a base material of an adhesive sheet constituting the adhesive roll is set to be within a range between 25 and 50 g/m^2.

[0009] Furthermore, the present invention relates to an adhesive roll for a cleaning device comprising: a frame, a scraping up body, a contact rotating body, and an adhesive roll. The scraping up body and the contact rotating body are rotatably supported to the frame in parallel, and the adhesive roll astride the scraping up body and the contact rotating body is placed on the scraping up body and the contact rotating body. A numerical value based on a tilt type ball tack of an adhesive surface in an adhesive sheet constituting the adhesive roll is set to be within a range between

10 and 30.

[0010] Furthermore, the present invention relates to an adhesive roll for a cleaning device comprising: the cleaning device having at least a scraping up body and an adhesive roll, and the adhesive roll not being directly in contact with a cleaning surface for the cleaning device. The adhesive roll is structured by winding an adhesive sheet therearound, and an amount of application of an adhesive agent on a base material of the adhesive sheet is set to be within a range between 25 and 50 g/m^2.

[0011] Furthermore, the present invention relates to an adhesive roll for a cleaning device comprising: the cleaning device having at least a scraping up body and an adhesive roll, and the adhesive roll not being directly in contact with a cleaning surface for the cleaning device. The adhesive roll is structured by winding an adhesive sheet therearound, and a numerical value based on a tilt type ball tack of an adhesive surface in the adhesive sheet is set to be within a range between 10 and 30.

[0012] In this case, the numerical value based on the tilt type ball tack which is used in the present invention is defined in an adhesive tape and adhesive sheet testing method in Z0237 of Japanese Industrial Standards (JIS). In other words, a ball rolling device is employed as a test equipment, and an adhesive sheet constituting the adhesive roll in accordance with the present invention is placed as a test piece on an inclined plate of the ball rolling device in a state in which an adhesive surface is set to an upper side. Further, there are rolled on the adhesive surface of the adhesive sheet, thirty one kinds of balls in total except balls belonging to 5/64, 7/64, 9/64, 15/64 and 17/64 in balls having sizes 1/16 to 1 on the basis of "nominal designation of balls" defined in JIS B1501 and made of materials defined in JIS G4805, one by one in accordance with different orders. As a result, the maximum ball among the balls is found which stops within a measurement area corresponding to an area on the adhesive sheet on the inclined plate. It is confirmed that the found ball is the maximum ball applied to the measurement regulation, by rolling the following total three balls one by one, (in total three times); the maximum ball found by the same test piece, and the balls respectively having one larger and smaller sizes. Then, the numerical value corresponding to thirty two-fold the "nominal designation of balls" mentioned above is regarded as a ball number, the result of the test is expressed by the found maximum ball number, an average value of three test pieces is determined, and the ball number is set to a numerical value based on the tilt type ball tack defined in JIS Z0237.

BRIEF DESCRIPTION OF THE DRAWINGS

[0013]

FIG. 1 is a perspective view showing a cleaning device;
FIG. 2 is a side elevational view showing a cleaning device; and
FIG. 3 is a schematic view showing a test equipment of a numeric value on the basis of a tilt type ball tack.

BEST MODE FOR CARRYING OUT THE INVENTION

[0014] A cleaning device 10 is structured, as shown in FIGS. 1 and 2, such that a supporting arm 13 is connected to a front end portion of a handle 11 via a joint portion 12 in such a manner as to freely swing in a lateral direction, and a frame 15 is supported to both side arm portions 13A of the supporting arm 13 via a supporting shaft portion 14 in such a manner as to freely swing in a longitudinal direction.

[0015] A scraping up body 16 constituted by a brush is rotatably supported to a front portion of the frame 15 via a rotational shaft 17. A contact rotating body 18 constituted by a roll body is rotatably supported to a rear portion of the frame 15 via a rotational shaft 19, and the scraping up body 16 and the contact rotating body 18 are arranged in parallel. The scraping up body 16 is constituted by a scraping up portion 16A (a brush portion) and a tire portion 16B, and a diameter of the scraping up body (a diameter of a brush) of the scraping up portion 16A is made larger than a tire diameter of the tire portion 16B. The contact rotating body 18 is structured such that an elastic body thereof forms a surface, and is constituted, for example, by a silicon roll. Here, in the case that the adhesive force of the adhesive roll 21 is low, a material of the contact rotating body 18 may have no elasticity. In this case, a concavo-convex portion may be provided on a surface of the contact rotating body 18. The concavo-convex portion corresponds to a structure obtained by applying a rib, a convex portion, a recess portion, a craping surface, or the like to a roll surface of the contact rotating body 18.

[0016] The adhesive roll 21 astride the scraping up body 16 and the contact rotating body 18 is put on the scraping up body 16 and the contact rotating body 18, and the adhesive roll 21 rotates to interlock with the rotation of the contact rotating body 18. A take in and out port of the adhesive roll 21 is provided in an upper portion of the frame 15 and is covered by a transparent cover 22 being able to be opened and closed. The adhesive roll 21 according to the present embodiment is constituted by a take-up roll in which an adhesive sheet 21A is wound around a core 21B and an adhesive surface of the adhesive sheet 21A can be wound out toward an outer side and can be cut.

[0017] In this case, the adhesive roll 21 may be structured such that the rotational shaft thereof is supported to the frame 15 and the adhesive roll 21 is not in contact with the scraping up body 16. That is, no contact may be generated between the scraping up body 16 and the adhesive roll 21, and it is preferable to set a distance between the brush front end portion of the scraping body 16 and the outermost peripheral surface of the adhesive roll 21 to about 2 to 3mm in view of an adhesion easiness of dust.

[0018] In this case, the adhesive roll 21 is structured, for example, such that the core 21B is formed by a paper tube or the like having a diameter of 25 mm and an initial diameter of the adhesive sheet 21A is set to be equal to or less than 40 mm, and more preferably about 35mm. Further, the adhesive roll 21 is structured such that a horizontal width of the adhesive sheet 21A along an axial direction of the adhesive roll 21 is set to be within a range between 170 and 300mm, and more preferably about 195mm. Further, the adhesive roll 21 is structured such that an amount of application of the adhesive agent on a base material in the adhesive sheet 21A is set to be within a range between 25 and 50 g/m^2, and more preferably about 40 g/m^2. As the base material of the adhesive sheet 21A, a kraft paper can be preferably employed in view of strength, and as the -adhesive agent, a rubber adhesive agent can be preferably employed for the reason of a reduced smell. In addition, as the base material of the adhesive sheet 21A, a glassine paper or a pure white paper may be employed, and as the adhesive agent, an acrylic adhesive agent may be employed. The adhesive sheet 21A of the adhesive roll 21 is described later in detail.

[0019] A dustpan portion 23 is supported to a rear portion of the scraping up body 16 in the frame 15. The dustpan portion 23 has a bottom surface portion 23A being in contact with a floor surface, and a scooping surface portion 23B facing to the scraping up body 16 with no gap (or via a gap) and formed in a curved surface shape (or a flat surface shape), and flat supporting shaft portions 23C in both sides of the dustpan portion 23 are supported to obliquely-shaped rectangular holes 24 backward bending with respect to a vertical direction and disposed in both sides of the frame 15 so as to freely move in a vertical direction. The dustpan portion 23 guides all the dust scraped up by the scraping up portion 16A of the scraping up body 16 to the side of the adhesive roll 21 by the scooping surface portion 23B without missing the dust rearward along the floor surface, by vertically moving the supporting shaft portions 23C with respect to the rectangular holes 24 and bringing the bottom surface portion 23A and the lowermost end portion of the scooping surface portion 23B into contact with the floor surface with no gap due to their own weights.

[0020] The cleaning operation by the cleaning device 10 is performed in the following manner.

(1) The operating force applied to the handle 11 in the axial direction moves forward the cleaning device 10, rotates the tire portion 16B of the scraping up body 16 and the contact rotating body 18, and simultaneously rotates the adhesive roll 21 in an interlocking manner.

(2) When the scraping up portion 16A of the scraping up body 16 scrapes up dust on the floor surface, the dust is guided by the dustpan portion 23 to be fed out to the side of the adhesive roll 21, and the dust is adsorbed and picked up on the adhesive surface of the adhesive roll 21.

(3) The dust picked up on the adhered surface of the adhesive roll 21 moves to the side of the contact rotating body 18 together with the rotation of the adhesive roll 21, and is pressed to the adhesive surface of the adhesive roll 21 by the contact rotating body 18 to be fixed thereto. That is, at a time of cleaning, the adhesive roll 21 and the contact rotating body 18 pick up the dust due to their contact. However, before cleaning or in correspondence to the cleaning condition, the adhesive roll 21 and the contact rotating body 18 may be in a contact or non-contact state.

(4) When a user views from the transparent cover 22 that a lot of dust has been picked up all around the periphery of the adhesive surface of the adhesive roll 21, the adhesive roll 21 is again placed on the scraping up body 16 and the contact rotating body 18 after opening the cover 22 so as to take out the adhesive roll 21, cutting and removing one periphery of adhesive sheet 21A and exposing a new adhesive surface, and then the cover 22 is closed.

[0021] In this case, the cleaning device 10 can not only move forward but also move backward, and at a time of moving backward, the dust on the floor surface attached to the contact rotating body 18 can be adsorbed and picked up by the adhesive roll 21. The dustpan portion 23 is formed in an R shape at a tail end portion of the bottom surface portion 23A, thereby preventing the tail end portion from being caught into the floor surface at a time of backward moving.

[0022] A description will be given in detail below of an adhesive sheet 21A used in the adhesive roll 21 in accordance with the present invention.

[0023] In other words, the adhesive roll 21 uses a tack force of the adhesive surface in the adhesive sheet 21A by a numerical value between 10 and 30 based on the tilt type ball tack (JIS Z0237-2000), preferably by a numerical value between 12 and 25, and more preferably by a numerical value between 14 and 25. In the case that the numerical value based on the tilt type ball tack corresponding to the tack force is less than 10, a force for adhering and holding the dirt is poor. Accordingly, even if only slightly, dirt such as cotton dust or the like is attached to the surface, it is not long

before more dirt can not be collected, and the floor area in which the adhesive surface can clean up (a cleaning force maintaining area) is too small. Further, if the numerical value based on the tilt type ball tack corresponding to the tack force is larger than 30, the adhesive force is too strong, so that an operability after the adhesive roll 21 is attached to the cleaning device 10 is deteriorated, and it is hard to handle the adhesive roll 21 due to stickiness of the adhesive roll 21 to a hand or the like, at a time when the adhesive roll 21 is attached to the cleaning device 10.

[0024] As the adhesive agent, there is usable a hot melt adhesive agent, a solvent adhesive agent, a water borne adhesive agent, and the like. As the hot melt adhesive agent, there is usable a styrene adhesive agent, an olefin adhesive agent, and the like. As the solvent adhesive agent, there is usable a styrene adhesive agent, an olefin adhesive agent, an acrylic adhesive agent, and the like. As the water borne adhesive agent, there is usable an acrylic adhesive agent and the like. As the adhesive agent used for the adhesive sheet 21A in accordance with the present invention, taking into consideration a workability and an adhesive force, the styrene type hot melt adhesive agent is preferable.

[0025] Further, the hot melt adhesive agent preferably employs a hot melt adhesive agent containing a base polymer, a tackifier component, a softener component and an antioxidant.

[0026] As the base polymer, there is usable a styrene butadiene rubber (SBR), a styrene butadiene styrene block copolymer (SBS), a styrene isoprene styrene block copolymer (SIS), a styrene ethylene butylene styrene block copolymer (SEBS), a styrene ethylene propylene styrene block copolymer (SEPS), and the like. The base polymer is used in a range between 10 and 100 weight part in the case that a total amount of the tackifier component and the softener component is set to 100 weight part.

[0027] As the tackifier component, there is usable a C5 petroleum resin, a C9 petroleum resin, a dicyclopentadiene petroleum resin, a rosin petroleum resin, a polyterpene resin, a terpene phenol resin and the like. The tackifier component is used in a range between 50 and 90 weight part in a total amount 100 weight part of the tackifier component and the softener component.

[0028] As the softener component, there can be preferably usable a process oil, a mineral oil, various kinds of plasticizer, a polybutene, a liquid tackifier resin and the like in which a softening point is equal to or lower than 10 °C and an average molecular weight is between 200 and 700. The softener component is used in a range between 10 and 50 weight part in a total amount 100 weight part of the tackifier component and the softener component.

[0029] As the antioxidant, there can be used a phenol antioxidant, an amine antioxidant, a phosphor antioxidant, a benzimidazole antioxidant, and the like. The antioxidant is used in a range between 0.5 and 3 weight part in the case that a total amount of the tackifier component and the softener component is set to 100 weight part.

[0030] Further, in addition to the components mentioned above, any components which are normally employed in the adhesive agent may be appropriately added in a range not adversely effecting the desired effect of the present invention.

[0031] Further, an amount of application of the adhesive agent is set to 25 g/m^2 to 50 g/m^2, and is preferably set to 25 g/m^2 to 40 g/m^2.

[0032] If the adhesive agent is applied more than 50 g/m^2, the adhesive agent often runs over from an end portion of the roll due to the pressure at a time when the adhesive sheet is taken up in a roll shape. In particular, in the case that the adhesive agent is kept for a long time at a high temperature equal to or more than 30 degrees, the protrusion from the end portion of the roll becomes significant.

[0033] As the sheet base material, there can be used papers such as a glassine paper, a white paper, a kraft paper and the like. In particular, in the case that a stretch paper having a high tearing strength is used, it is possible to easily peel the soiled adhesive sheet without tearing the adhesive sheet even when fibrous dust such as hair or the like is wound around the adhesive roll. Further, as the sheet base material in addition to the paper, there can be used films such as a polyester, a polypropylene, and the like. In the case that the hot melt adhesive agent is used as the adhesive agent, it is necessary to use a heat resisting film.

[0034] Further, a silicone release agent is applied to a back face of the adhesive surface of the adhesive sheet. At this time, the release agent is applied onto a filler laminated by a low density polyethylene in correspondence to the sheet base material. In this case, the kind of the release agent and the filler resin used at this time is not specified to them.

[0035] Further, a commercially available adhesive roll cleaner is structured by winding the adhesive sheet around a core tube such as a paper tube or the like in a state in which an adhesive surface is directed to an outer side. In the wound adhesive sheet, a perforated line is provided in an entire length in a direction perpendicular to a winding direction and a slit is provided in a roll width end portion in the perpendicular direction, whereby the wound off adhesive sheet can be cut by using both hands. However, it is hard to cut off the adhesive sheet all along the width direction neatly, and a cutting operation itself is complicated. In particular, in the case that the adhesive roll is attached to the cleaning device in accordance with the present embodiment, this cutting operation becomes more complicated. Accordingly, it is desirable to employ an adhesive roll of a type in which the adhesive sheet of the adhesive roll is previously cut one roll by one roll and the cut adhesive rolls are independent. Further, in the case of using the adhesive roll of the type in which the independent adhesive sheets are wound spirally around the core tube, it is possible to easily peel off the soiled sheet spirally only by picking a sharp leading end portion of the narrow adhesive sheet and pulling up the leading

end portion. Accordingly, this type of adhesive roll is desirable.

[0036] Further, it is apparent on the basis of the following experimental result that a lower limit of the numerical value based on the tilt type ball tack of the adhesive surface in the adhesive sheet 21A of the adhesive roll 21 in accordance with the present invention should be set to 10. In this case, if the numerical value based on the tilt type ball tack is larger than 30, the adhesive force is too strong, an operability after the adhesive roll 21 is attached to the cleaning device is deteriorated, and it is hard to handle the adhesive roll 21 due to stickiness of the adhesive roll 21 to a hand or the like, at a time when the adhesive roll 21 is attached to the cleaning device 10. Therefore, an upper limit of the numerical value based on the tilt type ball tack is set to 30.

[0037] (1) The adhesive roll is prepared in which the numerical value based on the tilt type ball tack corresponding to the tack force of the adhesive roll is set to each of the following examples 1 to 3 and the following comparative examples 1 and 2.

[0038] In this case, the test equipment and the test method of the numeric value based on the tilt type ball tack are set as follows on the basis of the regulation of the adhesive tape and adhesive sheet test method in Japanese Industrial Standard (JIS) Z0237 (refer to FIG. 3).

1. Test equipment 30 (ball rolling device 31, test ball 32)

[0039] The ball rolling device 31 used in the tilt type ball tack test employs a ball tack tester MODEL VR-5710 (trade name) manufactured by Ueshima Co., Ltd.

[0040] The material of the test ball 32 used for the test is constituted by a second kind (SUJ2) of a high-carbon chromium ball-bearing steel defined in JIS G4805, and the size and the number of the ball 32 are constituted by thirty one kinds except for those belonging to 5/64, 7/64, 9/64, 15/64 and 17/64 in the size between 1/16 and 1 of the "nominal designation of ball" defined in JIS B150.

2. Test method

(a) Size and number of test piece 33

[0041] The size of the adhesive sheet 21A constituting the adhesive roll 21 corresponding to the test piece 33 is set to a width 15 mm and a length 300 mm, and four sheets of adhesive sheets 21A are collected.

(b) Test environment

[0042] The test environment is as follows. After the test equipment 30 and the test piece 33 are left under the environment of 20 °C/RH 53% for one hour, the test is carried out under the environment.

(c) Fixing of test equipment 30

[0043] The ball rolling device 31 is horizontally fixed onto a measurement table by using a level. An angle θ of an inclined plate 34 is set to 30 degrees.

(d) Mounting method of test piece 33 and cleaning of test ball 32

[0044] FIG. 3 shows an outline of the test equipment 30 to which the test piece 33 is mounted.

[0045] The test piece 33 is mounted to a predetermined position on the inclined plate 34 by using the adhesive tape fastening an upper end and a lower end of the test piece 33, in a state in which the adhesive surface is set to be directed upward.

[0046] Next, a polyethylene terephthalate (PET) film (transparent film defined in JIS C2318: length equal to or more than 100 mm, thickness 25 μm) for a runway 35 is attached to a predetermined position of the test piece 33.

[0047] The PET film is attached in such a manner that no bubble makes an intrusion into the film and no wrinkles are generated, and the film should not be strongly crimped.

[0048] Further, it is necessary to pay attention in order to prevent the test piece 33 from floating, getting wrinkled or being bent, at a time of mounting the test piece 33 onto the inclined plate 34. If the edge is curled and floated, the curled and floated portion is fixed onto the plate by the other adhesive tape.

[0049] Further, the test piece 33 and the PET film as the runway 35 are mounted such that a runway distance L of the test ball 32 from a start position S becomes 100 mm, and a measurement area P in the test piece 33 becomes 100 mm from the lower end of the runway 35.

[0050] With regard to the cleaning of the test ball 32, in the present test, the test is carried out after the ball 32 is

cleaned in accordance with the test plate cleaning method described in JIS Z0237. In this case, a solvent (for example, n-hexane) described in JIS Z0237 is employed as the solvent used for cleaning.

(e) Details of test method

[0051] With regard to one of four test pieces 33, the maximum ball 32 is searched and found in the balls 32 which run along the runway 35 and stop between the contact point with the measurement area P of the test piece 33 and 100 mm apart therefrom (in which the balls do not move for five seconds or more).

[0052] Next, with regard to the remaining three test pieces 33, it is confirmed that the found ball stops within the measurement portion (100 mm), by rolling the following total three balls one by one, (in total three times); the maximum ball 32 found in the first test piece 33, and the balls respectively having one larger and smaller sizes, three balls in total.

(f) Arrangement of test results

[0053] The test results are arranged with regard to the remaining three test pieces 33 except the first sheet. The test results are expressed by the number of the found maximum ball 32, and an average value of three sheets of test pieces 33 is determined.

[Example 1]

[0054] A base material sheet is obtained by laminating a polyethylene (15 μm) on a bleached kraft stretch paper (manufactured by Oji Paper Co., Ltd., and having weight 75 g/m^2), and applying a treatment for applying a silicone release agent onto the polyethylene laminate. A single-sided adhesive sheet is obtained by coating the SIS (styrene isoprene styrene block copolymer) adhesive agent at a basic weight 14 g/m^2 on a back face of the surface to which the treatment of applying the release agent for the base material sheet is applied. The core tube is prepared by winding the commercially available adhesive tape around the paper tube having an inner diameter 1 inch and a thickness 1.4 mm in a state in which the adhesive surface thereof is directed to an outer side, and adjusting the size to a size having a width 195 mm and an outer diameter 34 mm. The adhesive roll is obtained by cutting the adhesive sheet to every 60 mm widths and spirally winding the cut adhesive sheets around the core tube in such a manner that the adhesive surface is directed to the outer side. The tack force of the adhesive roll is 10 in the numerical value based on the tilt type ball tack mentioned above.

[Example 2]

[0055] A single-sided adhesive sheet is obtained by coating the SIS adhesive agent at a basic weight 23 g/m^2 on the back face of the surface to which the treatment of applying the release agent for the base material sheet in the example 1 is applied. The adhesive roll is obtained by cutting the adhesive sheet to every 60 mm widths and spirally winding the cut adhesive sheets around the core tube in the example 1 in such a manner that the adhesive surface is directed to the outer side. The tack force of the adhesive roll is 14 in the numerical value based on the tilt type ball tack mentioned above.

[Example 3]

[0056] A single-sided adhesive sheet is obtained by coating the SIS adhesive agent at a basic weight 32 g/m^2 on the back face of the surface to which the treatment of applying the release agent for the base material sheet in the example 1 is applied. The adhesive roll is obtained by cutting the adhesive sheet to every 60 mm widths and spirally winding the cut adhesive sheets around the core tube in the example 1 in such a manner that the adhesive surface is directed to the outer side. The tack force of the adhesive roll is 17 in the numerical value based on the tilt type ball tack mentioned above.

[Comparative example 1]

[0057] The adhesive roll is obtained by winding off the adhesive sheet from the commercially available adhesive roll (manufactured by Helmac Products Co., trade name: Lint Pic-Up Adhesive Roller, of spirally wounded type), and spirally winding the adhesive sheet around the core tube in the example 1 in such a manner that the adhesive surface is directed to the outer side. The tack force of the adhesive roll is 4 in the numerical value based on the tilt type ball tack mentioned above.

[Comparative example 2]

[0058] The adhesive roll is obtained by winding off the adhesive sheet from the commercially available adhesive roll (manufactured by Nitoms Co., Ltd., trade name: Spare tape for Korokoro Flooring Cleaner), and winding the adhesive sheet around the core tube in the example 1 in such a manner that the adhesive surface is directed to the outer side. The tack force of the adhesive roll is 9 in the numerical value based on the tilt type ball tack mentioned above.

(2-1) Hair collection rate test method A (Initial state: no dirt due to model attachment on surface of adhesive sheet)

[0059]

(1) As an initialization of the carpet, a cleaner with a rotary brush is used to clean the carpet having a cleaning area 50 cm x 50 cm (commercially available cut pile carpet [Sun Harmony (trade name) manufactured by Sangetsu, fiber: acrylic 85 %, nylon 15 %, pile length: 8 mm, density: gage 1/10, stitch 14.5]) in a carpet mode.
(2) As a scattering method of hair, ten hairs each having a length of 10 cm are evenly scattered on the carpet.
(3) As a cleaning method of the carpet, an indirect collection type cleaning device in which the adhesive roll is not directly in contact with the cleaning surface is used, and is moved back and forth on the carpet five times. The collection rate (%) is calculated from the number of the hairs attached to the adhesive sheet in accordance with the following formula.

$$\text{Collection rate (\%)} = (\text{number of attached hair})/(\text{number of scattered hair}) \times 100$$

(4) The items (1) to (3) are performed three times, and an average value thereof is set as the hair collection rate.

(2-2) Hair collection rate test method B (model dirt exists on surface of adhesive sheet)

[0060] As a model dirt, a wool yarn, made of an acrylic fiber 100 % and cut into 1 to 2 mm and unknitted, is used. The test mentioned in the item (2-1) is performed by using the adhesive roll in which 0.033g of the cut fiber corresponding to the model dirt is evenly scattered on the surface of the adhesive sheet.

(2-3) Hair collection rate test method C (initial dirt exists on surface of adhesive sheet)

[0061] As a model dirt, a wool yarn, made of an acrylic fiber 100 % and cut into 1 to 2 mm and unknitted, is used. The test mentioned in the item (2-1) is performed by using the adhesive roll in which 0.065g of the cut fiber corresponding to the model dirt is evenly scattered on the surface of the adhesive sheet.

(2-4) Bread crumb collection rate test method A

[0062]

(1) As an initialization of the carpet, a cleaner with a rotary brush is used to clean the carpet having a cleaning area 50 cm $\times$ 50 cm (commercially available cut pile carpet [Sun Harmony (trade name) manufactured by Sangetsu, fiber: acrylic 85.%, nylon 15 %, pile length: 8 mm, density: gage 1/10, stitch 14.5]) in a carpet mode.
(2) As a scattering method of bread crumb, 0.9 g of commercially available bread crumb classified to ϕ1.4 to 1.7 mm is evenly scattered on the carpet.
(3) As a cleaning method of the carpet, an indirect collection type cleaning device in which the adhesive roll is not directly in contact with the cleaning surface is used, and is moved back and forth on the carpet five times. The collection rate is calculated from the weight of the bread crumb attached to the adhesive sheet in accordance with the following formula.

$$\text{Collection rate (\%)} = (\text{amount of attached bread crumb})/(\text{amount of scattered bread crumb}) \times 100$$

(3) Test results

[0063] Arranging the test results, the following Table 1 is obtained.

Table 1

		Example 1	Example 2	Example 3	Comparative example 1	Comparative example 2
Numerical value based on tilt type ball stack		10	14	17	4	9
Collection rate of hair (%)	A	100	100	100	20	100
	B	50	90	100	20	50
	C	40	40	70	0	0
Collection rate of bread crumb (%)	A	20	45	57	3	13
A: use product in initial state (no model dirt exists on surface of adhesive sheet) B: use product in which 0.033 g cut fibers are evenly attached to whole surface of adhesive sheet C: use product in which 0.065 g cut fibers are evenly attached to whole surface of adhesive sheet (cut fiber: wool yarn made of acrylic fiber 100 % and cut into 1 to 2 mm and unknitted)						

[0064] As is apparent from this Table 1, it can be recognized that both of the hair collection rate and the bread crumb collection rate are remarkably improved in comparison with the comparative examples, by setting the lower limit of the numerical value based on the tilt type ball tack of the adhesive surface in the adhesive sheet 21A of the adhesive roll 21 in accordance with the present invention to 10. Further, as described above, since the upper limit of the numerical value based on the tilt type ball tack is set to 30, an operability after the adhesive roll 21 is attached to the cleaning device 10 is not deteriorated due to a too strong adhesive force, and it is not hard to handle the adhesive roll 21 due to stickiness of the adhesive roll 21 to a hand or the like, at a time when the adhesive roll 21 is attached to the cleaning device 10.

[0065] According to the present embodiment, the following effects can be obtained.

(1) The adhesive roll 21 is structured such that the adhesive sheet 21A is wound around the core 21B and the initial outer diameter of the adhesive roll 21 is small such as 40mm or less, whereby it is possible to make the cleaning device 10 compact. Since the adhesive roll 21 is not directly in contact with the surface to be cleaned, the other implanted fabrics such as the carpet or the like other than dust are not attached onto the surface of the adhesive roll 21 due to picking off or the like, so that even when the surface area of the adhesive roll 21 is small, the adhesive force does not become weak in a few moments. Accordingly, even when the outer diameter of the adhesive roll 21 is made small as mentioned above and the surface area is reduced, it is possible to increase a pick-up amount of dust by the adhesive roll and it is possible to increase the cleaning force maintaining area after the new adhesive sheet 21A is exposed.

(2) Since the adhesive roll 21 is not directly in contact with the surface to be cleaned, there is not a risk that the adhesive roll 21 is strongly adhered to the flooring or the like, whereby the adhesive roll 21 can roll thereon without increasing a risk that the adhesive roll 21 picks off the implanted fabrics such as the carpet or the like to injure the surface to be cleaned. Further, the amount of application of the adhesive agent on the base material 21B of the adhesive sheet 21A can be increased to an amount between 25 and 50 g/m^2, thereby increasing the adhesive force. Accordingly, it is possible to increase the amount of dust picked up by the adhesive roll and it is possible to increase the cleaning force maintaining area after the new adhesive sheet 21A is exposed.

(3) Since the numerical value based on the tilt type ball tack of the adhesive surface in the adhesive sheet 21A of the adhesive roll 21 in accordance with the present invention is set to the range between 10 and 30, the adhesive force in the adhesive sheet 21A of the adhesive roll 21 is not too strong, it is possible to maintain the force of attaching and holding the dirt such as the hair or the like, and it is possible to increase the cleaning area.

(4) Since the horizontal width of the adhesive sheet 21A along the axial direction of the adhesive roll 21 is set to a wide width between 170 and 300mm, it is possible to increase the floor area which can be cleaned by one rotation of the adhesive roll 21, and it is possible to improve the cleaning efficiency.

(5) The dust scraped up by the scraping up body 16 is immediately adhered to the side of the adhesive roll 21 to be removed, hairs or the like are not wound around the scraping up body 16 and are not left there, the scraping up body 16 is always cleaned due to the contact with the adhesive roll 21, and thereby a cleaning performance thereof is stably maintained.

(6) The contact rotating body 18 mounts the adhesive roll 21 thereon and securely rotates the adhesive roll 21 in an interlocking manner. Accordingly, it is possible to always make the adhesive surface of the adhesive roll 21

being in contact with the scraping up body 16 due to its rotation, and it is possible to securely adhere and pick up dust scraped up by the scraping up body 16 by the new adhesive surface of the adhesive roll 21. At this time, since the adhesive roll 21 is riding over the scraping up body 16 and the contact rotating body 18, it is possible to attach any kind of adhesive rolls 21 having several kinds of large and small outer diameters to the cleaning device 10. Accordingly, a freedom on manufacturing can be given to the outer diameter of the adhesive roll 21, and it is possible to select the adhesive roll 21 having a proper outer diameter in correspondence to the floor condition.

(7) The contact rotating body 18 presses dust adhered and picked up by the adhesive roll 21 to the adhesive surface of the adhesive roll 21 to fix the pick-up state of dust. In this case, dust which the contact rotating body 18 picks up due to the contact with the floor surface is adhered and picked up by the adhesive roll 21, and the adhesive roll 21 keeps the contact rotating body 18 clean.

(8) The dust which the scraping up body 16 scrapes up from the deep portion in the fiber of the carpet, and dust which the scraping up body 16 scrapes rearward from the hard flat surface of the flooring are also scooped up by the dustpan portion 23 in the rear portion of the scraping up body 16 so as to be securely guided in a direction of the adhesive roll 21, whereby it is possible to improve a dust collecting performance.

(9) Since the scraping up body 16 is provided with the tire portion 16B, the tire portion 16B is pressed to the floor surface due to the weight of the cleaning device 10 to rotate, thereby securely rotating the scraping up body 16. Since the diameter of the scraping up body is made larger than the diameter of the tire, the scraping up portion 16A strongly scrapes up dust due to the scraping up force on the basis of a restitution of an elastic deflection to improve the scraping up performance, and dust in the deep portion of the carpet fiber can be well scraped out.

(10) The contact rotating body 18 is provided with the elastic body surface, whereby it is possible to well press and fix dust adhered and picked up in the adhesive roll 21 to the adhesive surface of the adhesive roll 21.

(11) In the case that the adhesive force of the adhesive roll 21 is strong, since the adhesive roll 21 and the contact rotating body 18 rotate together, it is hard to rotate and the operation becomes heavy. Accordingly, it is possible to lighten the rotation by providing at least two concavo-convex portions on the surface of the contact rotating body 18. That is, by providing the concavo-convex portion in the contact rotating body, it is possible to form a gap between the adhesive roll 21 and the contact rotating body 18, whereby it is possible to reduce the contact area between the both and it is possible to improve an operability. Since dust attached to the contact rotating body 18 is transferred to the adhesive roll 21 without a close attachment between the adhesive roll 21 and the contact rotating body 18, a height of the concavo-convex portion is preferably between 0.1 and 0.5 mm in the case that the contact rotating body 18 is made of polypropylene, and more preferably between 0.2 and 0.4 mm. Further, in the case that the contact rotating body 18 is made of silicone rubber, the height may be lower than the above values. In this case, the concavo-concave portion corresponds to a structure obtained by applying a rib, a convex portion, a recess portion, a crimping surface, or the like to the surface of the contact rotating body 18.

[0066] As the adhesive roll used in the present invention, a structure obtained by detachably covering a cylindrical sheet on a core roll may be used. At this time, an original form of the cylindrical sheet is formed in a sheet type envelope-like sheet, and a lot of envelope-like sheets can be laminated with each other to be stored.

[0067] Further, in accordance with the present invention, the scraping up body is not limited to the brush, and may be constituted by a sponge, a rubber blade, an elastomer, an elastic projection body, or the like.

[0068] Further, in accordance with the present invention, the contact rotating body is not limited to the roll body, and may be constituted by a tire or the like.

[0069] As mentioned above, according to the present invention, it is possible to increase the cleaning force maintaining area after the new adhesive sheet of the adhesive roll is exposed, while making the cleaning device compact. Further, according to the present invention, it is possible to make the adhesive force of the adhesive roll strong without injuring the surface to be cleaned, thereby increasing the cleaning force maintaining area after the new adhesive sheet is exposed. Further, according to the present invention, it is possible to increase the floor area that can be cleaned by one rotation of the adhesive roll, thereby improve the cleaning efficiency.

Claims

1. An adhesive roll for a cleaning device comprising:

a frame;
a scraping up body;
a contact rotating body;
an adhesive roll;
the scraping up body and the contact rotating body being rotatably supported to the frame in parallel; and

the adhesive roll astride the scraping up body and the contact rotating body being put on the scraping up body and the contact rotating body,

wherein an initial outer diameter of the adhesive roll is set to be equal to or less than 40 mm.

2. An adhesive roll for a cleaning device comprising:

a frame;
a scraping up body;
a contact rotating body;
an adhesive roll;
the scraping up body and the contact rotating body being rotatably supported to the frame in parallel; and
the adhesive roll astride the scraping up body and the contact rotating body being placed on the scraping up body and the contact rotating body,

wherein an amount of application of an adhesive agent on a base material of an adhesive sheet constituting the adhesive roll is set to be within a range between 25 and 50 g/m^2.

3. An adhesive roll for a cleaning device comprising:

a frame;
a scraping up body;
a contact rotating body;
an adhesive roll;
the scraping up body and the contact rotating body being rotatably supported to the frame in parallel; and
the adhesive roll astride the scraping up body and the contact rotating body being placed on the scraping up body and the contact rotating body,

wherein a numerical value based on a tilt type ball tack of an adhesive surface in an adhesive sheet constituting the adhesive roll is set to be within a range between 10 and 30.

4. An adhesive roll for a cleaning device as claimed in any one of claims 1 to 3, wherein a horizontal width of an adhesive sheet constituting the adhesive roll is set to be within a range between 170 and 300mm.

5. An adhesive roll for a cleaning device as claimed in any one of claims 1 to 4, wherein the adhesive roll is constructed by winding an adhesive sheet.

6. An adhesive roll for a cleaning device comprising:

the cleaning device having at least a scraping up body and an adhesive roll; and
the adhesive roll not being directly in contact with a cleaning surface for the cleaning device,

wherein the adhesive roll is structured by winding an adhesive sheet therearound, and

an amount of application of an adhesive agent on a base material of the adhesive sheet is set to be within a range between 25 and 50 g/m^2.

7. An adhesive roll for a cleaning device comprising:

the cleaning device having at least a scraping up body and an adhesive roll; and
the adhesive roll not being in direct contact with a cleaning surface for the cleaning device,

wherein the adhesive roll is structured by winding an adhesive sheet therearound, and

a numeric value based on a tilt type ball tack of an adhesive surface in the adhesive sheet is set to be within a range between 10 and 30.

FIG.1

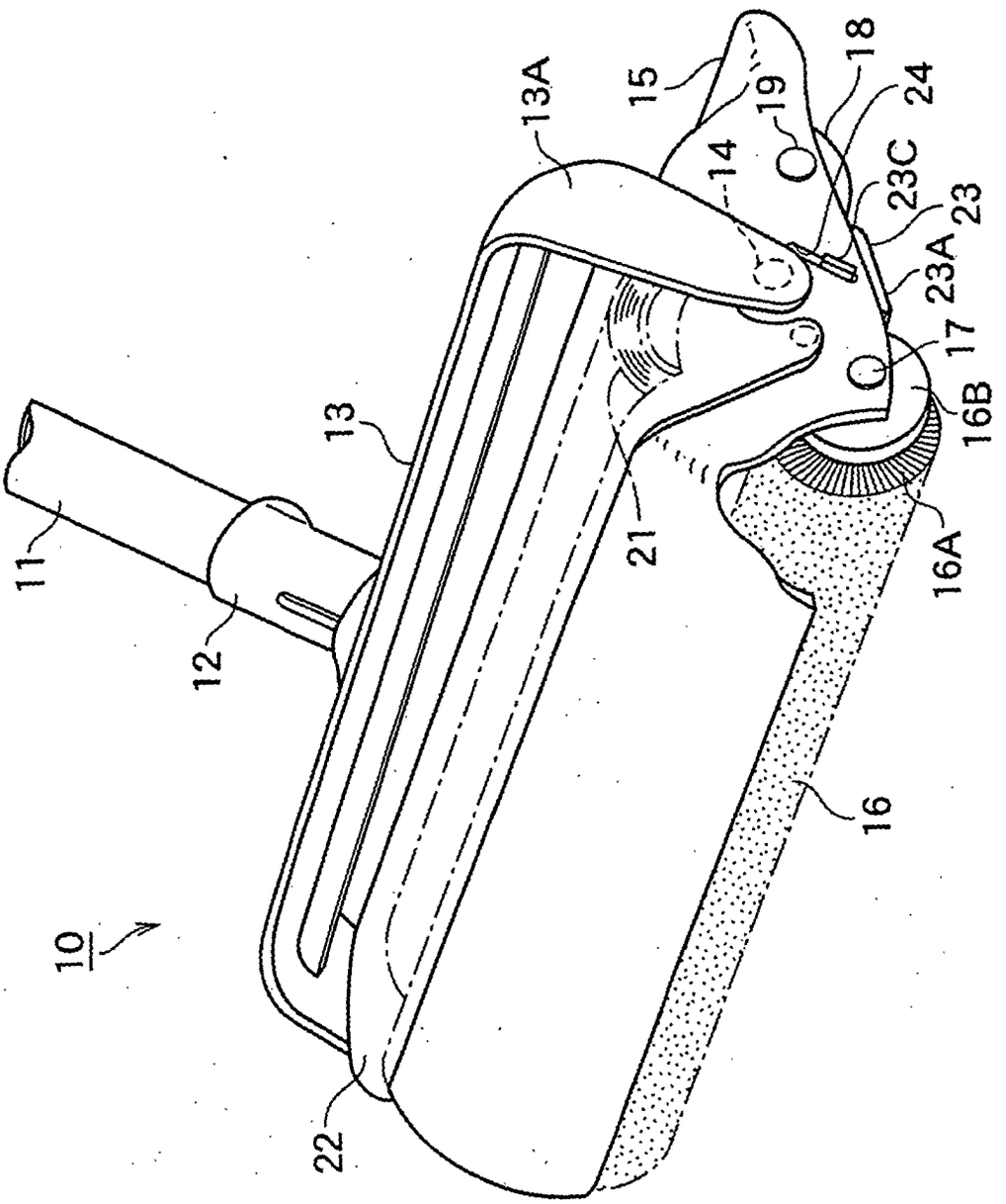


FIG.2

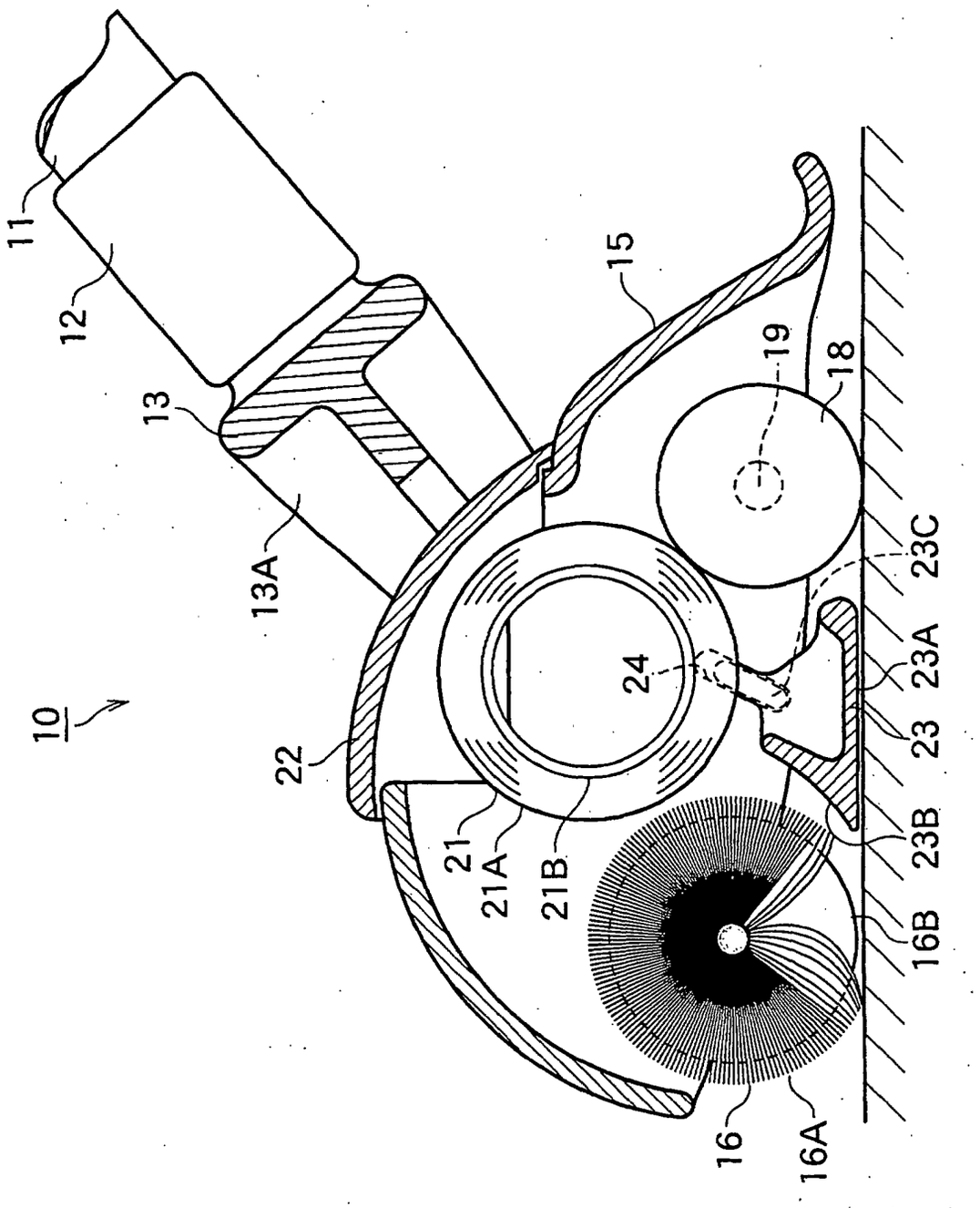
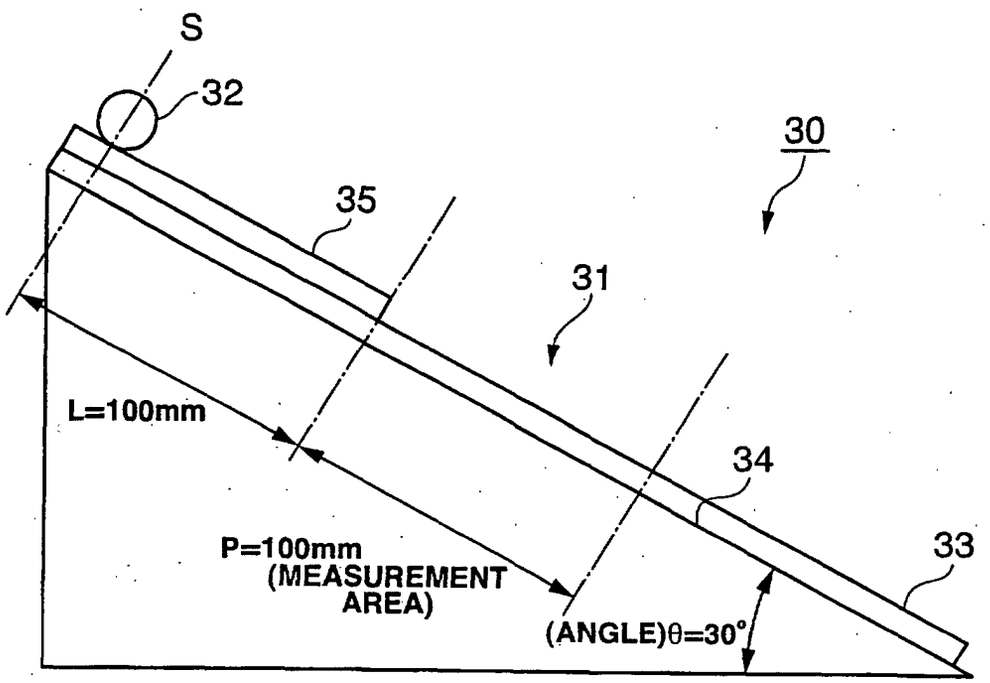


FIG.3



INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/00979

A. CLASSIFICATION OF SUBJECT MATTER
Int.Cl[7] A47L11/22

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
Int.Cl[7] A47L11/22, 11/24, 11/32, 25/00

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched
Jitsuyo Shinan Koho 1922-1996 Jitsuyo Shinan Toroku Koho 1996-2002
Kokai Jitsuyo Shinan Koho 1971-2002 Toroku Jitsuyo Shinan Koho 1994-2002

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	JP, 02-12363, U (Nagaoka Corp.), 25 January, 1990 (25.01.90), (Family: none)	1-7
X	JP, 63-163767, U (Go FUKUHARA), 25 October, 1988 (25.10.88), (Family: none)	1-7
Y	JP, 10-5159, A (Kao Corp.), 13 January, 1998 (13.01.98), (Family: none)	1-7
Y	JP, 09-253025, A (Dainihon Jochugiku Co., Ltd. and another), 30 September, 1997 (30.09.97), (Family: none)	1-7
Y	JP, 59-139261, U (Hirota K.K.), 18 September, 1984 (18.09.84), (Family: none)	1-7

☒ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:
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Date of the actual completion of the international search	Date of mailing of the international search report
06 March, 2002 (06.03.02)	19 March, 2002 (19.03.02)
Name and mailing address of the ISA/ Japanese Patent Office	Authorized officer
Facsimile No.	Telephone No.

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INTERNATIONAL SEARCH REPORT

International application No.
PCT/JP02/00979

C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
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A	JP, 61-71433, U (Rohm Co., Ltd.), 15 May, 1986 (15.05.86), (Family: none)	1-7
A	JP, 2000-200959, A (Yugengaisha PCB Planning), 19 May, 2000 (19.05.00), (Family: none)	1-7

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