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CLEANER DEVICE ✓

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The present invention relates generally to a cleaner device and, more particularly, to a cleaner device such as a broom, a sweeper and the like, which is adapted to be detachable equipped with a cleaning sheet (inclusive of a whipping or sweeping sheet) and used to clean a floor or the like.

The device of such type is known, for example, from Japanese Patent Application Laid-Open Publication No. Hei6-78872 according to which the cleaner device comprises a plate-like head detachably carrying a cleaning sheet and a stick pivotally on an upper surface of the plate-like head. The plate-like head presents a rectangular shape having its long sides transversely with respect to its course of cleaning operation and is provided on its upper surface with left and right clamp means for clamping the cleaning sheet to the upper surface and on its bottom surface with a plurality of elastic projections vertically extending down. The cleaning sheet covers the bottom surface of the plate-like head and its marginal region extending outward beyond a peripheral edge of the plate-like head is folded back onto the upper surface of the plate-like head and clamped thereto.

by the clamp means.

For the cleaner device of such type, it is always expected by a user that the area of the cleaning sheet covering the bottom surface of the plate-like head could be used as fully and efficiently as possible to catch dust and dirt on a house floor and the like. Dust and dirt on the floor are of infinite variety from floatably light dust like fleece or fluff to sticky dirt lying flat on the floor which cannot be caught unless they are scratched off. It is also expected by a user, therefore, that the cleaner device could catch the whole these dust and dirt infinite variety with every stroke of wiping or sweeping.

The above-mentioned cleaner device of well known art can meet to some degree the demand for effective utilization of the cleaning sheet because the elastic projections are adapted to be deformed by irregularity of the floor surface. However, in order that the cleaner device is able to scratch off any sticky dirt lying flat on the floor, these projections should be sufficiently hard to resist a significant deformation. With the cleaner device having such hard projections, the floatably light dust like fleece or fluff would accumulate along the peripheral edge of the plate-like head equipped with the cleaning sheet and

prevented from entering under the cleaning sheet. Provided with the soft projections, on the contrary, the cleaner device would be adapted to catch the light dust but not adapted to scratch off the sticky dirt. In any case, the user's demand has been partially but not completely satisfied by the cleaner device of prior art.

In view of the problem as has been described above, it is a principal object of the invention to provide a cleaner device using a cleaning sheet allowing the floatably light dust and the sticky dirt lying flat on the floor to be simultaneously caught and, in addition, allowing the area of the cleaning sheet to be utilized as fully as possible.

The object set forth above is achieved, according to the invention, by a cleaner device comprising a rectangular plate-like head, a stick mounted on an upper surface of the plate-like head, a plurality of elastic projections arranged on a bottom surface of the plate-like head intermittently along respective pairs of long and short sides of the plate-like head, and a cleaning sheet detachably attached to the plate-like head so as to be maintained in contact with lower ends of the projections, the cleaner device being characterized by configuration as well as distribution of the

elastic projections such that their elastic deformability gradually increases from a middle line of the plate-like head bisecting the pair of short sides toward the pair of long sides under a horizontal pressure exerted thereon in a direction orthogonal to the middle line.

In a preferable embodiment of the invention, the plurality of elastic projections are substantially uniform in a cross-sectional shape and have their lower ends substantially in a common plane; and wherein heights of the elastic projections as measured from said plane to their base ends gradually increase from said middle line toward said long sides.

In a preferable embodiment of the lower ends of the plurality of elastic projections lie substantially in a common plane and the heights of the elastic projections as measured from said plane are uniform; and wherein thicknesses of the elastic projections as measured in a direction orthogonal to said middle line gradually decrease from said middle line toward said long sides.

In a preferable embodiment of the invention, as viewed in a section of the plate-like head taken in a direction orthogonal to said middle line, a line connecting the lower

ends of the elastic projections describes a downward directed convex curve.

With the cleaner device according to the invention, even floatably light dust can enter under the cleaning sheet attached to the rectangular plate-like head without being obstructed by the peripheral edge of the elastic bottom member and reliably caught by the cleaning sheet, since, of the plural elastic projections forming the bottom surface of the rectangular plate-like head connected to the stick, those distributed in the proximity of the respective long sides of the plate-like head are readily deformed. On the other hand, the projections distributed in the proximity of the middle line bisecting the short sides of the plate-like head are suitable for scratching off sticky dirt lying flat on the floor, since these projections are relatively thick and correspondingly resistant to deformation.

According to the alternative embodiment in which the projections distributed in the proximity of said middle line extend downward further than the remaining projections so that the cleaning sheet attached to the plate-like head describes the downward directed convex curve, the region of the plate-like head in the proximity of the forward long side

of the plate-like head is easily spaced from the floor and thereby dust and dirt of various types can be introduced under the cleaning sheet.

Fig. 1 is a perspective view of a cleaner device according to the invention;

Fig. 2 is a bottom view of the cleaner device;

Fig. 3 is a sectional view taken along a line III-III in Fig. 1;

Fig. 4 is a view similar to Fig. 3 showing an alternative embodiment of the invention; and

Fig. 5 is a view similar to Fig. 3 showing another alternative embodiment of the invention.

Details of a cleaner device according to the invention will be more fully understood from the following description given hereunder in reference with the accompanying drawings.

A cleaner device 1 shown by Fig. 1 in a perspective view comprises a plate-like head 2, a stick 4 connected by a universal joint 3 to the plate-like head 2 and a disposable cleaning or wipping or sweeping sheet 5 (hereinafter referred to "cleaning sheet") which covers a bottom surface of the plate-like head 2 with its marginal portion extending along

opposite long sides of the plate-like head 2 to be folded back onto an upper surface 10 of the plate-like head 2, as shown by imaginary lines.

The plate-like head 2 is configured in a rectangle and comprises a main body 8 made of hard plastic material having a pair of long sides 7A extending transversely with respect to the course of cleaning operation and a pair of short sides 7B, and an elastic bottom member 9 extending to cover the bottom surface as well as a peripheral portion of the main body 8. The upper surface 10 of the main body 8 is centrally provided with a pair of projections 11 arranged transversely side by side so as to make a part of the universal joint 3. Symmetrically with the pair of projections 11, the upper surface 10 of the plate-like head 2 is further provided with a pair of clamping members 13 shown in their closed positions. These clamping members 13 may be opened in a direction as indicated by an arrow P around their inner ends 4 pivotally mounted on the main body 8 by raising these clamping members 13 with their outer ends 15 held by a user's fingers and may be closed again, after the marginal portions of the cleaning sheet 5 has been folded back onto the upper surface 10 of the main body 8, to clamp the cleaning sheet 5 between the respective clamping members 13 and the upper

surface 10 of the main body 8.

The stick 4 is made of hard plastic material and pivotable in two directions as indicated by double-headed arrows Q and R.

Figs. 2 and 3 are a plan view of the elastic bottom member 9 as viewed from below and a sectional view of the elastic bottom member 9 taken along a line III-III. In Fig. 2, projections 21 as will be described later are partially left out. The elastic bottom member 9 is shaped in a rectangle defined by pairs of long and short sides 9A, 9B extending in parallel to the pairs of long and short sides 7A, 7B, respectively. The elastic bottom member 9 is provided along its peripheral edge with a groove 17 adapted to be engaged with the peripheral edge of the main body 8 and thereby the elastic bottom member 9 is integrally assembled with the main body 8. A lower surface of the elastic bottom member 9 is provided with a plurality of projections 21 intermittently arranged in parallel to the long and short sides 9A, 9B and extending downward. These projections 21 have their lower ends 22 lying substantially in a common plane X and each of them has a height as measured from the plane X to a base end 23 of this projection 21, a width W as

measured along the long side 9A and a thickness T as measured along the short side 9B. A cross-sectional shape of each projection is a square defined by the width W and thickness T or a circle inscribed in this square. Each pair of adjacent projections 21 are spaced apart from each other by distances m and n along the long side 9A and the short side 9B, respectively. The elastic bottom member 9 is preferably defined by the long side of 200 ~ 800mm and the short side 9B of 50 ~ 200mm. Of the projections 21, those arranged in the proximity of the middle line D-D bisecting the short sides 9A have relatively large thicknesses T and such thicknesses T gradually decrease toward the long sides 9A. The thickness T is preferably $1 \leq T \leq 5\text{mm}$ and $T \leq W$. Preferably, the height H of the projection 21 is 0.5 ~ 5mm and the distances m, n are 1 ~ 7mm. The elastic bottom member 9 may be molded selectively from thermoplastic material, elastomer, synthetic rubber, etc., so far as desired softness and elasticity are obtained.

The cleaner device 1 constructed as has been described above is now equipped with the cleaning sheet 5 made of nonwoven fabric and impregnated with specified oily agent as shown by Fig. 1 and alternately moved in directions as indicated by arrows Y and Z, i.e., in the direction

orthogonal to the long sides 9A to rub the floor. The relatively thin projections 21 distributed in the proximity of the long sides 9A are readily crooked as the cleaner device is moved and thereby allow floatably light dust to enter under the cleaning sheet 5 and to be caught by the cleaning sheet 5. On the other hand, sticky dirt lying flat on the floor is scratched by the projections 21 distributed in the proximity of the middle line D-D and caught by the cleaning sheet 5, since these projections 21 distributed in the proximity of the middle line D-D are relatively thick and not readily deformed.

Fig. 4 is a view similar to Fig. 3 showing an alternative embodiment of the invention. According to this alternative embodiment of the cleaner device 1, the heights H of the projections 21 on the elastic bottom member 9 as measured from the plane X to the base ends of the projections 21 gradually increase from the middle line D-D toward the respective long sides 9A. As the width W and the thickness T are dimensioned so as to be substantially uniform for all the projections 21, alternate movement of the cleaner device 1 in the directions Y and Z causes the projections 21 distributed in the proximity of the respective long sides 9A to be readily crooked and thereby facilitates the floatably light

dust to enter under the cleaning sheet 5. The projections 21 of smaller heights distributed in the proximity of the middle line D-D, on the other hand, are not readily crooked and able to rub the floor with a frictional force sufficient to scratch off sticky dirt lying flat on the floor.

Fig. 5 is a view similar to Fig. 3 showing another alternative embodiment of the invention. In the cleaner device 1 according to this embodiment, the projections 21 distributed in the proximity of the middle line D-D extend downward further than the remaining projections 21 so that the cleaning sheet 5 (partially shown by imaginary lines) attached to the plate-like head 2 describes a downward directed convex curve W which is symmetric with respect to the middle line D-D. The heights H of the projections 21 as measured from the convex curve W are uniform and their thicknesses T gradually decrease from the middle line D-D toward the respective long sides 9A. The cleaner device 1 according to this embodiment allows relatively bulky dust to enter under the cleaning sheet 5 and to be easily caught by the cleaning sheet 5, since not only the projections 21 distributed in the proximity of the respective long sides 9A are readily crooked but also the region of the elastic bottom member in the proximity of the forward long side 9A is easily

spaced from the floor F as shown.



What is Claimed is:

1. A cleaner device comprising a rectangular plate-like head, a stick mounted on an upper surface of the plate-like head, a plurality of elastic projections arranged on a bottom surface of the plate-like head intermittently along respective pairs of long and short sides of the plate-like head, and a cleaning sheet detachably attached to the plate-like head so as to be maintained in contact with lower ends of the elastic projections, the cleaner device being characterized by configuration as well as distribution such that their elastic deformability gradually increases from a middle line of the plate-like head bisecting the pair of short sides toward the pair of long sides under a horizontal pressure exerted thereon in a direction orthogonal to said middle line.

2. A cleaner device according to Claim 1, wherein the plurality of elastic projections are substantially uniform in a cross-sectional shape and have their lower ends substantially in a common plane; and wherein heights of the elastic projections as measured from said plane to their base ends gradually increase from said middle line toward said



long sides.

3. A cleaner device according to Claim 1, wherein the lower ends of the plurality of elastic projections lie substantially in a common plane and the heights of the elastic projections as measured from the plane are uniform; and wherein thicknesses of the elastic projections as measured in a direction orthogonal to said middle line gradually decrease from said middle line toward said long sides.

4. A cleaner device according to Claim 1 or 3, wherein, as viewed in a section of the plate-like head taken in a direction orthogonal to the middle line, a line connecting the lower ends of said elastic projections describes a downward directed convex curve.