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CLEANER DEVICE

This invention relates to a cleaner device used to clean a surface, for example, of floor or wall with a wiping sheet detachably fastened thereto.

Japanese Utility Model Registration No. 3013149 disclosed an example of such a cleaner device. This well known device comprises a rectangular plate-like assembly, a stick mounted on a top surface of the plate-like assembly and a wiping sheet placed against a bottom surface of the plate-like assembly. Transversely opposite margins of the wiping sheet are folded back onto the top surface along transversely opposite side edges of the plate-like assembly and held thereon by clamping means formed on the top surface. Each of these clamping means comprises a combination of a linear arm mounted on the top surface of the plate-like assembly and a groove formed also in the top surface. The linear arm is adapted to be selectively raised or flattened so as to extend in parallel to long sides of the plate-like assembly in its flattened position and the groove extends in parallel to the long sides of the plate-like assembly so as to receive the flattened arm.

A soft and elastic sheet made of nonwoven fabric, paper

or long fibers tow is often employed as a base material for the wiping sheet. The base sheet is apt to be torn along the orientation of its component fibers if most of these component fibers are uniformly oriented. If the wiping sheet employing such base sheet is attached to the cleaner device of prior art with the fibers orientation extending in parallel to the clamping arms of the plate-like assembly, a force tending to tear the clamped wiping sheet along the clamping arms, i.e., in accordance with the fibers orientation is exerted to the wiping sheet as the plate-like assembly is moved orthogonally to the long sides of the plate-like assembly. Once the sheet has been torn along the arms, it is no more possible to maintain the wiping sheet fastened to the plate-like assembly and, even if this wiping sheet is still effective to wipe dust and/or dirt, it must be exchanged with a fresh sheet.

In view of the problem as has been described above, it is a principal object of the invention to provide a cleaner device so improved that a wiping sheet can be clamped on a cleaner device without any apprehension that the wiping sheet might be torn during its use.

The object set forth above is achieved, according to

the invention, by a cleaner device comprising a plate-like assembly having a top surface, a bottom surface and the outermost wall connecting these top and bottom surfaces with each other, a stick mounted on the top surface and clamping means formed on the top surface so that margins of a wiping sheet placed against the bottom surface may be folded back onto the top surface and clamped by the clamping means to fix the wiping sheet to the plate-like assembly, the cleaner device being characterized in that: each of the clamping means comprises an arm mounted by a hinge mechanism on the top surface so as to be selectively raised or flattened and having a first pair of locks in the form of male locks which vertically extend from the top surface downward toward the bottom surface as the arm is completely flattened and a second pair of locks in the form of female locks formed in the top surface adapted to receive the first pair of locks, respectively, and thereby to substantially hold the margins of the wiping sheet in cooperation with the first pair of locks as the arm is completely flattened; and both the first pair of locks and the second pair of locks extend at least partially along portions of the outermost edge respectively lying adjacent them and spaced from the respective portions of the outermost edge by a distance gradually increasing or

decreasing in a direction in which they extend.

Preferably, the first pair of locks in the form of male locks and the second pair of locks in the form of female locks extend so as to describe arcs which are convex toward the portions of the outermost edge respectively lying adjacent the first pair of locks and the portions of the outermost edge lying respectively adjacent the first pair of locks linearly extend.

Alternatively, all of the first pair of locks, the second pair of locks and the portions of said outermost edge respectively lying adjacent the first pair of locks may linearly extend.

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

Fig. 2 is a sectional view taken along a line II - II in Fig. 1;

Fig. 3 is a fragmentary perspective view showing the cleaner device with one of clamping arms being raised;

Fig. 4 is a schematic diagram showing the arrangement according to the invention in the proximity of a line IV - IV in Fig. 1, in which a dimensional relationship of the configuration is illustrated by arrows; and

Fig. 5 is a diagram similar to Fig. 4 showing another embodiment of the arrangement according to the invention.

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

A cleaner device 1 shown by Fig. 1 in a perspective view comprises a plate-like assembly 2 and a stick 4 mounted by a conventional universal joint 3 to the plate-like assembly 2. Referring to Fig. 1, a wiping sheet 5 is indicated by imaginary lines and the stick 4 is shown as partially broken away.

The plate-like assembly 2 is substantially shaped in a rectangle defined by a pair of opposite long sides 6A, 6B extending transversely as viewed in Fig. 1 and a pair of opposite short sides 7A, 7B. The plate-like assembly 2 comprises a main body 8 made of hard plastics and elastic member 9 covering a peripheral surface 21 as well as a bottom surface 10B (See Fig. 2) of the main body 8. A top surface 10A of the main body 8 defining a top surface of the cleaner device 1 is provided in the middle of a line dividing the pair of short sides 7A, 7B in two with a pair of projections 11 aligned with each other on the line for mounting of a

universal joint 3. In addition, the top surface 10A is formed with recesses 16 respectively extending between the respective short sides 7A, 7B and the respective projections 11, 11. The recesses 16 are shown in Fig. 1 as having their practically entire areas covered with respective clamping arms 13 which have, in turn, their respective inner ends 14 mounted by hinge mechanisms on the main body 8 so that these arms 13 may be selectively raised or flattened. Such operation of raising or flattening the respective arms 13 may be carried out by holding outer ends 15 of the respective arms 13 which are remotest from the associated inner ends 14 on the line dividing the short sides 7A, 7B. After the arms 13 have been raised in the direction as indicated by an arrow P, margins 45, 46 of the wiping sheet 5 may be placed above the respective recesses 16 followed by flattening the arms 13 to clamp the wiping sheet 5 between the top surface 10A and the arms 13 and thereby to fasten the wiping sheet 5 to the plate-like assembly 2.

The stick 4 is made of hard plastics and adapted to pivot in both directions as indicated by double-headed arrows Q, R.

Fig. 2 is a sectional view taken along a line II - II in Fig. 1, in which one of the arms 13 is shown as being

slightly raised. The elastic member 9 forming a part of the plate-like assembly 2 has a first peripheral side wall 31 in engagement with a flange 22 extending outward from a peripheral surface 21 of the main body 8. The peripheral surface 21 and the first peripheral side wall 31 are substantially integral with each other. The elastic member 9 covers the entire bottom surface 10A of the main body 8 so as to define a bottom surface 23 of the cleaner device 1. A plurality of ribs 24 are in contact with an inner surface of the elastic member 9. The elastic member 9 further comprises, outside the first peripheral side wall 31, a second peripheral side wall 30 having a proximal end portion 32 horizontally extending from a top of the first peripheral side wall 31 and an elastically deformable distal end portion (outermost edge) 33 extending downward from the proximal end portion 32 substantially in parallel to the first peripheral side wall 31. The distal end portion 33 is spaced out from the first peripheral side wall 31 by a distance d.

Fig. 3 is a fragmentary perspective view showing the raised arm 13 and a portion of the plate-like assembly 2. The arm 13 is made of hard plastics and provided on a lower surface of the outer end 15 with a male lock 35 in the form of a latch adapted to be engaged with a female lock 36

provided on the main body 8 as the arm 13 is flattened. In addition to the male and female locks 35, 36, the lower surface of the arm 13 is formed on its transversely opposite sides with a pair of male locks 37, 38 extending downward. These male locks 37, 38 are vertically directed when the arm 13 is flattened and have saw-toothed distal ends. As the arm is completely flattened, the male locks 37, 38 are received by a pair of grooves 39, 40 formed in the respective recesses 16 so as to serve as female locks. Between the pair of grooves 39, 40, a male component 41 of so-called mechanical fastener comprising male and female fasteners and well known under the trade mark such as VELCRO is bonded to the main body 8.

With the cleaner device 1 constructed as has been described above, the user begins by raising the arms 13, then places the wiping sheet 5 against the bottom surface 23 of the plate-like assembly 2 and folds the margins 45, 46 (See Fig. 1) of the wiping sheet 5 extending outward beyond the respective long sides along the distal end portion 33 of the elastic member 9 so as to be placed upon the top surface 10A of the plate-like assembly 2. The wiping sheet 5 is relatively wide so that the respective grooves 39 may be covered with the margin 45 and the respective grooves 40 may

be covered with the margin 46. Furthermore, the sufficient width of the wiping sheet 5 allows these margins 45, 46 to be fastened to the respective fasteners 41. After these margins 45, 46 have been fastened in this manner, the arms 13 may be flattened to hold the wiping sheet 5 between side walls 37A, 37B, 38A, 38B of the respective male locks 37, 38 and side walls 39A, 39B, 40A, 40B of the respective grooves 39, 40 and/or to catch the wiping sheet 5 by saw-toothed distal ends 37C, 38C of the respective male locks 37, 38. The wiping sheet 5 is thereby substantially fixed to the plate-like assembly 2. Consequently, there is no apprehension that the wiping sheet 5 might be unintentionally detached from the plate-like assembly 2 even if an object to be cleaned is violently rubbed with the wiping sheet 5. Additionally, the second peripheral side wall 30 of the elastic member 9 offers an advantageous effect for reliably attaching the wiping sheet 5 to the plate-like assembly 2. Specifically, the margins 45, 46 may be fastened to the fasteners 41 while the second peripheral side wall 30 is elastically deformed so as to tension the wiping sheet 5 transversely of the plate-like assembly 2 and then the clamping arms 13 may be flattened. As a result, the wiping sheet 5 is further tensioned under a restoring force of the second peripheral side wall 30 and

brought more closely in contact with the bottom surface 23 of the cleaner device 1.

Fig. 4 is a schematic diagram showing the arrangement of the invention in the proximity of a line IV - IV in Fig. 1, in which a dimensional relationship of the configuration is illustrated by arrows. Referring to Fig. 4, the plate-like assembly 2 as well as one of the arms 13 are partially illustrated and one 37 of the male locks 37, 38 is illustrated as completely received by the associated groove 39. In parallel to the adjacent long side 6A, the male lock 37 extends from its first end P_1 adjacent the short side 7A to its second end P_2 adjacent the short side 7B, describing an arc which is convex toward the long side 6A. The first and second ends P_1, P_2 are spaced from each other by a linear distance L as measured in parallel to the long side 6A. A distance between the male lock 37 and the long side 6A gradually decreases from a value D_1 as measured at the first end P_1 to the minimum value D_3 as measured at an intermediate point P_3 and then gradually increases to the maximum value D_2 as measured at the second end P_2. The groove is dimensioned to be slightly larger than the male lock 37 and describes an arc extending in parallel to the male lock 37.

Referring to Fig. 4, a length of the wiping sheet 5

defined between the first end P_1 and the intermediate point P_3 is clamped over a width W_1 and a length defined between the intermediate point P_3 and the second end P_2 is clamped over a width W_2. The wiping sheet 5 clamped in this manner may often have most of their component fibers oriented in parallel to the long side 6A. In such case, a force tending to tear the wiping sheet 5 in accordance with the fiber orientation is concentrated in a region of the wiping sheet 5 clamped between the male lock 37 and the associated groove 39 as the device 1 is moved orthogonally to the long side 6A as indicated by a double-headed arrow Y to wipe dust and/or dirt with the wiping sheet 5. However, the cleaner device 1 according to the invention can disperse such force transversely of the wiping sheet 5 by clamping the wiping sheet 5 between the male lock 37 and the associated groove 39 both describing the arc spaced apart from the adjacent long side 6A by a distance gradually varying along the long side 6A. On the contrary, the cleaner device of prior art employs the linear arm extending in parallel to the long side 6A to clamp the wiping sheet 5 and the wiping sheet 5 may be easily torn along the arm under the effect of the tearing force. The cleaner device 1 according to the invention alleviates such possibility by employing the male lock and the

associated groove of the unique configuration. The value L as measured with respect to the male lock 37 is preferably 20 mm or more and the values D_1, D_2, D_3 also as measured with respect to the male lock 37 are preferably selected so as to assure the values W_1, W_2 of 2 mm or more.

Fig. 5 is a diagram similar to Fig. 4 illustrating an alternative embodiment of the invention. With the plate-like assembly 2 in the embodiment illustrated by Fig. 5, the male lock 37 provided on the arm 13 and the associated groove 39 formed in the main body 8 are linear obliquely with respect to the linear long side 6A. The first and second ends P_1, P_2 of the male lock 37 are spaced apart from the long side 6A by distances D_1, D_2, respectively, and D_1 may be smaller than D_2 as in the illustrated case or inversely D_1 may be larger than D_2. In any case, the wiping sheet 5 is fixed to the plate-like assembly 2 over a width W_3. As measured with respect to the male lock 37, a distance L between the first and second ends P_1, P_2 as measured in parallel to the long side 6A is preferably 20 mm or more and the values D_1, D_2 are preferably selected so as to assure the value W_3 of 2 mm or more.

In the cleaner device according to the invention, the male locks provided on the respective arms as well as the grooves formed in the main body adapted to receive the

associated arms and thereby to clamp the wiping sheet are configured so that they are spaced from portions of the peripheral wall of the main body respectively lying adjacent the pair of male locks provided on the main body by a distance gradually varying along the respective portions of the outermost edge. The cleaner device of such unique arrangement can alleviate a force tending to tear the wiping sheet in the direction parallel to the respective portions of the peripheral wall by dispersing such tearing force transversely of the wiping sheet.

WHAT IS CLAIMED IS:

1. A cleaner device comprising a plate-like assembly having a top surface, a bottom surface and the outermost edge connecting these top and bottom surfaces with each other, a stick mounted on the top surface and clamping means formed on the top surface so that margins of a wiping sheet placed against the bottom surface may be folded back onto the top surface and clamped by the clamping means to fix the wiping sheet to the plate-like assembly, the cleaner device being characterized in that:

each of the clamping means comprises an arm mounted by a hinge mechanism on the top surface so as to be selectively raised or flattened and having a first pair of locks in the form of male locks which vertically extend from the top surface downward toward the bottom surface as said arm is completely flattened and a second pair of locks in the form of female locks formed in the top surface adapted to receive the first pair of locks, respectively, and thereby to substantially hold the margins of the wiping sheet in cooperation with the first pair of locks as said arm is completely flattened; and

both the first pair of locks and the second pair of

locks extend at least partially along portions of the outermost edge respectively lying adjacent them and spaced from the respective portions of the outermost edge by a distance gradually increasing or decreasing in a direction in which they extend.

2. A cleaner device according to Claim 1, wherein the first pair of locks in the form of male locks and the second pair of locks in the form of female locks extend so as to describe arcs which are convex toward the portions of the outermost edge lying adjacent the first pair of locks and the portions of the outermost edge respectively lying adjacent the first pair of locks linearly extend.

3. A cleaner device according to Claim 1, wherein all of the first pair of locks, the second pair of locks and the portions of the outermost edge respectively lying adjacent the first pair of locks linearly extend.