Aug. 27, 1963 B. STILLER 3,101,567

VACUUM CUP HOLDING DEVICE HAVING IMPROVED HOLDING MEANS

Filed Nov. 30, 1961 3 Sheets-Sheet 1

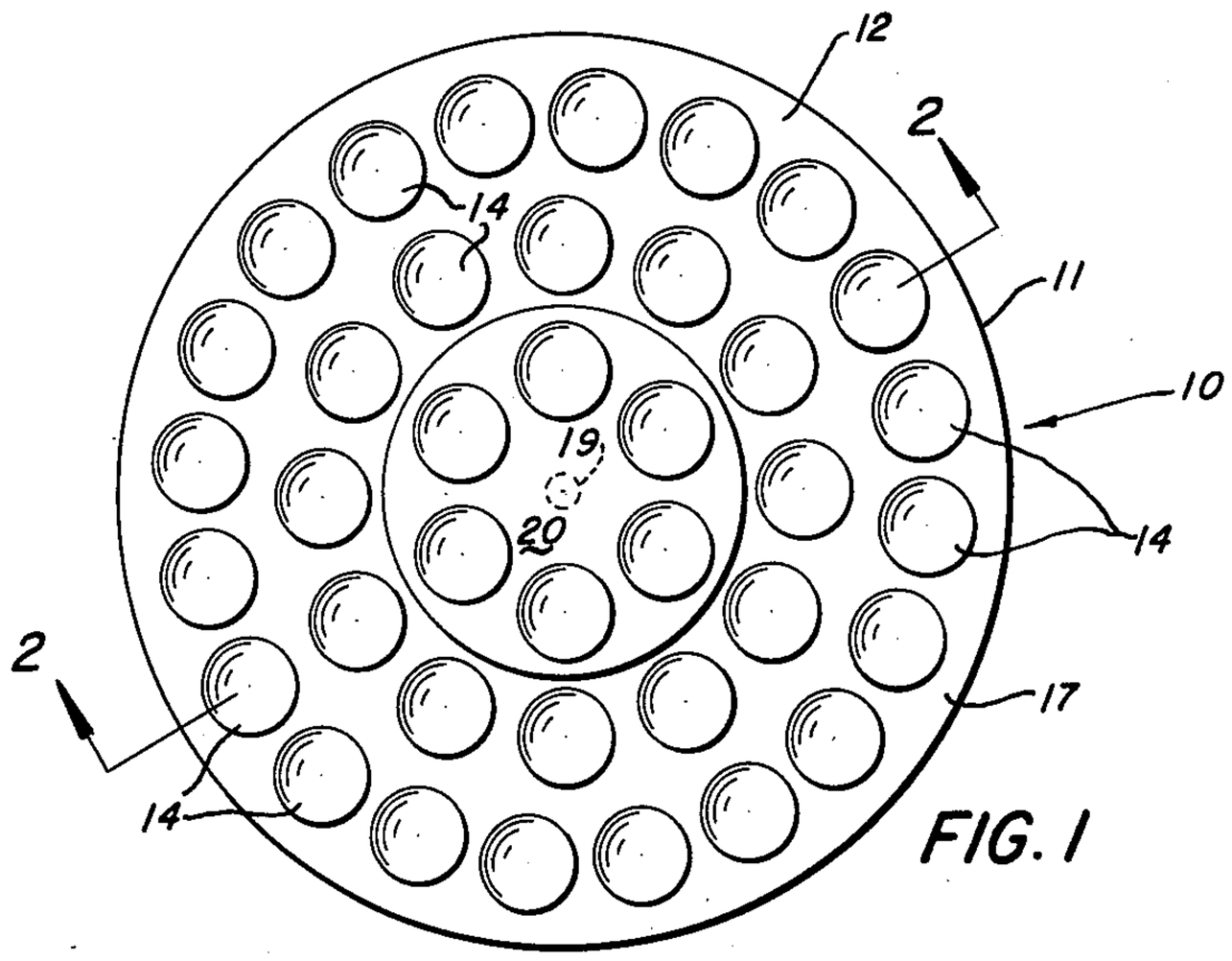

FIG. 1

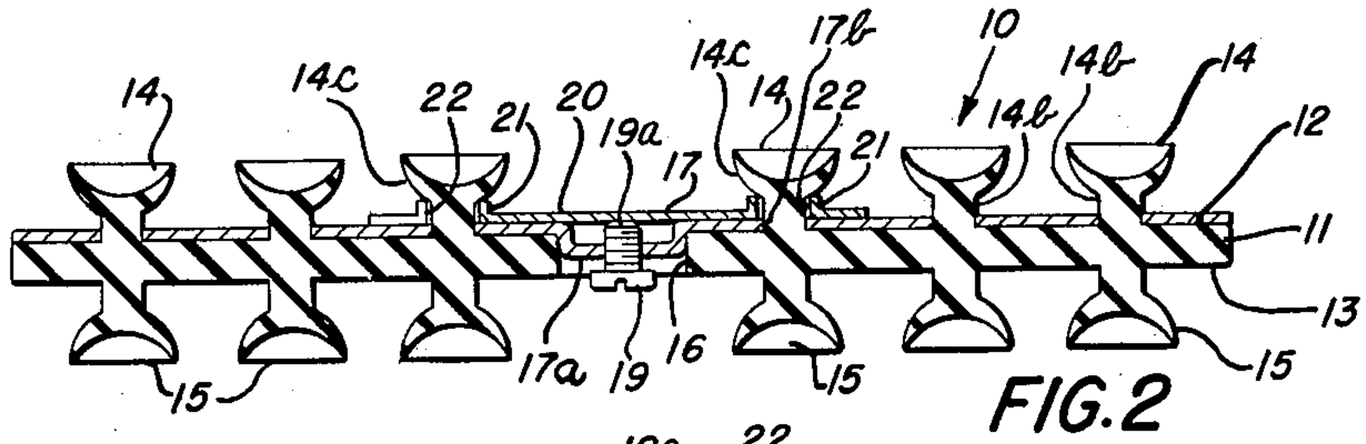

FIG. 2

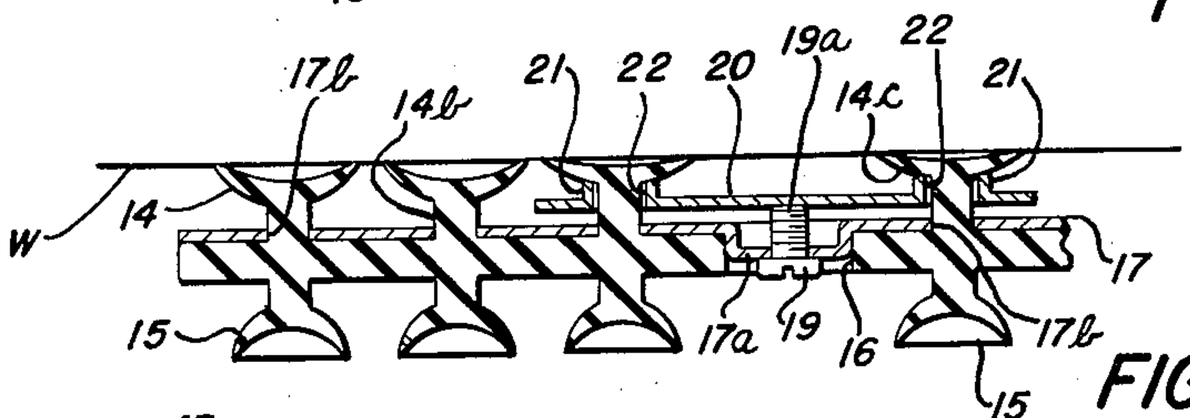

FIG. 3

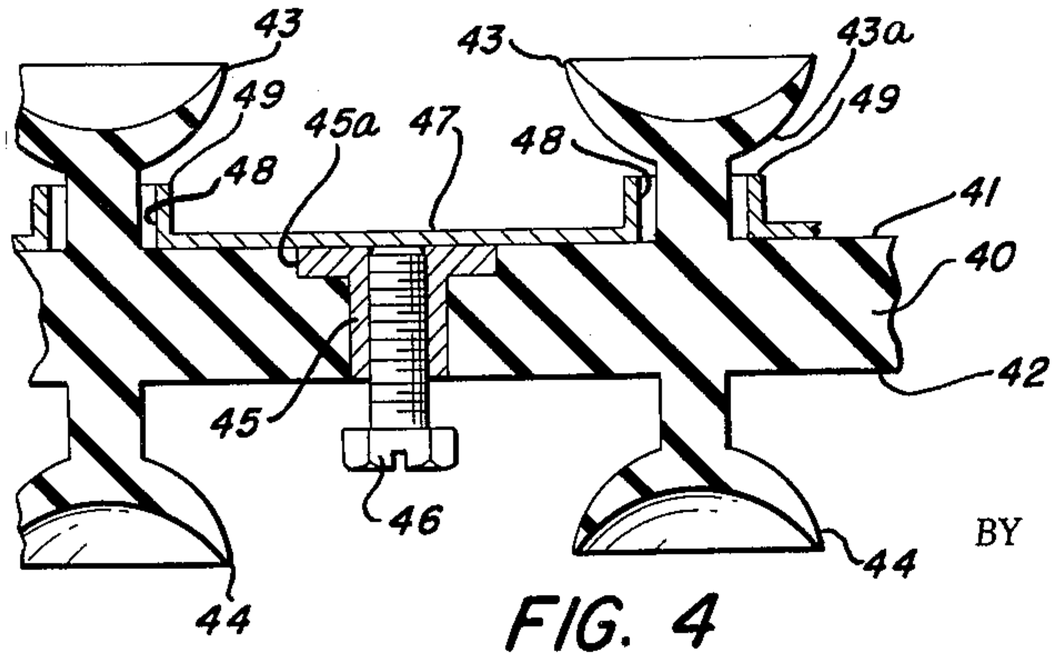

FIG. 4

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Aug. 27, 1963 B. STILLER 3,101,567

VACUUM CUP HOLDING DEVICE HAVING IMPROVED HOLDING MEANS

Filed Nov. 30, 1961 3 Sheets-Sheet 2

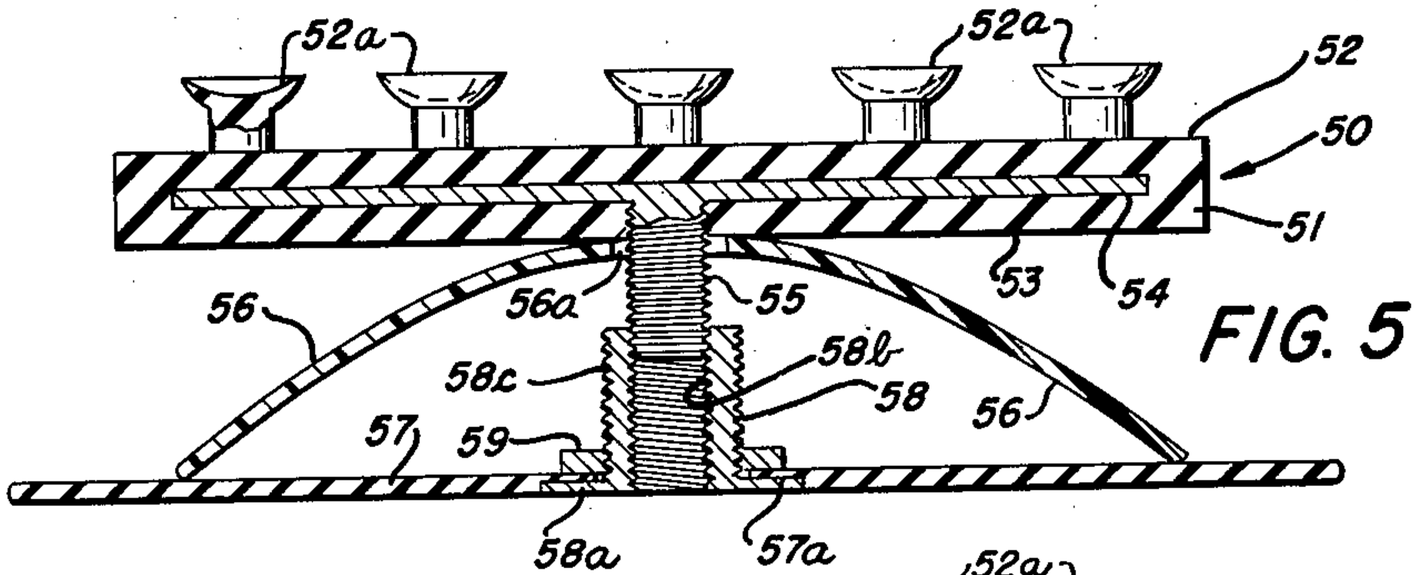

FIG. 5

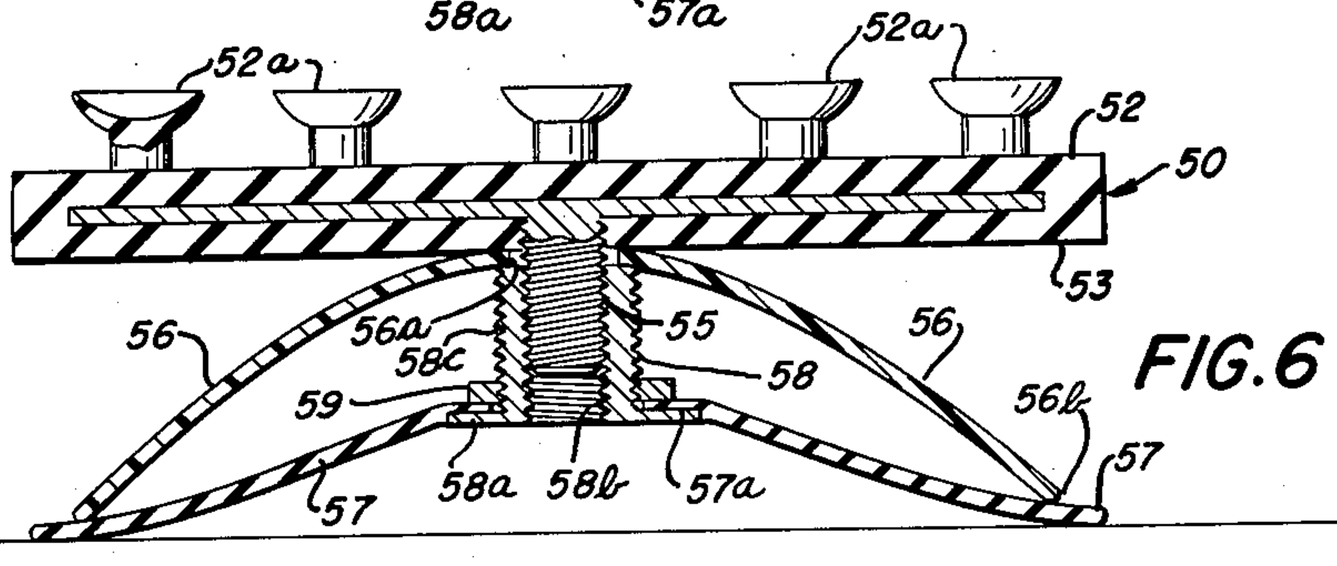

FIG. 6

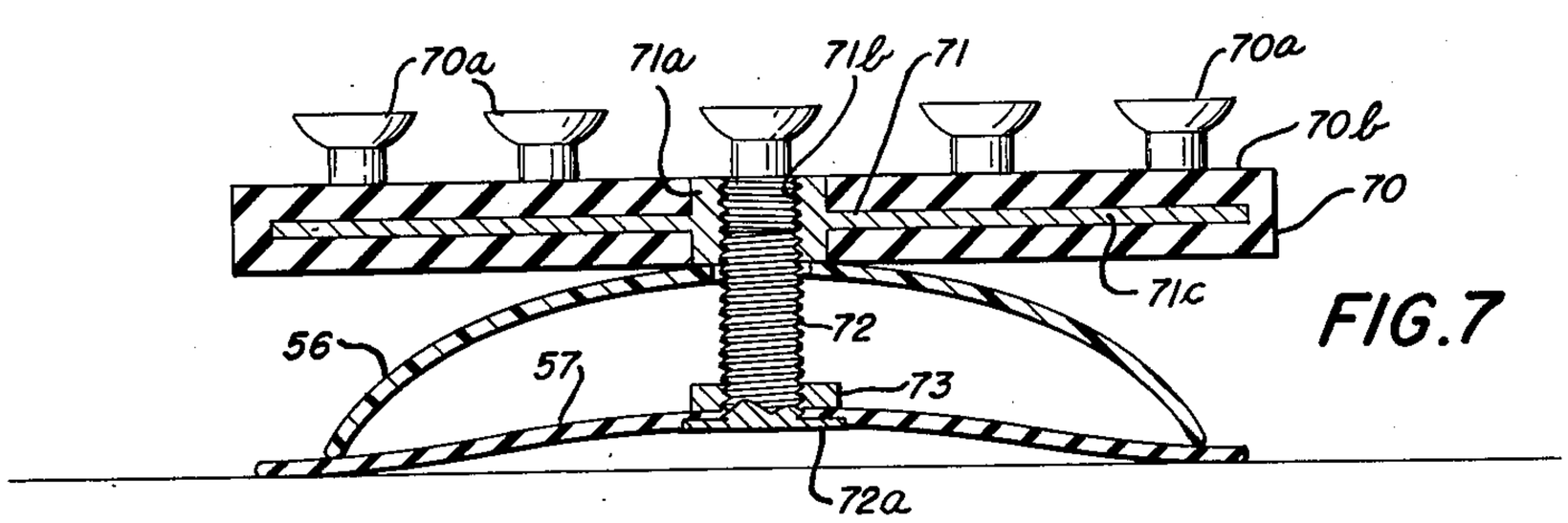

FIG. 7

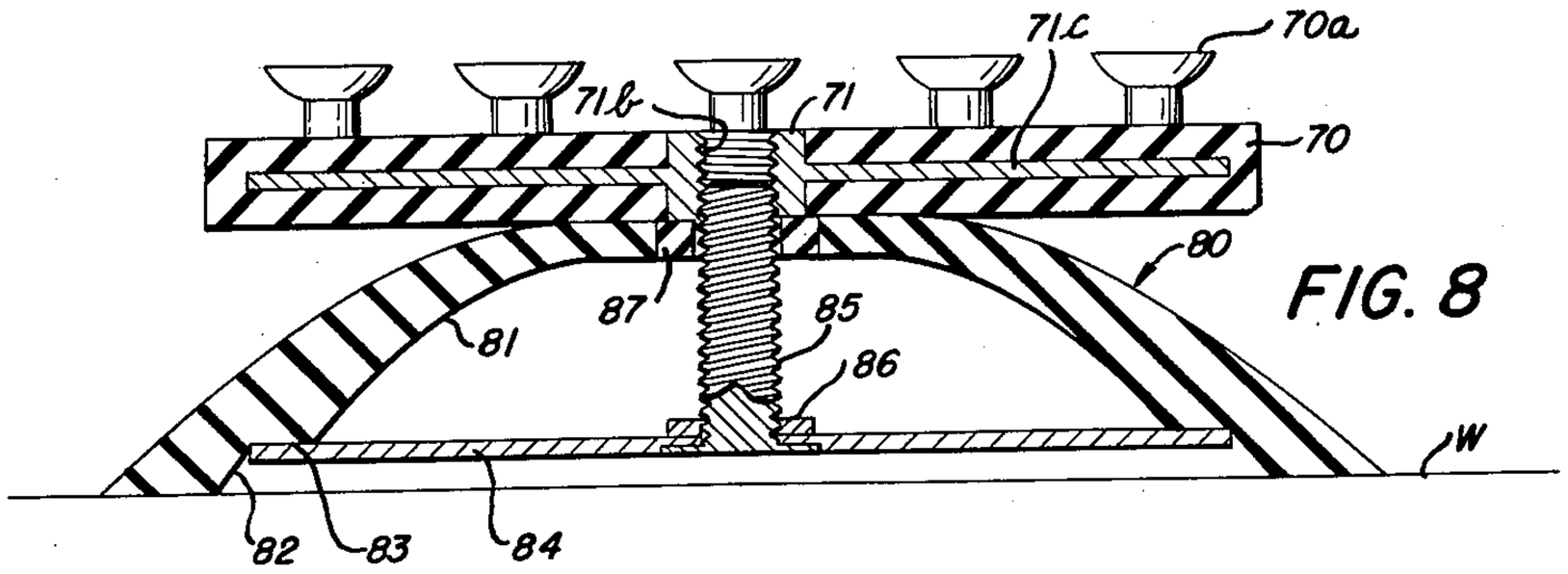

FIG. 8

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VACUUM CUP HOLDING DEVICE HAVING IMPROVED HOLDING MEANS

Filed Nov. 30, 1961 3 Sheets-Sheet 3

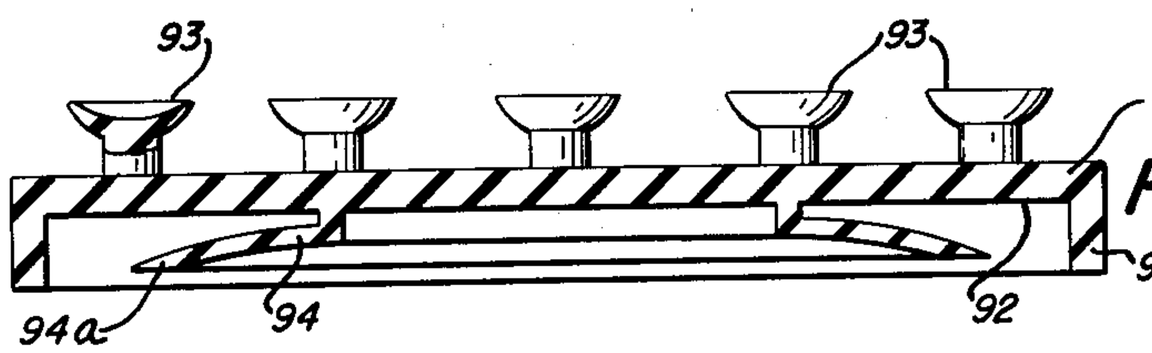

FIG. 9

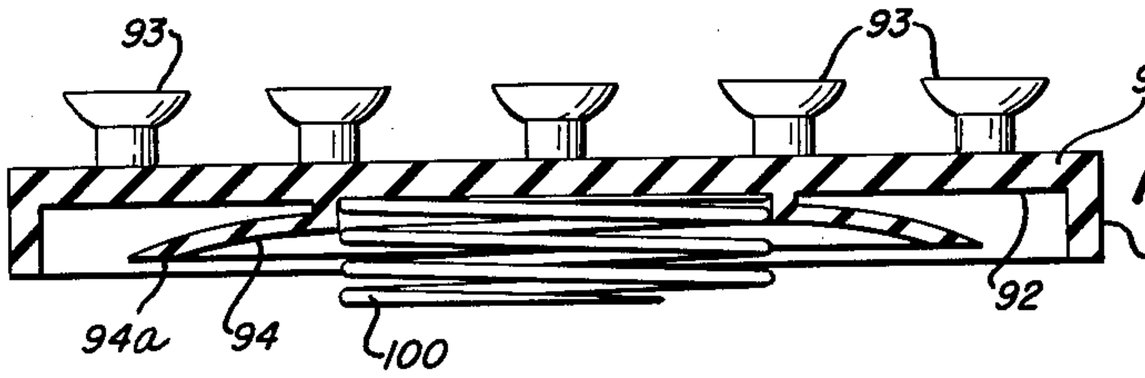

FIG. 10

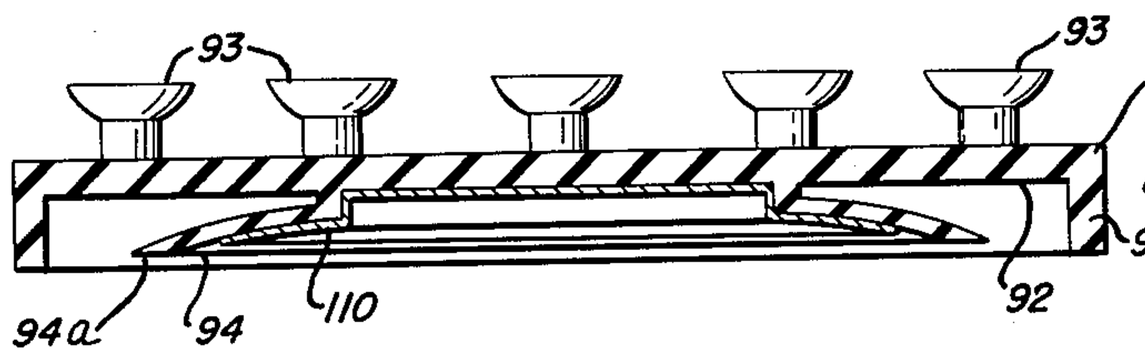

FIG. 11

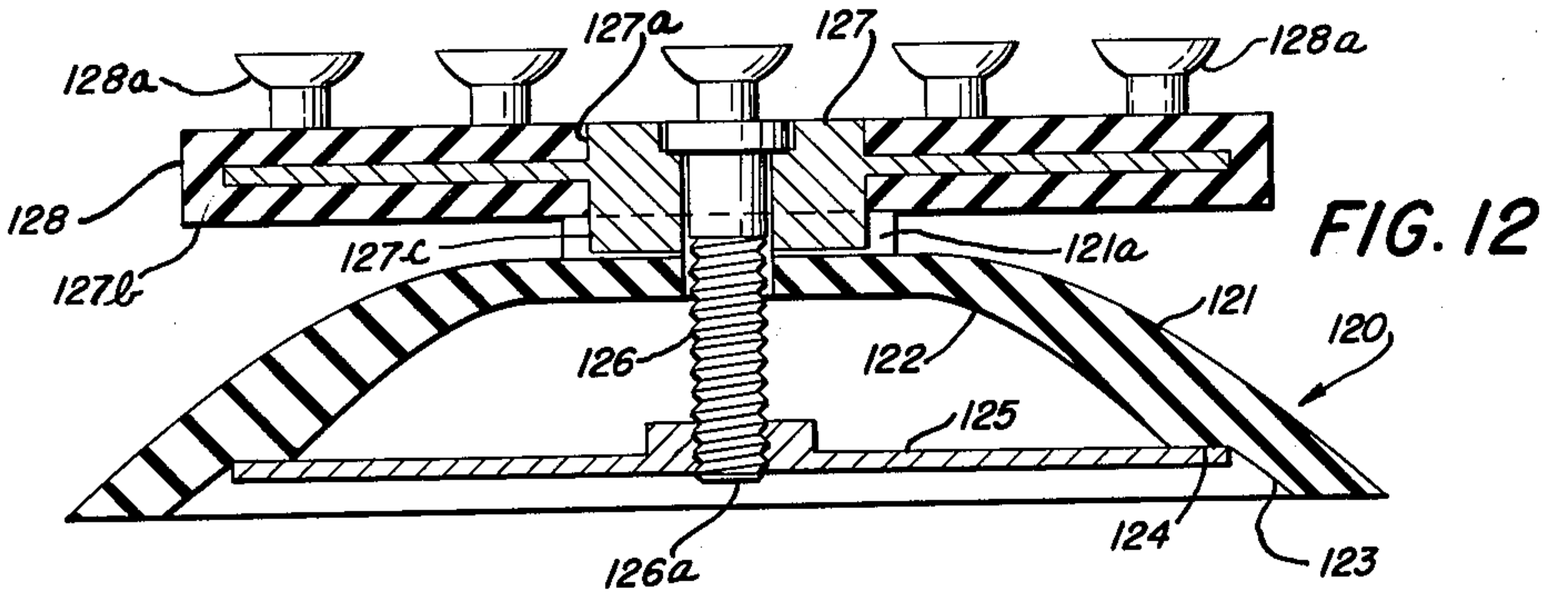

FIG. 12

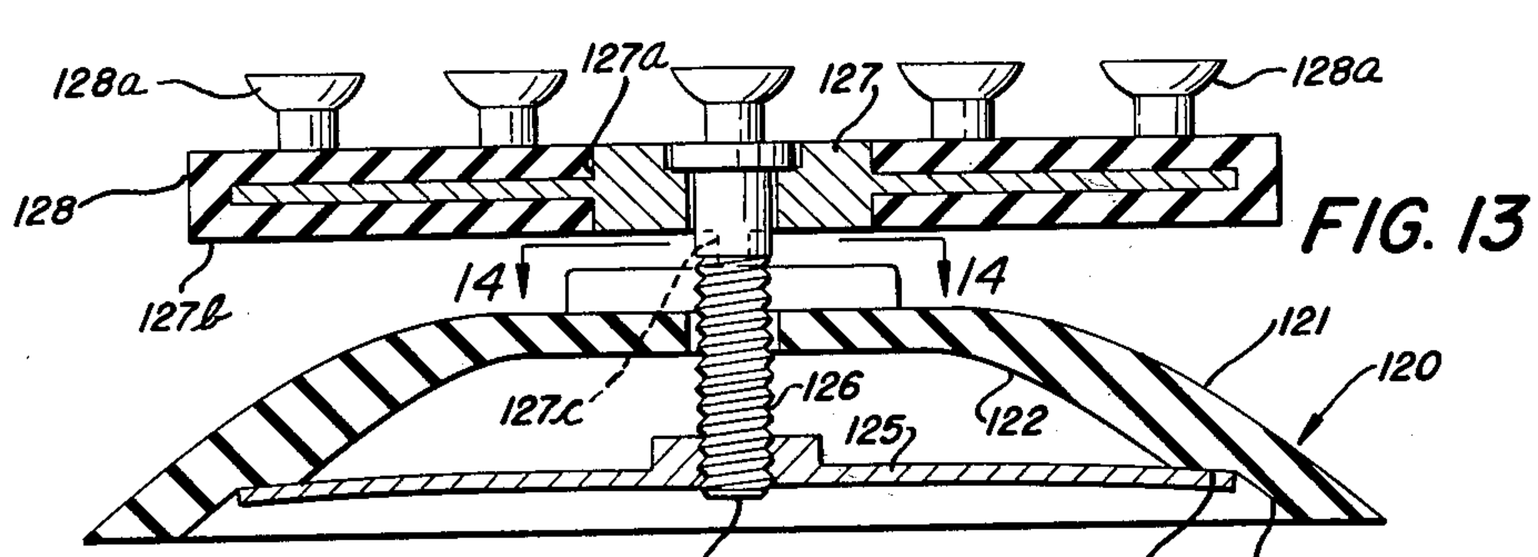

FIG. 13

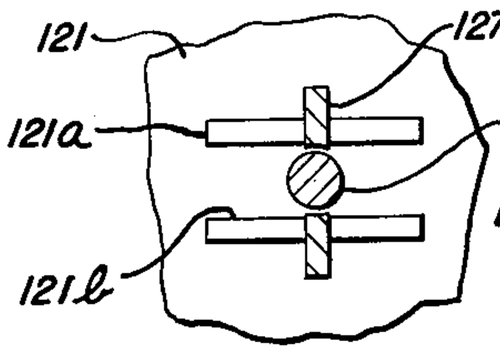

FIG. 14

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United States Patent Office

3,101,567
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3,101,567
VACUUM CUP HOLDING DEVICE HAVING IMPROVED HOLDING MEANS

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Filed Nov. 30, 1961, Ser. No. 156,108
9 Claims. (Cl. 45—28)

This invention relates to the art of holding devices, and in particular relates to an article that utilizes vacuum cups for the purpose of suspending a bar of soap or other like articles with respect to a planar surface such as a wall.

In applicant's prior United States Patent 2,466,502, there was disclosed a device of this general character wherein a thin sheet of resilient material was provided with a plurality of suction cups that projected from the opposed faces thereof in opposed relationship to each other with one set of such cups securing the device to the wall while the other such set served to suspend the soap with respect to the device per se.

While the device of the aforementioned United States patent has enjoyed wide-spread commercial useage, it has, nonetheless, been found to possess certain disadvantages.

Specifically, the device of the aforementioned patent employed an equal number of suction cups on each face so as to make either set of cups utilizable for attachment with respect to either the wall surface or the soap. While this achieved the advantage of versatility, there, nonetheless was a disadvantage in view of the fact that the wall adhering properties were limited to the configuration of cup required to adhere to the soap. Additionally, and on this point, it has been found that in some instances certain soaps would deform the cups after repeated useage, and the interchangeable use of both surfaces in connection with the soap, accordingly, operated, in some instances, to render the device ineffective for the purpose of adhering the unit to the wall surface.

It has been discovered that the aforementioned disadvantages can be obviated by providing one set of cups that is designed for attachment to the wall surface involved and by providing supplemental means that increase the adhering properties of the cups that are provided for this purpose.

Production of an improved soap holding device having the above advantages accordingly becomes the principal object of this invention, with other objects thereof becoming more apparent upon a reading of the following brief specification, considered and interpreted in the light of the accompanying drawings.

Of the drawings:

FIGURE 1 is a plan view of a preferred form of the invention.

FIGURE 2 is a sectional view taken on the lines 2—2 of FIGURE 1.

FIGURE 3 is a similar sectional view and showing the auxiliary holding means in operation.

FIGURE 4 is a partial sectional view similar to FIGURE 3 but showing a modified form of the invention.

FIGURES 5 and 6 are similar sectional views respectively showing a modified form of auxiliary holding means in collapsed and adhering positions.

FIGURES 7 and 8 are similar views of modified forms of the invention.

FIGURES 9, 10, and 11 are sectional views of further modifications of the invention.

FIGURES 12 and 13 are further sectional views showing a still futrher modification of the invention in non-operating and operation positions respectively.

FIGURE 14 is a sectional view taken on the lines 14—14 of FIGURE 13.

Referring now to the drawings and in particular to FIGURES 1 to 3 thereof, the improved soap holder, generally designated by the numeral **10**, is shown including a flat resilient sheet **11** having opposed sides **12** and **13** from which a first and second series of cups **14, 14** and **15, 15** respectively project in opposed relationship, as clearly shown in FIGURES 2 and 3 of the drawings, with the arrangement of cups and base sheet **11** being similar to the arrangement shown in the aforementioned United States Patent 2,466,502.

For the purpose of coacting with certain means to be described, the base sheet **11** is shown as being centrally apertured, as at **16**, to receive the offset portion **17***a* of a rigid flat sheet **17** that is of circular configuration in plan and that is provided with a plurality of apertures **17***b*, **17***b* that are located so as to surround the various shanks **14***b*, **14***b* of the suction members **14, 14** as clearly shown in the drawings. The offset portion **17***a* is further tapped with threads for the purpose of receiving a threaded bolt **19** with the projecting end **19***a* of the bolt engaging against a pressure applying plate **20** and with the plate **20** having a series of upturned flanges **21, 21** surrounding the openings **22, 22** thereof. Also, and for the purpose of coacting with the cups **14, 14**, the flanges **21** and the openings **22** are shown disposed for respective positioning in surrounding relationship to the innermost circle of suction members **14, 14** as clearly shown in the drawings.

Accordingly, and in use of the device, it is merely necessary that the suction members **14, 14** be applied against a wall surface W, as shown in FIGURE 3 and following such application, it is merely necessary that a screw driver or other appropriate turning instrument be used to turn the bolt **19** so as to advance the projecting end thereof against the pressure applying plate **20**. This will separate the plate **20** from the plate **17** and will further have the effect of having the projecting end of the flanged portions **21, 21** applied against the surface **14***c* of the individual cups **14, 14** in the inner circle of cups, with this condition being clearly illustrated in FIGURE 3.

Such application of pressure by the flanges **21, 21** will have the effect of further collapsing the innermost circle of cups **14, 14** into a flatter relationship with the wall surface so that there will be less air entrapped to accordingly result in a greater vacuum with an attendant increase of the holding power of the cups so effected. Accordingly, it will be noted that each of the cups in the innermost circle of cups is providing a greater amount of holding force than is any cup in the second and third circular series of cups adjacent thereto and uneffected by the aforementioned movements of the plate **20**.

The result of the foregoing is that the holding power of the individual suction members **14, 14** is materially increased in a localized area so as to accordingly result in an increase in the overall holding power of the suction members **14, 14**. When it is desired to release the suction, it is merely necessary that the screw **19** be backed off, whereupon a normal suction will exist with respect to the innermost circle of cups, whereupon the unit can be removed.

Thus, it will be seen that there has been provided means for increasing the holding power of the individual cups in a localized region so as to, accordingly, increase the overall capacity of the unit to adhere to a wall surface. With regard to the preferred form of the invention, it is preferred that the base **11** and cups **14, 14** and **15, 15** be made of rubber or rubbery material, including plastic, so as to have the requisite resiliency for suction adherence as above described. The plates **17** and **20** would be

preferably formed of rigid material such as metal or rigid plastic and could if desired be increased in diameter and provided with additional openings so as to surround the second and third circular series of cups instead of just the innermost circle as has been described.

The modified form of the invention shown in FIGURE 4 is directed to a construction wherein the overall flexibility of the unit is enhanced by a construction that eliminates the main support plate 17. Accordingly, in FIGURE 4, the base 40 of the suction unit employed therein has opposed faces 41 and 42, with cups 43, 43 projecting from the face 41, while cups 44, 44 project from the face 42, as shown in FIGURE 4. Centrally of the resilient integral unit just described, is embedded a sleeve 45 having a flange 45*a* and being internally threaded to receive the threaded shank of a bolt 46. A pressure applying plate 47 has openings 48 aligned in registry with the necks of the suction cups 43, 43 with the flange portions 49 thereof encircling the same as shown in FIGURE 4. In this fashion, when the bolt 46 is rotated within the sleeve 45 the pressure applying plate 47 will be separated from the face 41 so that the projecting ends of the sleeves or flanges 49, 49 will be applied against the convex surface 43*a* of the cups 43, 43 to collapse the same and thus increase the holding power of the same with respect to any wall surface.

It will be noted that the construction of FIGURE 4 has the advantage of utilizing a rigid plate 47 only in a localized region thereof, with the result that the overall flexibility of the unit to adapt to curved surfaces, for example, is not impaired as a result of the increased holding power provided by the pressure plate 47 and the means associated therewith as described. Again, the unit 40 is preferably made of rubber or rubbery material, including plastic, while the sleeve 45 and plate 47 are formed of rigid material such as metal or hard plastic.

Referring now to the modified form of the invention shown in FIGURES 5 and 6 of the drawings, it will be first noted that the unit 50 thereof includes a resilient support sheet 51 having opposed faces 52 and 53 and further having embedded centrally therein a rigid plate 54 from which projects an integrally threaded stud 55. Vacuum cups 52*a*, 52*a* project from the face 52 in aligned coplanar relationship with each other while a dome-like sheet of semi-rigid material 56 is aligned in registry with the sheet 51 by medium of an aperture 56*a* thereof being placed in encirclement with the aforementioned stud 55. The main suction portion of the unit is defined by a thin resilient sheet 57 that is apertured and counter-bored as at 57*a* to receive the flanged head 58*a* of a sleeve 58, with the sleeve 58 being internally threaded, as at 58*b*, for coaction with the stud 55 and also being externally threaded, as at 58*c*, for coaction with a lock nut 59 that serves to clamp the counter-bored portion of the sheet 57 between the flange 58*a* and the lock nut 59.

In this fashion, it will be noted that as the base 50 and the embedded plate 54 are rotated around the axis of the stud 55 that the sleeve 58 will be drawn towards the base 51, with this condition of component parts being illustrated in FIGURE 6 of the drawings. During such movement, the peripheral edge 56*b* of the rigid or semi-rigid dome 56 will serve to hold down the peripheral edge of the sheet 57 as shown in FIGURE 6 and, accordingly, following application of the unit 50, in the position of FIGURE 5, to a wall surface, the suction created beneath the retracted sheet 57 will materially increase due to the fact that the volume is being increased, while the pressure is being maintained constant with the overall result that a greater vacuum will occur to provide greater adhering powers to the unit 50. It should be noted in this regard, that due to the fact that the suction of the device 50 is increased by rotation of the base 51 and components associated therewith, that variable amounts of increased suction can be obtained as required. Accordingly, full suction of FIGURE 6 or intermediate degrees of suction can be obtained as required.

As to the material requirements, it is preferred that the base 51 and cups 52*a*, 52*a* be of rubber or rubbery material, including plastic, while the parts 54, 55, 58 and 59 are preferably of metal or other rigid material. The part 56 is preferably of a semi-rigid plastic so as to have a modicum of resiliency, while the part 57 is fully flexible, as indicated previously, and would, accordingly lend itself to be made of rubber or rubbery material, including plastic.

The modified form of the invention shown in FIGURE 7 is, in many respects, similar to that previously discussed in connection with FIGURES 5 and 6, but employs a different type of actuating mechanism that is designed to produce a simpler type of operation.

Accordingly, the FIGURE 7 modification includes a resilient base sheet 70 having cups 70*a*, 70*a* projecting from the face 70*b* thereof and further has a centrally embedded reinforcing element 71 provided therein as shown in FIGURE 7, with the element 71 including a sleeve portion 71*a* that is internally threaded as at 71*b* for coaction with a bolt 72. Additionally and for the purpose of reinforcing the base sheet 70, the element 71 further includes a radially extending flange portion 71*c* that serves to provide rigidity to the base 70. The element 56 of the type disclosed in FIGURES 5 and 6 is again employed over a sheet 57, which is also identical to the sheet 57 described in FIGURES 5 and 6. The bolt 72 has a head portion 72*a* that coacts with a threaded nut 73 to firmly secure the sheet 57 with respect to the bolt 72.

Accordingly, and in this fashion, rotation of the base 70 around the axis of bolt 72 will cause the sheet 57 to be drawn upwardly towards the base sheet 70, as illustrated in FIGURE 7, with the semi-rigid dome 56 again having its peripheral edge contacting the periphery of the sheet 57. In this fashion, and as was the case in FIGURES 5 and 6, rotation of the unit 70 produces a variable amount of suction pressure that is exerted by the sheet 57 so that variable amounts of holding pressure may be obtained by merely controlling the amount of rotation that is effectuated.

The modified form of the invention shown in FIGURE 8 operates on a similar principle as that previously discussed in connection with FIGURES 5, 6 and 7 but varies therefrom in that the semi-resilient dome 56 is replaced by a formed suction cup 80 that provides the wall adhering means for this modified form of the invention.

Accordingly, and referring to FIGURE 8, it will be first noted that the base sheet 70 and insert member 71 are identical to the form of the invention shown in FIGURE 7. The cup 80, however, has a concave inner surface 81 that is offset as at 82 to provide a shoulder 83 against which a pressure plate 84 can operate as shown in the drawings. The plate 84 integrally connects to a threaded bolt 85, with nut 86 holding the bolt 85 with respect to the plate 84, as shown, and with the threaded portion of the bolt 85 being threadingly engaged with the threaded portion 71*b* of member 71.

In this fashion, rotation of the base sheet 70 around the axis of bolt 85 will cause the plate 84 to be drawn towards the reinforced base sheet 70 and, as a result of this movement and the coaction with the shoulder 83, the volume between the plate 84 and the wall surface W will be increased to thus create a larger vacuum. Again, the amount of such vacuum may be regulated by controlling the amount that the reinforced base sheet 70 is rotated with respect to the bolt 85.

With regard to the material employed in this modification, it is preferable that the base sheet 70 and the suction cups associated therewith be integrally molded from rubber or rubbery material, including plastic, while the insert 71 and the plate 84 should be of metal or hard plastic material. The main suction cup 80 is formed of relative-

ly rigid rubber and is preferably provided with a rigid insert **87** that facilitates mounting of the cup **80** with respect to the bolt **85**.

The modified forms of the invention shown in FIGURES 9, 10 and 11 operate on a principle of providing an auxiliary force that will constantly urge the main base sheet away from the wall surface so as to accordingly increase the holding powers thereof.

Accordingly, in FIGURE 9, the base sheet **90** is provided with a peripheral flange **91** that projects from the face **92** in opposed relationship to the suction cups **93**, **93**. Also projecting from the face **92** is a centrally disposed suction cup **94** with the peripheral flange **94***a* of this cup preferably being recessed in amount of projection with respect to the plane of the projecting end of the flange **91**. In this fashion and when the suction cup **94** is depressed, the peripheral flange **91** will constantly urge the base plate **90** away from the wall so as to increase the vacuum in the area enclosed by the suction cup **94**.

The modified form of the invention shown in FIGURES 10 and 11 is similar to that just described except that the aforementioned pressure exerted by the peripheral flange **91** is augmented, in the case of FIGURE 10, by a centrally positioned coil spring **100**, while in FIGURE 11 an appropriately contoured flat spring **110** is provided interiorly of the cup **94** for the purpose of urging the base sheet **90** away from the wall surface.

Here again, the preferred form of the invention in FIGURE 9 would contemplate the use of a one-piece molded rubber or rubbery material, including plastic, while the FIGURE 9 construction would be augmented by the conventional spring type material in connection with the FIGURE 10 and 11 modifications.

Operation of these modified forms of the invention would merely involve the pressing of the cup surface **94** against the wall, followed by manual depressing of the same to insure full suctional contact. During the period of adherence, the suction would be maintained by the constant forces that operate to urge the unit away from the wall and thus increase the holding pressures of the suction cup **94**.

The modified form of the invention shown in FIGURES 12 through 14 of the drawings envisions a construction similar to that shown and disucssed in connection with FIGURE 8 of the drawings, wherein variable suction pressures could be obtained by the rotation of a reinforced base sheet. However, the construction of FIGURES 12 through 14 differs in that the same is designed to be indexed between 90 degree positions so as to snap into and out of maximum holding position as will now be described.

Thus, and referring to FIGURE 12, it will be noted that there is provided a main suction cup **120** having a convex outer surface **121** and a concave inner surface **122**, with the inner surface **122** being offset as at **123** to define a shoulder **124** against which a rigid pressure plate **125** may operate. The pressure plate **125** is centrally tapped to receive the threaded end **126***a* of a stud member **126** that is rotatably supported with respect to a reinforcing element **127** that is embedded within the base sheet **128** as shown in FIGURES 12 and 13. The reinforcing element **127** includes a main central cylinder **127***a* that has a projecting radial flange **127***b* embedded between the opposed faces of the base sheet **128**, and further includes a transverse rib **127***c* that is designed to be received either, on top of, or between, molded ribs **121***a*, **121***b* (FIGURE 14) that are provided at the apex of the convex surface **121**. In this regard, it should be noted that the rib **127***c* is positioned between such ribs **121***a* and **121***b* in FIGURE 12, while being positioned on top of the same in the position shown in FIGURE 13 where maximum suction pressure is being obtained.

In operation of this modified form of the invention, it is merely necessary that the cup **120** be applied against the surface involved followed by 90 degree rotation of the base unit **128** and the component parts associated therewith, including the insert **127**. Such rotation will cause the rib **127***c* to be lifted into position on top of the ribs **121***a* and **121***b* as shown in FIGURE 13, with such lifting movement serving to also draw the stud **126** and plate **125** towards the base sheet **128** and thus increase the suction pressure beneath the plate **125**.

With regard to the material employed in this modified form of the invention, it is preferred that the cup **120** and base sheet **128**, as well as the suction cups **128***a*, **128***a* be made of rubber or rubbery material, including plastic. The reinforcing insert **127** together with the stud **126** and pressure plate **125** would, as before, be made of rigid material, such as metal or hard plastic.

While a full and complete description of the invention has been set forth in accordance with the dictates of the patent statutes, it is to be understood that the invention is not intended to be limited to the specific embodiments herein shown.

Accordingly, modifications of the invention may be resorted to without departing from the spirit hereof or the scope of the appended claims.

What is claimed is:

1. A soap holder of the character described, comprising;
   (A) a resilient base of generally flat configuration and having opposed faces;
   (B) a first series of suction cups projecting from one said face of said resilient base and adapted to support a bar of soap thereon;
   (C) at least one surface adhering suction cup projecting from said remaining face of said resilient base in opposed relationship to said first series of suction cups and adapted to engage a smooth surface and support said holder with respect thereto;
   (D) and mechanically actuated means carried by said base between said opposed cups, and being operable to increase the holding power of said surface engaging cup beyond a normal holding power thereof.

2. The device of claim 1 further characterized by the fact that said means include a resilient flange element projecting from a peripheral edge of said base coextensive with said cup and urging said base away from said surface during the period said cup is engaged with said surface in depressed condition.

3. The device of claim 1 further characterized by the fact that said mechanically actuated means include a pressure applying plate having apertures that surround the shanks of said surface adhering cups; and means for urging said plate away from said base whereby said apertures will be urged against said cups to flatten the same against said surface.

4. A soap holder of the character described, comprising;
   (A) a resilient base of generally flat configuration and having opposed faces;
   (B) a first series of suction cups projecting from one said face of said resilient base and adapted to support a bar of soap thereon;
   (C) at least one surface adhering suction cup projecting from said remaining face of said resilient base in opposed relationship to said first series of suction cups and adapted to engage a smooth surface and support said holder with respect thereto;
   (D) and mechanically actuated means carried by said base operable to increase the holding power of said surface engaging cup beyond the normal holding power thereof;
      (1) said means including
         (*a*) a shaft carried by said base in axially shiftable relationship therewith and having one end secured to a central portion of said surface adhering suction cup;
         (*b*) means for shifting said shaft relatively of said base whereby said central portion

of said surface adhering cup is drawn towards said base;

(*c*) and means projecting from said base and tensionally engaging the peripheral edge of said surface adhering cup whereby said peripheral edge thereof is retained in contact with said surface during movement of said central portion towards said base.

5. The device of claim 4 further characterized by the presence of a rigid plate that is:

(1) supported by said base in non-shiftable relationship therewith, and

(2) that is threadingly engaged with said shaft.

6. A soap holder of the character described, comprising;

(A) a resilient base of generally flat configuration and having opposed faces;

(B) a first series of suction cups projecting from one said face of said resilient base and adapted to support a bar of soap thereon;

(C) at least one surface adhering suction cup projecting from said remaining face of said resilient base in opposed relationship to said first series of suction cups and adapted to engage a smooth surface and support said holder with respect thereto;

(D) and mechanically actuated means carried by said base operable to increase the holding power of said surface engaging cup beyond the normal holding power thereof;

(1) said means including

(*a*) a shaft carried by said base in axially shiftable relationship therewith;

(*b*) a circular shoulder defined by the interior surface adhering suction cup and being concentrically disposed adjacent the peripheral edge thereof;

(*c*) a rigid pressure plate secured to one end

of said shaft and having its peripheral edge seated against said shoulder;

(*d*) and draw means for drawing said plate towards said base whereby the vacuum pressure beneath said plate may be increased.

7. The device of claim 6 further characterized by the fact that said draw means include cam means carried by said surface adhering cup and being engaged by cam follower means carried by said base.

8. The device of claim 6 further characterized by the fact that said draw means includes a threaded connection between said shaft and said base.

9. A soap holder of the character described, comprising;

(A) a resilient base of generally flat configuration and having opposed faces;

(B) a first series of suction cups projecting from one said face of said resilient base;

(C) at least one suction cup of larger diameter and greater holding power projecting from said remaining face in opposed relationship to said first series of suction cups;

(D) support means reinforcing said base against distortion from said flat configuration;

(E) and suction increasing means coacting with said support means and to increase the suction forces of said larger diameter suction cup.

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