April 7, 1953 L. W. VAN DUSEN 2,634,077

VACUUM ATTACHMENT FIXTURE

Filed Nov. 28, 1949

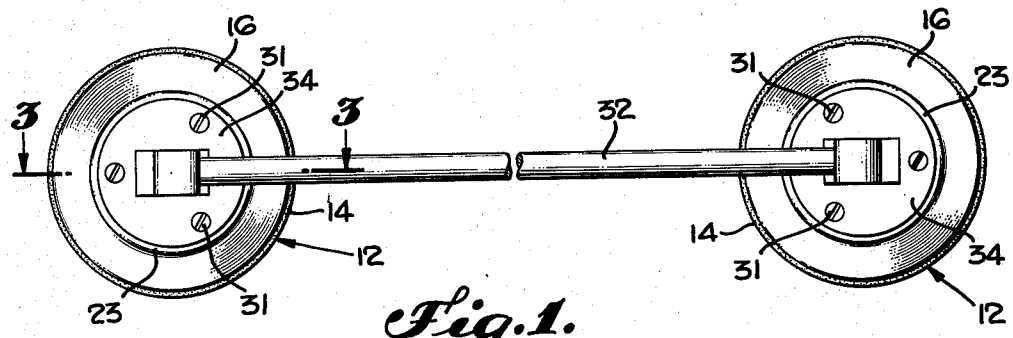


Fig. 1.

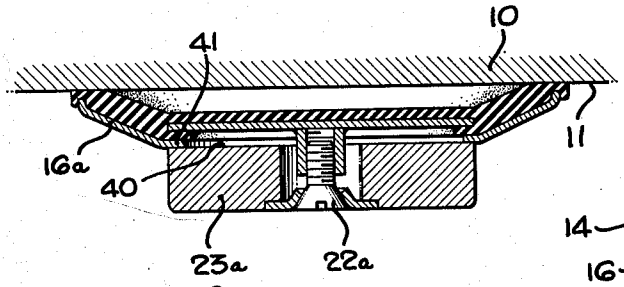


Fig. 4.

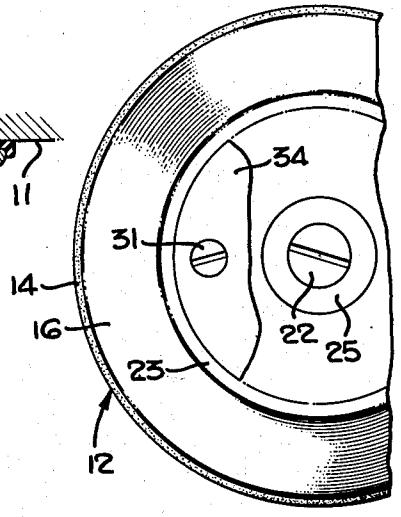


Fig. 2.

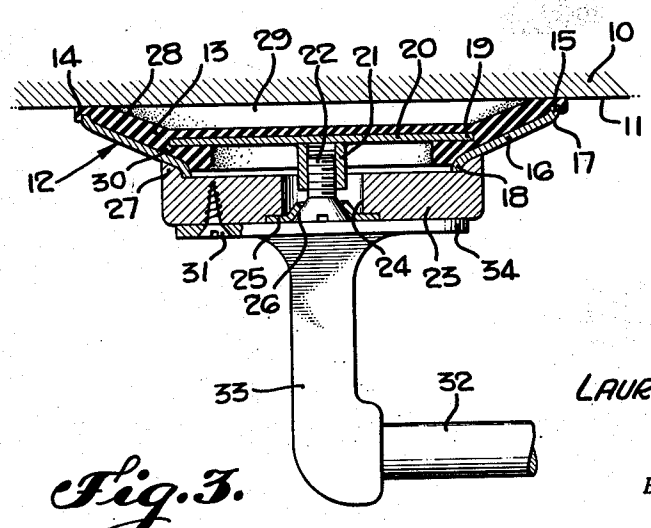


Fig. 3.

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VACUUM ATTACHMENT FIXTURE

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8 Claims. (Cl. 248—206)

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This invention relates to vacuum attachment devices and is particularly directed to improvements over the form of vacuum fixture disclosed in my copending application, Serial No. 103,970, filed July 11, 1949.

It is the principal object of this invention to provide vacuum attachment devices of universal application which can be used for supporting articles and devices without requiring any special supporting clips, or without requiring that any holes be drilled through metal.

It is another object to provide a vacuum attachment device employing the principle of operation set forth in said copending application but embodying an outer clamping member which is formed of a material suitable for the reception of wood screws.

Another object is to provide a vacuum attachment device employing a rubber-like diaphragm or suction member, the suction member being held in operative position by means of an annular metallic shell and the shell in turn being clamped by means of a central nonmetallic disk adapted to provide a mounting for a variety of supported articles and devices.

Another object is to provide a device of this type in which the inner portion of the annular shell overlies the outer periphery of a metallic plate imbedded within the rubber-like diaphragm.

Another object of this invention is to provide a device of this type in which all of the mechanical parts required to create the vacuum space within the periphery of the suction cup are confined within the shell and beneath the nonmetallic disk so that a substantial unobstructed flat surface area is available for attaching a variety of appliances.

Another object is to provide a vacuum attachment device of this type wherein the disk has an outer lip overlapping the inner portion of the annular shell. Other objects and advantages will appear more fully hereinafter.

In the drawings:

Figure 1 is a side elevation partly broken away showing a towel rack and supports therefor, the latter comprising a preferred embodiment of my invention.

Figure 2 is an elevation view partly broken away showing one of the vacuum attachment supports.

Figure 3 is a sectional plan view taken substantially on the lines 3—3 as shown in Figure 1.

Figure 4 is a sectional view similar to Figure 3

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showing a modified form of apparatus embodying my invention.

Referring to the drawings, the wall 10 having an impervious surface 11 is used as a supporting surface for the vacuum attachment device generally designated 12. The device includes a rubber-like diaphragm or suction cup 13 having a peripheral contact lip 14 provided with a groove 15. An annular shell 16 has an outer rim 17 which is received within the groove 15. The shell 16 has an inner rim 18 which overlies the outer periphery 19 of the metallic plate 20 which is imbedded within the rubber-like diaphragm 13 and bonded thereto. An internally threaded metallic element 21 is secured centrally of the plate 20 by any convenient means such as, for example, by welding, and a tension screw 22 is threaded into this element 21. A disk 23 has a central aperture 24 through which the tension screw 22 extends. A metallic washer 25 rests on the disk 23 and engages the head portion 26 of the screw 22. A peripheral lip 27 provided on the disk 23 overlies the inner rim 18 of the metallic shell 16.

When it is desired to mount the vacuum attachment device 12 on the wall 11, the disk 23 and shell 16 are removed from the diaphragm 13 by disconnecting the screw 22. The inner surface 28 of the diaphragm 13 is moistened if desired and the diaphragm is then pushed flat against the surface of the wall 11 so that substantially all of the air is extracted between the surfaces 11 and 28. The annular metallic shell 16 is then installed with its outer lip 17 in the groove 15 and the nonmetallic disk 23 is then installed over the shell 16 so that the lip 27 overlies the rim 18. The screw 22 is then inserted through the washer 25, and a screw driver (not shown) is used to turn the screw relative to the metallic threaded element 21. This action serves to create a vacuum space 29 between the surfaces 11 and 28 and to apply sealing force against the peripheral contact lip 14 of the diaphragm 13. That portion of the contact lip which lies under the outer rim 17 is subjected to relatively high compressive forces, thereby effectively preventing entrance of air into the vacuum space 29. Furthermore, since the outer diameter of the metallic plate 20 is greater than the inner diameter of the metallic disk 16, the material of the diaphragm 13 which is confined between the plate 20 and shell 16 in the region identified as 30 is also subjected to high compressive stresses with the result that air is prevented from leaking inwardly through this zone of compression. From

this description it will be understood that in order for atmospheric air to reach the vacuum space 29 from the outer exposed side of the wall 10, atmospheric air must pass through a zone of compression adjacent the metallic lip 17 or through a similar zone of compression adjacent the outer periphery 19 of the plate 20. In effect these two compression zones serve as concentric leakproof gaskets to prevent entrance of air into the vacuum space 29. These gaskets are located adjacent the inner and outer diameters of the metallic shell 16 which is itself impervious to the passage of air under atmospheric pressure.

The disk 23 may be formed of any material suitable for the reception of wood screws, and I have found that plywood is admirably suited for this use. Wood screws 31 may be used to attach any desired device or article, and it is unnecessary to drill any matching holes or attach any special brackets for mounting such articles and devices on the vacuum attachment device. As shown in the drawings, a towel rack assembly including a bar 32 and brackets 33 are mounted on the vacuum attachment device 12. Each of the brackets 33 may be provided with the usual mounting flange 34 and the wood screws 31 extend through openings provided in the flange. It will be understood that the towel rack assembly is shown for illustrative purposes only, and many other types of devices may be supported on the disk 23 in a similar manner. For example, such household articles as can openers, ice crushers, pencil sharpeners, soap dispensers, towel dispensers, may be conveniently supported on impervious surfaces such as provided by metal cabinets, porcelain or tile surfaces or the like. The mounting provided by this vacuum attachment may be quickly applied without requiring any holes to be drilled, and the surface of the metal, tile, glass, porcelain or other support is not marred by screws, nuts or bolts.

While I have shown and described my improved device in connection with a circular suction cup, it will be understood that the cup may be made in oval shape or even in a square or rectangular shape as desired, and that the cooperating parts of the device are shaped in a similar manner.

In the modified form of my invention shown in Figure 4 the underside 40 of the nonmetallic disk 23*a* is formed substantially flat and the inner periphery of the shell 16*a* is provided with a flat annular portion 41 instead of the rim 18. The disk 23*a* overlaps the flat annular area 41 and the disk is centered relative to the shell 16*a* by means of central screw 22*a*. The mode of operation of this form of my invention is substantially the same as that described above.

Having fully described my invention, it is to be understood that I do not wish to be limited to the details herein set forth, but my invention is of the full scope of the appended claims.

I claim:

1. A suction-type fastener comprising in combination: a resilient suction cup, a nonresilient shell closely conforming to the shape of the suction cup and having a central opening defining a continuous inner rim and a continuous outer rim adapted to compress a portion of the suction cup against a mounting surface, a nonresilient plate having its outer periphery embedded within a portion of the suction cup, the plate being larger than the central opening and confronting said opening, a threaded nonresilient element fixed to the nonresilient plate and protruding from the back face of the suction cup, a central nonmetallic member overlying the inner rim on the nonresilient shell and being provided with a central aperture, said nonmetallic member having a mounting face adapted to receive screw fastener elements, a screw element extending through the aperture in the member and into threaded engagement with said threaded element, the said inner rim of the shell lying near the outer periphery of the plate so that turning of the screw element serves to secure the non-metallic member on the shell and to clamp a continuous, relatively narrow zone of the suction cup under compression between the plate and the shell.

2. A suction-type fastener comprising in combination: a resilient circular suction cup, a nonresilient annular shell closely conforming to the shape of the suction cup and having a central opening defining an inner peripheral rim and a continuous outer peripheral rim adapted to compress a peripheral portion of the suction cup against a mounting surface, a nonresilient circular plate having its outer periphery embedded within a central portion of the suction cup, the plate being larger in diameter than said opening and confronting said opening, an internally threaded nonresilient element fixed to the nonresilient plate and protruding from the back face of the suction cup, a circular nonmetallic disk overlying the inner peripheral rim on the nonresilient annular shell and being provided with a central aperture, a screw extending through the disk aperture into threaded engagement with said internally threaded element, the said inner rim of the shell lying near the outer periphery of the plate so that turning of the screw serves to secure the non-metallic disk on the shell and to clamp a continuous, relatively narrow and annular zone of the suction cup under compression between the plate and the shell.

3. A suction-type fastener comprising in combination: a resilient suction cup, a relatively thin nonresilient annular shell closely conforming to the shape of the suction cup and having a central opening defining an inner peripheral rim and a continuous outer peripheral rim adapted to compress a peripheral portion of the suction cup against a mounting surface, a nonresilient plate having its outer periphery embedded within a central portion of the suction cup, the plate being slightly larger in size than the opening and confronting said opening, a threaded nonresilient element fixed to the nonresilient plate and protruding from the back face of the suction cup, a relatively thick nonmetallic disk having a peripheral lip overlying the inner rim on the nonresilient shell and being provided with a central aperture, a screw element extending through the disk aperture into threaded engagement with said threaded element, the said inner rim of the shell lying near the outer periphery of the plate so that turning of the screw element serves to clamp a continuous, relatively narrow and annular zone of the suction cup under compression between the plate and the shell and further serves to secure the disk on the shell.

4. In a vacuum attachment fixture, the combination of a resilient suction cup having a nonresilient element fixed centrally thereto and extending over a substantial portion of the area thereof and having its outer periphery imbedded in the suction cup, a nonresilient annular shell having a continuous outer rim engaging the outer

rim of the suction cup, the shell having an inner rim overlying the outer periphery of said nonresilient element to confine a continuous, relatively narrow and annular zone of the suction cup therebetween, a central disk formed of wood overlying the inner rim of said shell and having a central aperture, and mechanical means extending through the central aperture of the disk operatively connecting the nonresilient element with the disk for moving the central portion of the suction cup in a direction to produce a vacuum space inwardly of its outer rim.

5. In a vacuum attachment fixture, the combination of a resilient suction cup having a nonresilient element fixed centrally thereto and extending over a substantial portion of the area thereof and having its outer periphery imbedded in the suction cup, a relatively thin annular metal shell having a continuous outer rim engaging the outer rim of the suction cup, the shell having an inner rim overlying the outer periphery of said nonresilient element to confine a continuous, relatively narrow and annular zone of the suction cup therebetween, a relatively thick circular disk overlying the inner rim of said shell and having a central aperture, and mechanical means extending through the central aperture of the disk operatively connecting the nonresilient element with the disk for moving the central portion of the suction cup in a direction to produce a vacuum space inwardly of its outer rim.

6. A suction-type fastener comprising in combination: a rubber suction cup, a metallic annular shell closely conforming to the shape of the suction cup and having a continuous outer peripheral portion adapted to compress a peripheral lip of the suction cup against a mounting surface, a metallic plate bonded to the central portion of the suction cup and having its outer periphery embedded within a part of the suction cup, the metallic shell having an inner rim overlying the outer periphery of the plate, an internally threaded socket element fixed to the plate and protruding from the back face of the suction cup, a central wood disk overlying the inner rim of the metallic shell and being provided with a central aperture, a screw extending through the disk aperture into threaded engagement with said internally threaded socket element, the said inner rim of the shell lying near the outer periphery of the plate so that turning of the screw clamps a continuous, relatively narrow and annular zone of the suction cup under compression between the plate and the shell and secures the disk to the plate.

7. A suction-type fastener comprising in combination: a resilient suction cup, a relatively thin nonresilient annular shell closely conforming to the shape of the suction cup and having a continuous outer peripheral rim adapted to compress a peripheral portion of the suction cup against a mounting surface, a nonresilient plate having its outer periphery embedded within a central portion of the suction cup, a threaded nonresilient element fixed to the nonresilient plate and protruding from the back face of the suction cup, the annular shell having a flat annular flange adjacent its inner periphery overlying the outer periphery of the non-resilient plate, a relatively thick nonmetallic disk having a substantially flat inner surface overlying said annular flange on the shell and being provided with a central aperture, a screw element extending through the disk aperture into threaded engagement with said threaded element, the said inner annular flange on the shell lying near the outer periphery of the plate so that turning of the screw element serves to clamp a continuous, relatively narrow and annular zone of the suction cup under compression between the plate and the shell and further serves to secure the disk on the shell.

8. A vacuum attachment fixture as defined in claim 5, wherein the mechanical means includes a flat-headed screw countersunk into the disk so that the outer face of the head is flush with the outer surface of the disk.

LAURENCE W. VAN DUSEN.

REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
1,119,177	Krafft	Dec. 1, 1914
2,028,640	Zaiger	Jan. 21, 1936
2,047,658	Zaiger	July 14, 1936
2,233,870	Muter	Mar. 4, 1941

FOREIGN PATENTS

Number	Country	Date
3,660	Great Britain	Feb. 15, 1910
470,723	Great Britain	Aug. 20, 1937
651,820	Germany	Oct. 20, 1937