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S. L. JOHNSON

2,221,238

SUCTION CUP

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Fig. 1.

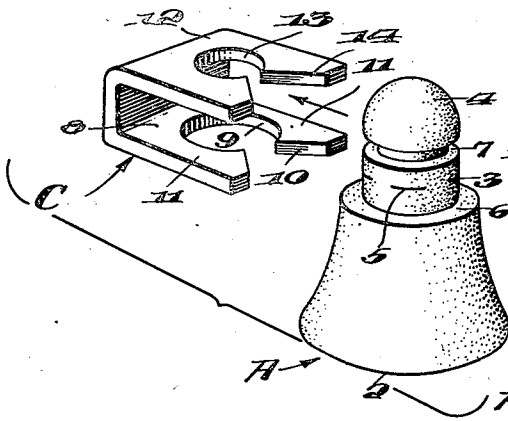


Fig. 2.

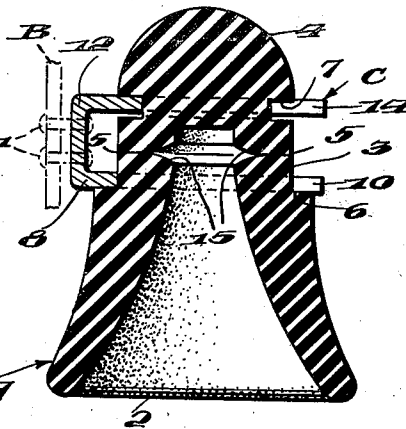


Fig. 3.

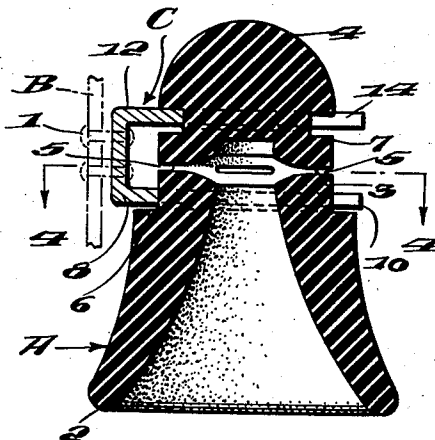
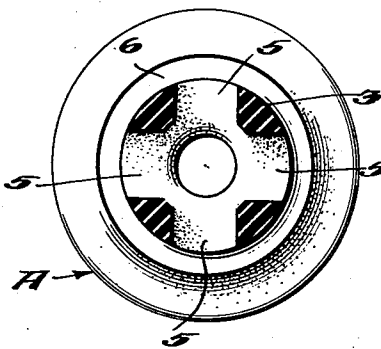


Fig. 4.



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UNITED STATES PATENT OFFICE

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SUCTION CUP

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1 Claim. (Cl. 248—206)

This invention relates to supports and more particularly to supporting feet adapted to hold a supported article releasably on a supporting surface and to resist sliding or shifting movement along the surface. Although supports embodying the invention may be used advantageously for supporting various kinds of articles they are particularly useful for supporting typewriters, adding machines, sewing machines or other articles which, due to their vibration in use, have a tendency to creep or shift on the supporting desk or table.

Heretofore it has been proposed to equip such articles with known or conventional suction cup supporting feet. Such supports, however, are inherently inconsistent in their action. Sometimes they do not maintain their suction for any considerable period and at other times, quite the contrary tendency is exhibited. They may hold to the supporting surface so tenaciously as to require a hard tug to lift or release the article.

An object of this invention is to provide a suction cup support which is adapted to maintain its suction or vacuum holding effect consistently.

Another object is to provide a suction cup support which is adapted easily to be separated from a supporting surface when desired.

A further object is to provide a suction cup support adapted to respond to vibrations of the article it supports for renewing or maintaining the suction or vacuum. Other objects will become apparent from a reading of the following description, the appended claims, and the accompanying drawing, in which:

Figure 1 is a perspective view of an embodiment of the invention including a suction cup and a device for connecting it to an article, the cup and connecting device being shown in separated relation;

Figure 2 is a vertical section through an assembled supporting device embodying the invention and showing diagrammatically a part of a supported article. In this view the parts are shown on an enlarged scale and in the positions occupied when the weight of the supported article is carried on the support;

Figure 3 is a section similar to Figure 2 but showing the parts in the positions they occupy when the article is being lifted to disengage the support from the supporting surface; and

Figure 4 is a horizontal section taken on the line 4—4 of Figure 2.

The illustrative embodiment of the invention

includes a suction cup A of rubber or other suitable resilient material attached as at 1 to a part B of a typewriter frame by means of a connecting device C.

The suction cup A includes a bottom surface-contacting rim 2, side walls 3, and a top 4. Four normally closed vent openings or slits 5 extend through the side walls intermediate the bottom rim 2 and top 4. An annular ledge or seat 6 extends around the cup side walls below the slits 5 and a groove is formed in side walls adjacent the top 4 and above the slits 5.

The connecting device C is of general channel shape and includes a bottom flange 8 formed with a circular opening 9 adapted to receive the side walls 3 of the cup and with an entrance opening 10 for permitting the cup to be inserted laterally into the opening 9. The flange portions on opposite sides of the opening 9 provide foot parts 11—11 adapted normally to rest upon the circumferential ledge or seat 6 of the cup. The top flange 12 of the device C is formed with a circular opening 13 adapted to receive the cup top in the plane of the groove or slot 7, an entrance opening 14 facilitating insertion of the cup into the opening 13. Although the seat 6 is shown as being annularly continuous, it will be clear that portions thereof on opposite sides of the cup constitute seats each adapted to support one foot part 11. Similarly, oppositely disposed portions of the groove 7 cooperable respectively with spaced portions of the top flange 12 constitute horizontal slot portions.

In operation, the parts normally would be positioned as shown in Figure 2 with the weight of the article B supported through the device C on the ledge or seat 6 of the cup. In this position the top flange 12 is in contact with but does not press substantially against the undercut surface or top wall of the groove 7 and is disposed slightly above the bottom wall thereof. In order to create a suction or vacuum within the cup to cause the latter and the article B to be held firmly on a supporting surface the article B is pushed downwardly. Force applied downwardly against the seat 6 partially collapses the cup and builds up air pressure therein. The increased pressure within the cup opens the normally closed slits 5 expelling air from within the cup. The clearance between the bottom of the top flange 12 and the bottom of the groove 7 permits the upper part of the cup to stretch vertically to effect such opening of the slits. Preferably, the inner ends of the slits are flared as shown at 15 in order to promote initial open-

ing of the slits and egress of air from the cup. When pressure thus applied to the article B is removed, the cup will tend to resume its normal form but will be prevented from so doing by closing of the slits 5 resulting in the creation of vacuum within the cup. It will be observed that when loading of the cup is removed and the latter returns partially towards its initial position there will be less air pressure within the cup than on the outside thereof. Consequently, the outside pressure acting downwardly on the top of the cup will tend to maintain the slits 5 closed, thus preventing the entrance of air into the cup.

When the support is used to carry an article or machine such, for example, as a typewriter, adding machine, or sewing machine, partaking of some vibration when in use, the constant effect of the vibrations will be repeatedly to collapse the cup a very small amount and to exhaust therefrom any air which may have leaked in under the rim 2. In this way an effective holding vacuum is maintained even though the cup is positioned on a somewhat rough supporting surface which otherwise would permit the suction soon to be lost and the cup rendered ineffective for holding the article in the desired position.

When the article is moved vertically to lift it clear of the supporting surface the top flange 12 of the connecting device will press upwardly against the top wall of the groove 7 tending to lift the top 4 and to stretch the side walls 3 of the cup, thereby opening the vent slits 5 and permitting air to enter into the cup to relieve the vacuum and release the cup from the supporting surface. The side walls preferably are

straight or vertical immediately above the seat 6 in order that there will be no obstruction to relative upward movement of the flange 8 of the connecting device C. The positions of the parts during lifting of the article and disengagement of the support from the supporting surface are shown in Figure 3, wherein the top flange 12 is pressing upwardly against the undercut top surface of the groove 7, the slits 5 are open and the bottom flange 8 of the device C has moved clear of the seat 6.

It will be observed that the slits 5, though normally closed, are adapted to open in response to vibration of a supported article for maintaining the required degree of vacuum or suction and also are adapted to be opened easily for destroying the vacuum in response to the application of vertical force to the top of the cup.

The support shown for the purposes of illustration embodies the invention in the now preferred form, but it will be understood that changes may be made without departing from the invention as defined in the claim.

I claim:

A suction cup having a normally closed vent opening in its side wall, a substantially horizontal ledge projecting outwardly from its side wall below said opening and adapted to serve as a supporting seat, and a substantially horizontal groove extending from its outside surface into the side wall above said opening and adapted to receive a device for lifting the cup, said side wall being stretchable by application of lifting force to said cup at said groove, and said vent opening being adapted to be opened by such stretching of said side wall.

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