Dec. 18, 1962 C. E. STEVENS 3,069,186

SUCTION NOZZLE

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FIG. 1.

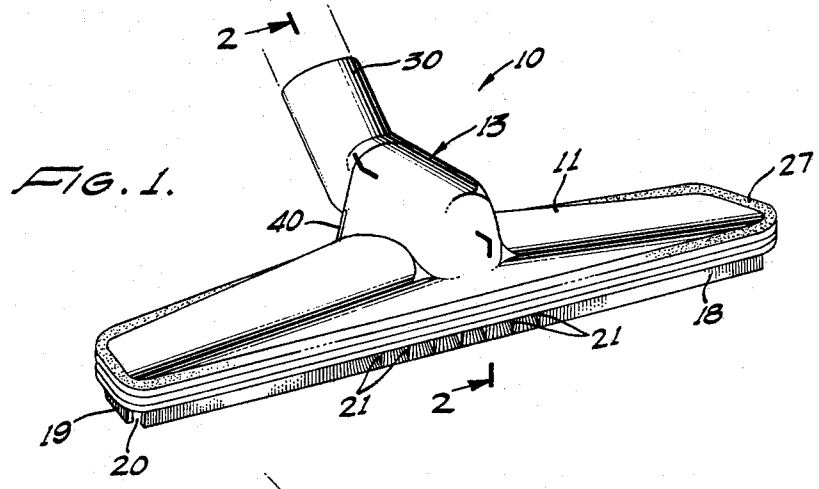


FIG. 2.

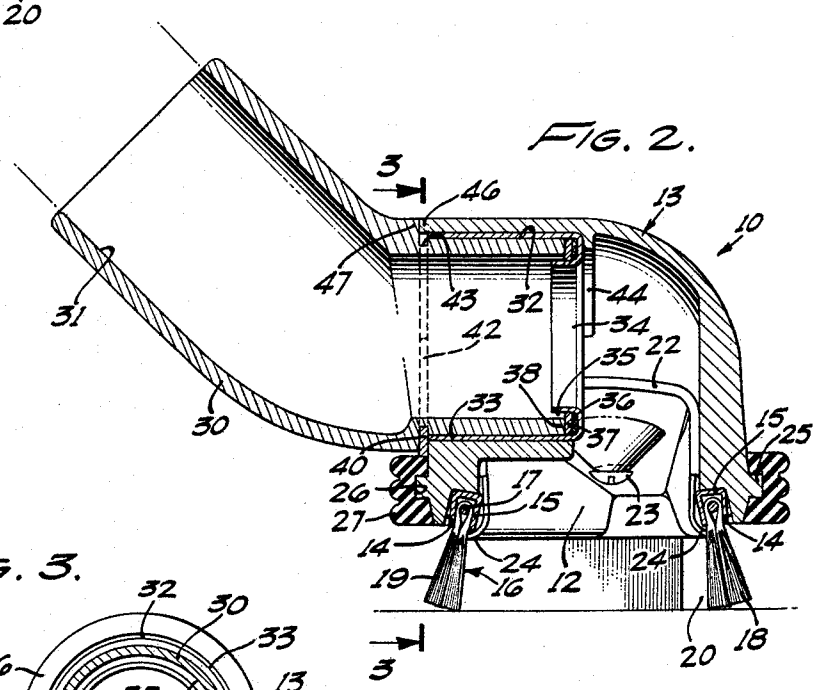
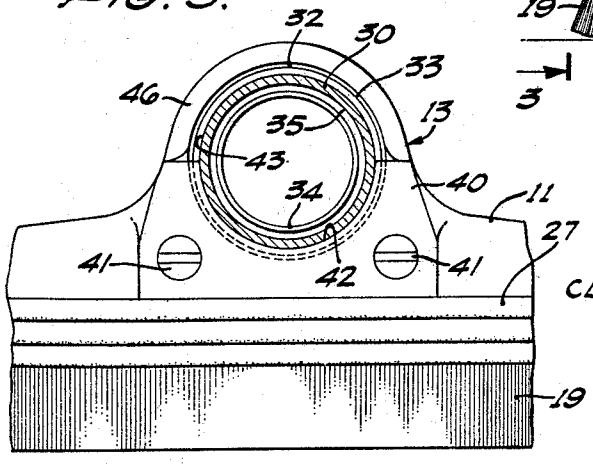


FIG. 3.



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FIG. 4.

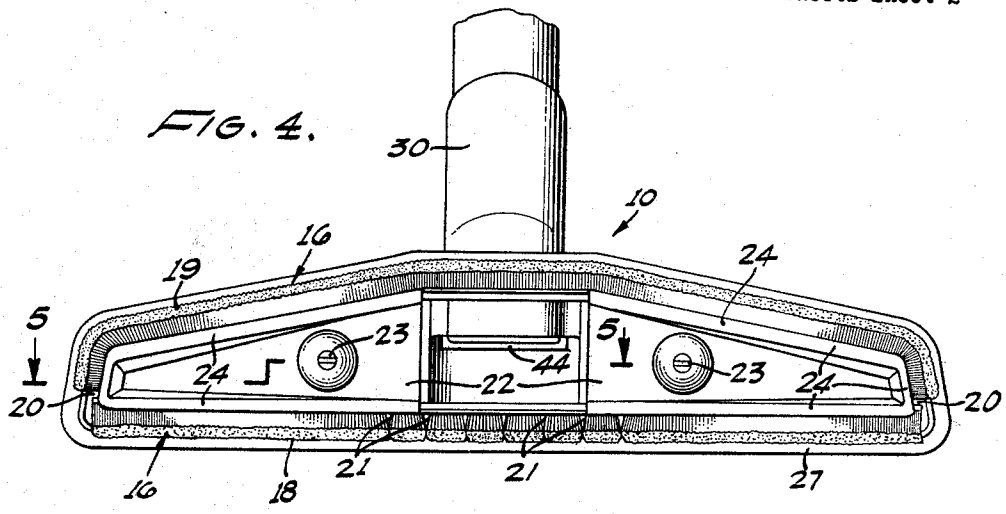
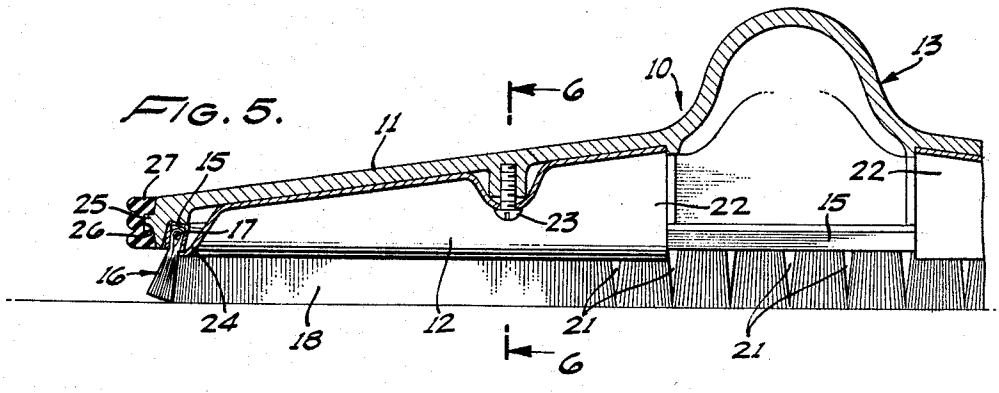


FIG. 5.



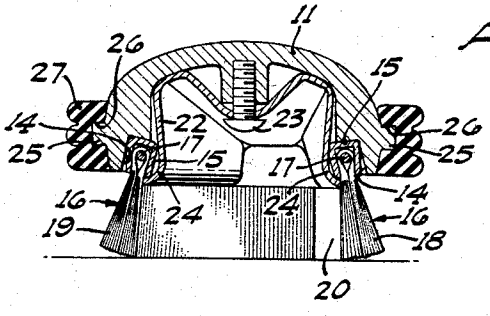


FIG. 6.

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3,069,186

SUCTION NOZZLE

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2 Claims. (Cl. 285—7)

This invention relates to suction nozzles for suction cleaners, and more particularly to a new nozzle construction provided with an improved swivelling coupling assembly and various other features to be described in detail below.

The function of a suction cleaning nozzle is to effect a rapid flow of air over a dirt-laden surface in a manner to remove the dirt and transport it to a filtering and dirt collecting chamber. Only free dirt or dirt which can be easily dislodged from the surface will be carried away in the suction air stream. If the surface being cleaned is a carpet the dirt tends to adhere to the pile with a tenacity frequently greater than the dislodging effect of the air stream.

A further important feature of the invention is a swivelling coupling at the suction air outlet formed inexpensively and providing an air-tight relatively free swivelling connection between the nozzle body and an elbow adapted to be connected to a suction wand or hose. Of particular interest is the use of a bearing insert for rotatably seating the end of the elbow and forming a retaining cavity for a resilient sealing gasket and a protective wear ring therefor.

It is primary object of this invention to provide an improved suction nozzle avoiding the disadvantages of prior constructions and which prevents leakage of air at its swivelling coupling and assures a more effective flow of air into its suction inlet.

Still another object of the invention is to provide a suction nozzle having a new and improved coupling at the outlet thereof including simple means for holding the parts assembled.

Additionally it is an object of the invention to provide a new and improved swivelling connection at the suction air outlet of a floor nozzle featuring means eliminating air leakage while permitting relatively free swivelling between an elbow member and a nozzle body.

A further object of the invention is the provision of a combined bearing insert and air seal retainer for use between a nozzle body and a swivelling elbow coupling member.

These and other more specific objects will appear upon reading the following specification and claims and upon considering in connection therewith the attached drawings to which they relate.

Referring now to the drawings in which a preferred embodiment of the invention is illustrated:

FIGURE 1 is a perspective view of the suction nozzle incorporating the present invention;

FIGURE 2 is a transverse sectional view through the nozzle and the swivelling elbow taken along line 2—2 on FIGURE 1;

FIGURE 3 is a sectional view through the swivelling coupling upon the line 3—3 on FIGURE 2;

FIGURE 4 is a bottom plan view of the nozzle looking into the suction inlet;

FIGURE 5 is a partial longitudinal section on the broken line 5—5 on FIGURE 4; and

FIGURE 6 is a cross-sectional view through the nozzle body taken at the line 6—6 on FIGURE 5.

Referring again to the drawings, 10 indicates generally a suction nozzle having a hollow main body 11 formed in any suitable manner as by die casting. Body 11 is formed as an elongated downwardly facing air inlet opening 12 and a central tubular air outlet housing 13 opening rearwardly and in a direction at right angles to major dimension of the suction air inlet 12. As best shown in FIGURES 2, 5 and 6, the inlet rim of the suction nozzle is provided with a continuous seat 14 having side and top walls which lie at right angles to one another, the side wall flaring outwardly relative to a median plane normal to the nozzle inlet. Seat 14 seats a pair of brushes or bristle strips 18 and 19, each having a U-shaped metal strip 15 holding bristles 16 clamped about a rigid core member 17. As will be observed in FIGURE 4, straight bristle strip 18 extends the full length of the forward edge of the nozzle inlet, whereas strip 19 is bent into a generally U-shaped configuration dimensioned to nest snugly against the similarly shaped portions of seat 14 extending along the rear edge and across the ends of the nozzle inlet. By reference to FIGURES 2, 4 and 6, it will be noted that the adjacent ends of brushes or bristle strips 18 and 19 are slightly spaced to provide narrow openings 20 at the opposite forward corners of the nozzle, the size of these openings being reduced somewhat under operating conditions by the tendency of the bristles to flare toward one another across the opening. However, this flaring is insufficient to close the opening and with the nozzle connected to a source of suction a high velocity jet of air flows inwardly through each opening 20.

As shown in FIGURES 1, 4 and 5 the central portion of brush 18 is provided with a plurality of spaced openings 21 formed by cutting away or omitting bristles at the points indicated. These openings are positioned centrally of the front of the nozzle and through them high velocity air jets flow like the jets flowing through openings 20 at the forward corners of the nozzle.

It will be understood that bristle strips 18 and 19 may initially form part of the same continuous strip, each strip being cut to appropriate length and then separately processed for mounting against shoulder 14. This processing includes cutting or punching bristles from strip 18 to form openings 21, and placing strip 19 in a forming die to shape its back to conform to the seat 14 along the rear edge and the end of the nozzle body. These strips are secured in the nozzle by placing them in the seat 14 and tightening the two clamping plates 22, 22 in place against the interior walls of the nozzle by means of screws 23. Clamping plates 22 are stamped from sheet metal and shaped to fit against the inner surface of the nozzle body with their out-turned peripheral edges 24 resiliently engaging the adjacent edges of the U-shaped backing 15 of the bristle strips. In this manner, the adjacent ends of both strips are locked in assembled position by a common clamping plate.

Surrounding the lower perimeter of nozzle body 11 is a continuous integral flange 25 having outwardly flaring opposite side walls adapted to interlock with a similarly shaped groove 26 formed in a continuous encircling strip of resilient material 27. Strip 27 may be extruded or

molded from rubber, plastic or like resilient material and provides a furniture guard to protect furniture from direct contact with the metal nozzle body.

Referring now to FIGURES 1 to 3, it will be seen that the swivelling coupling by which the nozzle is adapted to be connected to the suction hose or wand of a suction cleaner comprises a hollow elbow member **30** having the shape illustrated in FIGURE 2. The upwardly extending discharge end **31** is adapted to receive telescopically the end of a wand or other coupling member for a suction hose, while the cylindrical exterior surface **32** at its lower end has a close rotating fit with the interior cylindrical wall of a bearing insert **33** preferably formed from stamped sheet metal. The exterior surface of insert **33** has a press fit with the inner wall of annular outlet housing **13** and includes a return bend portion **34** at its inner end shaped to form an annular channel **35** to seat a resilient sealing gasket **36** formed of felt, cork, rubber or the like. Overlying gasket **36** with at least one peripheral edge frictionally engaging a side wall of channel **35** is a flat metal ring **37** retaining the gasket in assembled position and providing a wear plate for it. In the latter connection it will be understood that the inner end **38** of the elbow **30** bears against the wear plate **37** in a manner to compress gasket **36** slightly assuring the maintenance of an air-tight seal between elbow **30** and the nozzle body.

Holding elbow **30** assembled to the nozzle and within the bearing insert **33** is a keeper plate **40** secured to the nozzle body **11** by screws **41** as shown in FIGURE 3. The arcuate edge **42** of keeper **40** seats within an annular groove **43** in elbow **30** formed at the junction of its bearing surface **32** with its larger diameter main body portion **31**. During assembly bearing insert **33** is pressed into housing **13** until it abuts the integral stop **44** projecting from the inner wall of the nozzle body, its outer end then lying flush with the seating surface for the keeper **40**. Since the position of the annular groove in elbow **30** is accurately positioned with respect to its inner end **38** and with respect to the axial length of the bearing insert the inner end of the elbow will bear against wear plate **37** and compress gasket **36** sufficiently to prevent air leakage between the elbow and the nozzle body. It will also be understood that the housing **13** of the nozzle is formed with a semi-circular overhanging portion **46** overlying keeper plate **40** and having an end surface flush with the outer surface of this keeper plate to provide a continuous end bearing surface between the nozzle body and the adjacent radial surface **47** of elbow **30**.

The method of assembling the swivelling elbow coupling will be apparent from the foregoing. Following assembly of gasket **36** and wear ring **37** within groove **35** of bearing insert **33**, the latter is pressed into the air discharge housing **13** until its inner end abuts stop **44** and its outer end lies flush with the bottom of the mounting recess for keeper plate **40**. The arcuate edge **42** of keeper **40** is inserted in groove **43** of the elbow and the latter is telescoped into the bearing insert after which screws **41** are assembled to lock the keeper in place. As the screws are tightened its edge **42** bears against the inner side of groove **43** to hold end **38** of the elbow pressed against wear plate **37**. The pressure so applied to the wear plate, although providing assurance against air leakage around the end of the elbow does not interfere objectionably with the free swivelling of the elbow with respect to the nozzle body. Additionally, the lower edge of the clip may, if desired, compress the adjacent edge of the bumper **14** to aid in retaining it in place. When assembled as described, the suction nozzle is in readiness for connection to a suction cleaner in the usual manner.

In operation, the nozzle is placed on the surface to be cleaned, the weight of the nozzle being borne by the bristles of strips **18** and **19**, and primarily by those on the interior sides of the strips owing to the angle of flare and the trim of their free ends. Due to the outward inclination of bristle mounting seat **14**, the bristle tufts incline outwardly and the inner bristles contact the surface being cleaned. The forward and backward movement of the nozzle across the floor will, of course, deflect the bristles in a manner tending to bring a greater part of the bristle ends into contact with the surface at one side of the nozzle. This will not be true of the ends of the bristles along the other side of the nozzle with the result that these bristles will flex outwardly and offer a minimum resistance to the flow of air directly across the floor surface and beneath the ends of those bristles into the nozzle inlet. The high velocity air flow into the nozzle takes place not only across the surface of the carpet but also downwardly and through the carpet pile as the pile is progressively opened by the passages of the bristle ends thereover. This air entrains dirt from the pile and carries it upwardly into the nozzle and to the cleaner. Reversal of the direction of nozzle movement across the floor reverses the direction of flexing of the bristles and causes the greater inflow of air to take place beneath the bristles on the opposite side of the nozzle. Owing to the large number of bristles and their compact arrangement the air flow through the bristles is restricted and the major part of the air flows beneath their ends and through the inlet openings **20**, **21**.

The provision of openings **20**, **20** between the ends of the bristle strips at the forward corners of the nozzle provides high velocity air jets useful in cleaning dirt from corners. The action of these inlets is increased by positioning one end of the nozzle in the corner to be cleaned and pressing downwardly on the bristles to minimize the inflow of air therebeneath. In consequence, an increased flow of air takes place through openings **20** thereby entraining dirt lodged in the corner being cleaned. Openings **21** along the central portion of forward strip **18** may be employed similarly to entrain dirt from adjacent baseboards and furniture.

Should either bristle strip become damaged or worn excessively it may be quickly replaced by loosening retainer screws **23**, removing clamping plates **22** and replacing the damaged strip or strips with a new one. Thereafter the clamping plates **22** and screws **23** are replaced.

Another feature of the present nozzle design is the action of inturned lip **34** of the bearing insert **33** in providing a stream-lined flow of dirt-ladened air past the junction of the nozzle body with swivelling elbow **30**. Additionally, it will be apparent that lip **34** serves as a dirt guard preventing dirt from collecting in gasket **36** and interfering with its air sealing action.

While the particular suction nozzle herein shown and disclosed in detail is fully capable of attaining the objects and providing the advantages hereinbefore stated, it is to be understood that it is merely illustrative of the presently preferred embodiments of the invention and that no limitations are intended to the details of construction or design herein shown other than as defined in the appended claims.

I claim:

1. An air-tight swivelling coupling for the outlet of a suction cleaning nozzle, comprising a main suction nozzle body having a tubular outlet opening, a sheet metal bearing sleeve having an inturned end, said sleeve having a press fit within said nozzle outlet, resilient gasket means seated within the inturned end of said sleeve, and a combined gasket retainer and wear ring overlying said gasket and frictionally engaging a wall of said sleeve to hold said gasket in place therein, said sleeve being adapted to seat rotatably and snugly therein the cylindrical end of a rigid coupling member having a portion bearing against said wear ring.

2. An air-tight swivelling coupling as defined in claim 1 including an elbow provided with a cylindrical end forming a close running rotary fit with said bearing sleeve

with its end resting against the wear ring for said gasket, and means holding said elbow assembled within said sleeve with the end of the elbow bearing against said wear ring and cooperating therewith in providing an air-tight seal while leaving said elbow relatively free for rotation with respect to said sleeve.

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