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MOTORIZED PUMP MOUNTING MEANS FOR AUTOMATIC DISHWASHER

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Sheet 2 of 2

FIG. 2

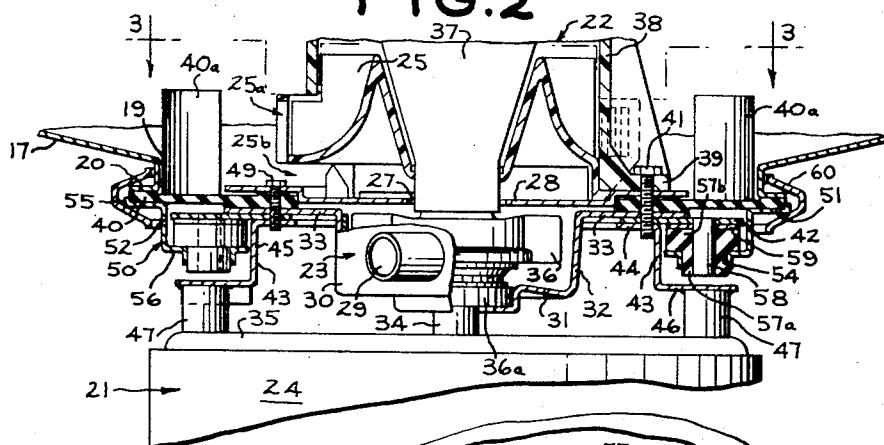


FIG. 3

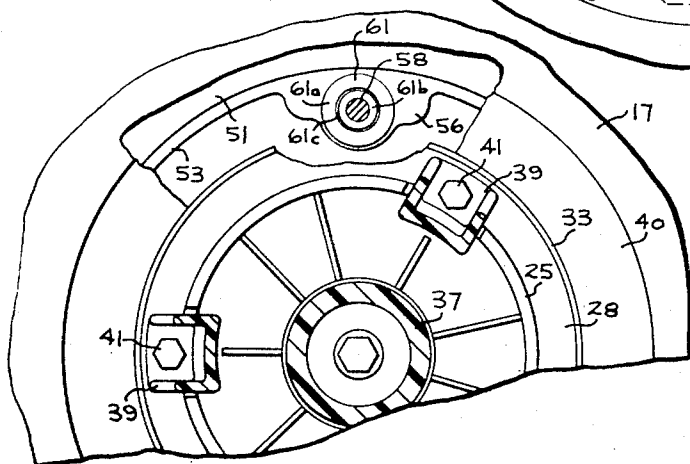
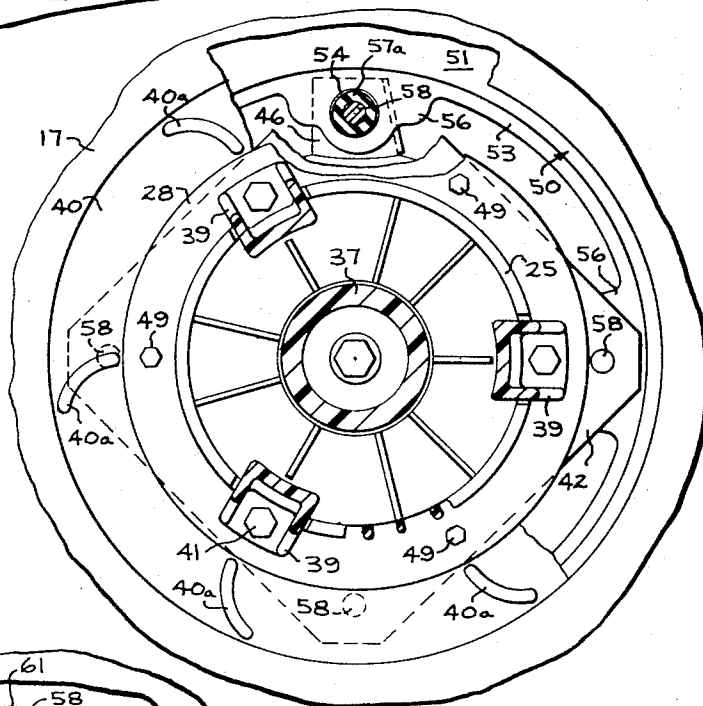


FIG. 5

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1

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MOTORIZED PUMP MOUNTING MEANS FOR AUTOMATIC DISHWASHER

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10 Claims

ABSTRACT OF THE DISCLOSURE

Fluid-sealing shock-absorbing mounting means for suspending a motorized pump assembly from a shouldered sump opening in the bottom wall of the wash chamber of an automatic washing machine. The mounting means includes a flexible, generally planar, solid ring-like boot and a substantially rigid support ring. The boot inner end is fluid-sealed to a shoulder or flange on the pump assembly and the boot outer end is sandwiched between the sump opening shoulder and the support ring outer end in a fluid-sealing relationship. The support ring inner end receives resilient shock-absorbing means connected to the pump assembly. A plurality of erect circumferentially spaced transverse fins are provided on the boot between its inner and outer ends and are received within the sump opening to guide installation of the pump assembly therein and to mitigate pump surging.

BACKGROUND OF THE INVENTION

Field of the invention

This invention relates generally to automatic washing machines and, more particularly, to means for mounting a motorized pump assembly on a shouldered sump opening in the bottom wall of the machine wash chamber.

Although not limited in its usefulness thereto, the present invention is particularly adapted for use in an automatic dishwasher.

The bottom of a dishwasher wash chamber is usually defined by a bottom wall having a centrally depressed portion forming therein a sump having a shouldered opening in its bottom. Disposed within the sump opening and supported by its shoulder is a vertically-arranged motorized pump assembly comprising an upper or wash pump and a lower or drain pump mounted on the upper end of a motor. The motor is of an electrically reversible type and, in one direction of rotation, draws water from the sump into an inlet at the bottom of the wash pump and directs a flow of water upwardly into the wash chamber. Opposite rotation of the motor draws sump water to an inlet at the top of the drain pump and propels it downwardly and outwardly through an effluent discharge which is connected to a normal household sewer system.

The lower or drain pump housing is conventionally provided with a flange or shoulder adjacent its upper or inlet end which has an outer diameter equal to that of the sump opening shoulder. Common practice is to assemble the pumps and motor and, then, mount the assembly to the sump opening by clamping the drain pump and sump opening shoulders together with a gasket interposed between them to prevent water leakage between their opposite faces.

It is desirable that the connection between the pump assembly and the sump opening shoulder minimize vibration and noise transmission from the pump assembly to the wash chamber during operation of the machine. This is particularly desired in an automatic dishwasher since the dishwasher is installed in the owner's kitchen, where excessive noise is especially annoying, and, moreover, the

2

wash chamber serves as a sounding board to amplify any noise transmitted thereto.

Automatic dishwashers are mass produced and, therefore, even the smallest cost reduction per unit results in significant savings to the manufacturer during the course of the year. Thus, support means which will reduce the parts costs are desirable not only from the standpoint of manufacture but also from that of a consumer, since cost savings will eventually pass to the consumer.

Description of the prior art

U.S. Patent No. 3,242,871 discloses complex liquid-sealing shock-absorbing means for mounting a motorized pump assembly to a shouldered sump opening in the bottom wall of the wash chamber of an automatic washing machine. However, the mounting means described by this prior-art patent require an elaborate tube-like seal and an intricate support ring for attaching the seal to the sump housing shoulder and receiving a shock-absorbing means which are connected to the pump assembly.

SUMMARY OF THE INVENTION

The present invention provides improved, lower cost fluid-sealing shock-absorbing means for mounting a motorized pump assembly to the shouldered sump opening of an automatic washing machine. Briefly described, in its preferred embodiments, the invention comprises: (A) a flexible, generally planar, solid ring-like boot including (1) a radially inner end having a diameter smaller than the outside diameter of an annular flange or shoulder on the exterior of the pump assembly and (2) a radially outer end having a diameter greater than the inside diameter of the sump opening shoulder, (B) means for fluid-sealing the boot inner end to the pump assembly; and (C) means for fluid-sealing the boot outer end to the sump opening shoulder and resiliently mounting the pump assembly to the sump opening shoulder, including (1) a substantially rigid support ring having (a) a radially outer end alignable with the sump opening shoulder and (b) a radially inner end receiving resilient shock-absorbing means, (2) means for joining the support ring outer end to the sump opening shoulder with the boot outer end sandwiched therebetween in a fluid-sealing relationship, and (3) means for connecting the shock-absorbing means to the pump assembly.

BRIEF DESCRIPTION OF THE DRAWINGS

The present invention is illustrated in the accompanying drawings, wherein:

FIGURE 1 is a side elevational view, with parts broken away and with parts in section, of an automatic dishwasher incorporating the present invention;

FIGURE 2 is an enlarged fragmentary side elevational view, with parts broken away and with parts in section, of the motorized pump assembly mounted to a wash chamber sump opening by one embodiment of the present invention;

FIGURE 3 is a sectional plan view, with parts broken away, taken substantially along line 3—3 of FIGURE 2;

FIGURE 4 is a view similar to FIGURE 2 of another embodiment of the present invention;

FIGURE 5 is a sectional plan view, with parts broken away, taken substantially along line 5—5 of FIGURE 4; and

FIGURE 6 is a view similar to FIGURE 2 of yet another embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

Referring now to the drawings, FIGURE 1 illustrates an automatic dishwasher 10 including an outer cabinet 11 having therein a wash chamber 12. The cabinet 11 has

a large access opening in one wall thereof and is provided with a closure member or door 13 to seal the access opening during operation of the dishwasher. The door is pivotal about a hinge means 14 adjacent the bottom of the door. Door latch means (not shown) are provided to retain the door 13 in the closed position, as shown in FIGURE 1.

Disposed within the wash chamber 12 are a pair of dish-supporting racks 15 and 16 which are adapted to receive and support articles to be washed, rinsed and dried within the wash chamber 12. Although the racks 15 and 16 do not form an important part of the present invention, and therefore will not be discussed in detail, it is to be understood that the racks 15 and 16 are suitably supported within the wash chamber 12 so that they may be at least partially withdrawn through the access opening when the door 13 is in its open position. This withdrawal facilitates loading and unloading of the racks.

The lower extremity of the wash chamber 12 is defined by a bottom wall 17 having a central depressed portion forming therein a sump 18. The sump 18 has an opening 19 through its bottom center which is provided with an outwardly extending annular rim or shoulder 20.

A vertically-arranged motorized pump assembly 21 passes through the center of the sump opening 19 and is mounted to the sump opening shoulder 20 by fluid-sealing shock-absorbing mounting means constructed in accordance with the present invention.

The pump assembly 21 may be of the general nature of that described in detail in U.S. Patent 3,084,701, issued to A. L. Hardy et al. on Apr. 9, 1963, and assigned to the General Electric Company, assignee of the present invention. The pump assembly 21 basically comprises an upper or wash pump 22 of the axial flow type and a lower or drain pump 23 of the centrifugal type mounted on the upper end of an electric drive motor 24. As best illustrated in FIGURES 1 and 2, the wash pump 22 extends upwardly into the sump 18, while the drain pump 23 and motor 24 extend downwardly from the sump opening 19.

The motor 24 is of the electrically reversible type and, in one direction of rotation of the motor 24, the wash pump 22 draws liquid from the sump 18 through an upper inlet 25a of an inlet divider member 25 interposed between the pumps 22 and 23 and propels it upwardly into a reaction type spray arm 26 that is rotatably mounted on the top of the wash pump 22. The spray arm 26 is provided with a plurality of orifices which direct a spray upwardly within the wash chamber 12 to impinge upon articles supported by the racks 15 and 16. Certain of these orifices are directed such that the reaction force of the liquid issuing therefrom causes spray arm 26 to rotate. In the opposite direction of rotation of the motor 24, the drain pump 23 draws liquid from the sump 18 through a lower inlet 25b of the member 25 and a central aperture 27 in drain pump cover 28 and propels it outwardly through an effluent discharge tube 29 in its housing 30 which is connected to a normal household sewer system (not shown) by suitable conduit means (not shown).

A normal complete operational cycle of the dishwasher 10 may include an initial admission of water to the wash chamber 12 by means of a water inlet valve (not shown) followed by the energization of the motor 24 in the direction wherein the wash pump 22 propels the water from the sump 18 up through the spray arm 26. This operation would comprise a pre-rinse and may last for two or three minutes. At this point, the motor 24 would be de-energized and then re-energized in the opposite direction of rotation so that the drain pump 23 would drain the liquid from the sump 18 and pump it into the household sewer system. Following, this another charge of water might be admitted to the wash chamber 12 and a detergent dispenser (not shown) would be energized to dispense a predetermined amount of detergent into the water and the motor 24 would be energized in the direction to effectuate a wash action upon the articles within the wash chamber 12. This operation, of course, would be the wash operation

and may last for several minutes. Once again, the motor 24 would be reversed to drain the wash chamber 12. Following this, there would be at least one and perhaps two, post-rinses identical to the afore-described pre-rinse. After termination of the last post-rinse, an electrical resistance heating element (not shown) would be energized to facilitate drying of articles supported by the racks 15 and 16 by evaporation of the liquid remaining thereon. The foregoing series of operations is conventional, and as is well known in the dishwasher art, a sequence control means (not shown) is provided to energize and de-energize the appropriate electrical elements of the dishwasher 10 in a predetermined sequence.

The above-described operation of the dishwasher 10 involves frequent starting, stopping and reversing of the pump assembly 21. In the past, the pump assembly 21 has often been rigidly mounted to the sump opening shoulder 20. Such a rigid mounting has resulted in transmission of shocks or vibrations produced by the starting, stopping, reversing and running of the pump assembly 21 to the wash chamber 12, which, in turn, has acted as a sounding board amplifying the noise level of the vibrations transmitted to it. Since the dishwasher 10 is normally installed in its owner's kitchen, where excessive noise is especially annoying, it is desirable that the mounting between the pump assembly 21 and the sump opening shoulder 20 be such as to minimize vibration and noise transmission from the pump assembly 21 to the wash chamber 12 during operation of the dishwasher. It is also desirable for obvious reasons that the pump assembly 21 be mounted to the sump opening shoulder 19 in a liquid-tight or fluid-sealing relationship.

As best illustrated in FIGURES 2 and 3, the drain pump housing 30 has a centrally apertured floor 31, an upwardly extending wall 32 and an outwardly extending flat peripheral rim or shoulder 33 adjacent its open upper end. The apertured housing floor 31 loosely surrounds a drive shaft 34 which extends upward from the axial center of an end bell 35 formed on the upper end of the housing of the motor 24. The drive shaft 34 mounts a centrifugal pump impeller 36 for rotation within the drain pump housing 30 beneath the drain pump cover 28 which loosely surrounds the shaft 34 and rests atop the drain pump housing shoulder 33. The inlet divider member 25 is centrally bored, loosely surrounds the drive shaft 34 and rests atop the drain pump cover 28. An axial flow pump impeller 37 is mounted to the drive shaft 35 above double-inlet member 25 for rotation within a housing 38 of the wash pump 22. The wash pump housing 38 is supported atop the drain pump cover 28 in an interlocking relationship with the inlet divider member 25 by an annular series of three feet 39 which are preferably integrally formed on the lower outer periphery of the wash pump housing 38. Suitable fluid-sealing means 36a formed as part of the drain pump impeller 36 are provided between the drive shaft 34 and the apertured floor portion 31 of the drain pump housing 30 to prevent liquid leakage onto the motor 24.

In accordance with the present invention, the radially outer dimensions of the drain pump cover 28 and shoulder 33, the inlet divider member 25 and wash pump housing feet 39 are made substantially smaller than the inside diameter of the sump opening 19, and generally planar, solid ring-like flexible boot 40, which is preferably formed of a molded elastomeric material, is provided to bridge the resultant annular gap between the sump opening and drain pump shoulders 20 and 33. The radially inner end of the boot 40 is made with a diameter that is less than the outside diameter of the drain pump shoulder 33, while the radially outer end of the boot 40 is made of a diameter larger than the inside diameter of the sump opening shoulder 20.

The present invention is particularly concerned with providing improved lower cost means for mounting the pump assembly 21 to the sump opening shoulder 20 in a

fluid-sealed shock-absorbing relationship. These means basically include, the boot 40, a substantially rigid support ring 50 and an axially-split annular clamping ring 60. The inner end of the boot 40 is fluid-sealed to the pump assembly drain pump housing shoulder 33 and the boot outer end is sandwiched between the sump opening shoulder 20 and the support ring outer end in a fluid-sealing relationship by the clamping ring 60. The support ring inner end receives resilient shock-absorbing means which are connected to the pump assembly 21. With this arrangement, the weight of the pump assembly 21 is transmitted through the shock-absorbing means to the support ring 50 and thence to the wash chamber bottom wall 17 via the clamping ring 60 and sump opening shoulder 20. Hence, the vibrations resulting from the starting, stopping, reversing and running of the pump assembly 21 during operation of the dishwasher 10 buffered by the shock-absorbing means and the intensity of the vibrations transmitted to the wash chamber 12 and the noise resulting therefrom are considerably reduced.

In the embodiment shown in FIGURES 2 and 3, the radially inner end of the boot 40 is joined to the pump assembly 21 in a liquid-tight relationship by sandwiching it between the radially outer ends of the drain pump cover 28 and shoulder 33 and clamping it therebetween with bolts 41 which are passed downwardly through each of the upper housing feet 39, the drain pump cover 28, boot 40 and drain pump housing shoulder 33, respectively, and into an annular series of threaded openings provided in a substantially square rigid support plate 42 which lies beneath drain pump housing shoulder 33. The support plate 42 is, in turn, rigidly connected to the motor end bell 35 through a substantially rigid support member or bracket 43. Both the support plate 42 and bracket 43 are centrally bored to receive the wall portion 32 of the drain pump housing 30 and the support bracket 43 has a section removed therefrom to permit passage of the effluent discharge tube 29.

The support bracket 43 has a flat upper end 44, a downwardly extending wall 45 and annular series of four tabs 46 which extend outwardly from the lower end of its wall 45. The bottom face of each of the tabs 46 is fixed by welding or other suitable fastening means to an internally threaded tubular spacer 47 that is threaded atop the upper end 48 (FIGURE 4) one of an annular series of four bolts (not shown) which extend axially through the housing of the motor 34 and protrude upwardly from the end bell 35 adjacent its circumferential edge. The support plate 42 is supported atop the flat upper end 44 of the mounting bracket 43 with its four corners respectively aligned over and spaced above the bracket tabs 46, and is secured to the bracket 43 by additional bolts 49 which are passed downwardly through a drain pump cover 28, boot 40 and support plate 42 and into an annular series of threaded openings in the bracket upper end 44.

In accordance with the present invention, the radially outer end of the boot 40 is fluid-sealed to the sump opening shoulder 20 and the pump assembly 21 is mounted through shock-absorbing means to the sump opening shoulder 20 by mounting means which include a substantially rigid support ring 50. The support ring 50 has a substantially flat outwardly extending upper end 51, a downwardly extending wall 52 and a lower end 53 that extends inwardly from the bottom of its wall 52 and includes four vertical openings 54 which can be respectively aligned over and spaced above the motor bolt upper ends 48 that protrude from the top of the end bell 35. The support ring upper end 51 is formed with an outside diameter slightly greater than the outside diameters of the sump opening shoulder 20 and the boot 40, and with inside diameter just slightly smaller than the diameter of the sump opening 19. The outer periphery of the support ring outer end 51 is provided with an upturned edge 55 to seat the outer end of the boot 40.

In the embodiment shown in FIGURES 2 and 3, the lower or inner end 53 of the support ring 50 is provided with annular series of four integrally formed tabs 56 which extend inwardly and are each pierced by one of the vertical openings 54 and spaced above one of the support bracket tabs 46. Each of the support ring tab openings 54 slidably receives the lower end of a resilient elastomeric shock mount 57. Each of the shock mounts 57 is of a type manufactured by the Barry Controls Division of the Barry Wright Corporation of Dayton, Ohio, and is substantially in the shape of a centrally bored tube 57a having outwardly extending annular shoulder 57b integrally formed on its upper end. The central bore of each shock mount 57 is slidably mounted around one of a series of four guide pins 58 which are secured by welding or other suitable fastening means adjacent each of the four corners of the support plate 42 to depend therefrom. The shouldered upper end 57b of each shock mount 57 overlies one of the tabs 56 and faces a flat rigid washer 59 which is fastened to the bottom of the support plate corner by the same means which fix the guide pin 58 thereto.

The outer end of the boot 40 extends beneath the sump opening shoulder 20 and is sandwiched between it and the support ring upper or outer end 51 in a liquid-tight relationship by an axially split annular clamping ring 60. With the support ring 50 so receiving the shock mounts 57 and being so clamped to the sump opening shoulder 20, the weight of the pump assembly 21 is transmitted through the support plate 42 to the shock mounts 57 and thence, through the support ring 50 to the wash chamber bottom wall 17 via the clamping ring 60 and sump opening shoulder 20. With this arrangement, the vibrations resulting from the starting, stopping, reversing and running of the pump assembly 21 during operation of the dishwasher 10 are buffed by the shock mounts 57. Hence, the intensity of the vibrations transmitted to the wash chamber 12 and the noise resulting therefrom are considerably reduced.

The second embodiment of the present invention (FIGURES 4 and 5) is similar to the first embodiment (FIGURES 2 and 3) in that it also employs the boot 40, support ring 50, annular clamping ring 60. However, this second embodiment differs from the first in that it employs different means for fluid sealing the inner end of the boot 40 to the pump assembly 21. The second embodiment further differs from the first in that it employs another type of resilient elastomeric shock mounts 61 which are fixed to rather than slidably received in the openings 54 in the four tabs 56 on the lower or inner end 53 of the support ring 50.

As best illustrated in FIGURE 4, the inner end of the boot 40 is sandwiched between the drain pump housing shoulder 33 and a substantially rigid ring-like support plate 42a, and is clamped therebetween in a fluid-tight relationship by the bolts 41 which are passed downwardly through the upper housing feet 39, the drain pump housing cover 28 and shoulder 33, the inner end of the boot 40 and the ring-like support plate 42a, respectively, and into the upper ends of the annular series of internally threaded studs 62, which are integrally formed on the motor end bell 35. The support plate 42 and bracket 43 of the first embodiment are, of course, omitted from this second embodiment.

As shown in FIGURES 4 and 5, the shock mounts 61 employed in the second embodiment are of a type manufactured by the Lord Manufacturing Company of Erie, Pa. Each mount 61 is substantially in the shape of a tubular washer which includes an outer ring portion 61a that is peripherally grooved to receive a marginal edge of the material surrounding the tab opening 54, and, thereby, fix it to the tab 56. An inner tubular portion 61b of each shock mount 61 extends axially through the circular ring portion 61a slightly beyond the upper and lower end of the circular ring portion 61a. The shock mount outer and inner portions 61a and 61b are interconnected by an

annular web of material 61c molded integrally therewith to provide for axial displacement of the outer and inner shock member portions 61a and 61b relative to one another. Each of the shock mounts 61 is connected to an upper end of one of the tubular spacers 47 by a washer bolt 63 passed downwardly through the central axial bore of the shock mount and threaded into the spacer 47.

As in the case of the first embodiment, the outer end of the boot 40 is sandwiched between the sump opening shoulder 20 and the support ring upper or outer end 51 in a liquid-tight relationship by the annular clamping ring 60. With the support ring 50 so connected to the sump opening shoulder 20, the weight of the pump assembly 21 is transmitted through the spacers 47 and bolts 63 to the shock mounts 61 and, thence, through the support ring 50 to the wash chamber bottom wall 17 via the clamping ring 60 and sump opening shoulder 20.

The third embodiment of the present invention (FIGURE 6) is also similar to the first embodiment (FIGURES 2 and 3) in that it also utilizes the boot 40, support ring 50 and annular clamping ring 60. The third embodiment differs from the first in that it provides other means for fluid-sealing the inner end of the boot 40 to the pump assembly 21. The third embodiment further differs from the first in that it employs still another type of resilient elastomeric shock mounts 64 which are slidably received in an annular series of four upwardly opening pockets 65 that are substituted for the tabs 56 and are integrally formed on the lower or inner end 53 of the support ring 50.

As shown in FIGURE 6, the inner end of the boot 40 is sandwiched between the drain pump housing shoulder 33 and a wider substantially rigid ring-like support plate 42b, and is clamped therebetween in a fluid-tight relationship by the bolts 41 which are passed downwardly through the upper housing feet 39, the drain pump housing cover 28 and shoulder 33, the inner end of the boot 40 and the support plate 42b, respectively, and threaded into the upper ends of the internally threaded studs 62 that are integrally formed on the motor end bell 35 in the same manner as in the second embodiment (FIGURES 4 and 5). The support plate 42 and bracket 43 of the first embodiment are, of course, also omitted from the third embodiment.

Each of the shock mounts 64 employed in the third embodiment is substantially in the form of a centrally bored elastomeric block which is slidably received within one of the support ring pockets 65. One of the vertical openings 54 is provided in the bottom of each of the pockets 65 and is made large enough to loosely pass one of the tubular spacers 47. Each of the spacers 47 passes upwardly through the central bore of one of the mounts 64. As shown in FIGURE 6, the outer diameter of the ring-like support plate 42b is made sufficiently great so that the plate 42b extends outwardly over the top of the shock mounts 64 and spacers 47.

As in the case of the first and second embodiments, the outer end of the boot 40 is sandwiched between the sump opening shoulder 20 and the support ring upper or outer end 51 in a liquid-tight relationship by the annular clamping ring 60. With the support ring 50 so connected to the sump opening shoulder 20, the weight of the pump assembly 21 is transmitted through the support plate 42b to the shock mounts 64 and, thence, through the support ring 50 to the wash chamber bottom wall 17 via the clamping ring 60 and sump opening shoulder 20.

As illustrated in FIGURES 2 and 3, a plurality of circumferentially-spaced erect fins 40a are integrally formed on the upper face of the boot 40 between its inner and outer ends. The fins 40a have a crescent shaped cross-section and are received within the sump opening 19 to guide the installation of the pump assembly 21 therein. During operation of the dishwasher 10, the fins 40a also serve as anti-vortex means to eliminate or mitigate surging of the pumps 22 and 23. While the fins 40a

are shown as being provided only in the first embodiment (FIGURES 2 and 3), it should be understood that they may also be similarly formed on the boot 40 for use in the second or third embodiments.

Thus it can be seen that the present invention provides an improved means to mount a motorized pump assembly from the sump opening shoulder of an automatic dishwasher which minimizes vibration and noise transmission from the motorized pump assembly to the cabinet during operation of the dishwasher.

As will be evident from the foregoing description, certain aspects of the invention are not limited to the particular details of construction of the examples illustrated, and it is contemplated that various other modifications or applications will occur to those skilled in the art. For example, the support ring 50 could be modified to have its upper end 51 formed as its radially inner end and its shock mount-receiving lower end 53 formed as its radially outer end. It is therefore intended that the appended claims shall cover such modifications and applications as do not depart from the true spirit and scope of the invention.

What I claim as new and desire to secure by Letters Patent of the United States is:

1. In an automatic washing machine of the type having a motorized pump assembly suspended from a shouldered sump opening in the bottom of a wash chamber, fluid-sealing shock-absorbing mounting means between the assembly and sump opening shoulder, comprising:
 - (a) a flexible, generally planar, solid ring-like boot having a radially inner end surrounding the pump assembly and a radially outer end of a diameter greater than the inner diameter of the sump opening shoulder,
 - (b) means for fluid-sealing said boot inner end to the pump assembly,
 - (c) means for fluid-sealing said boot outer end to the sump opening shoulder and resiliently mounting the assembly to the sump opening shoulder including
 - (i) a support ring having a radially outer end and a radially inner end with one of said support ring ends being alignable with the sump opening shoulder and the other of said support ring ends receiving resilient shock-absorbing means,
 - (ii) means for connecting said one of said support ring ends to the sump opening shoulder with said boot outer end sandwiched therebetween in a fluid-sealing relationship, and
 - (iii) means for connecting said shock-absorbing means to the assembly.
2. The invention of claim 1, wherein:
 - (a) said one of said support ring ends is said radially outer end of said support ring, and
 - (b) said other of said support ring ends is said radially inner end of said support ring
3. The invention of claim 1, wherein:
 - (a) said shock-absorbing means is fixed to said support ring.
4. The invention of claim 1, wherein:
 - (a) said shock-absorbing means is slidable relative to said support ring.
5. The invention of claim 1, wherein:
 - (a) said shock-absorbing means comprises a plurality of spaced shock-absorbing members.
6. The invention of claim 5, wherein:
 - (a) said shock-absorbing members comprises shock mounts formed of an elastomeric material.
7. The invention of claim 1, further including:
 - (a) a plurality of erect fins spaced on said boot between said boot ends.
8. The invention of claim 1, wherein:
 - (a) said other of said support ring ends underlies a portion of said shock-absorbing means, and

9

(b) said means for connecting said shock-absorbing means to said assembly includes a part which overlies said portion and is connected to said assembly.

9. The invention of claim 8, wherein:

(a) said part comprises a plate

10. The invention of claim 8, wherein:

(a) said part comprises a bolt.

5

10

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ROBERT M. WALKER, *Primary Examiner.*