March 13, 1962 F. W. ROBSON 3,024,914

ANTI-VORTEX DEVICE FOR DISHWASHING MACHINES

Filed Oct. 2, 1959 2 Sheets-Sheet 1

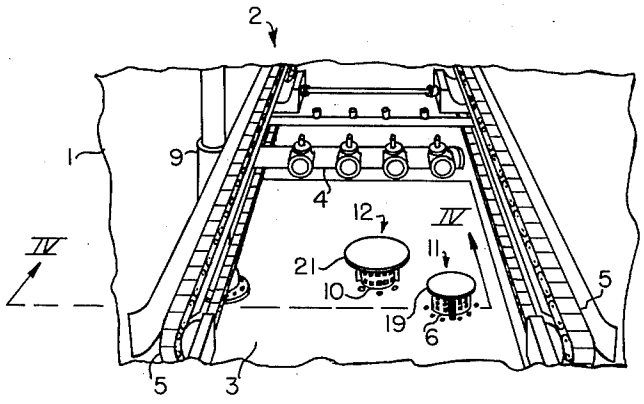


Fig. I

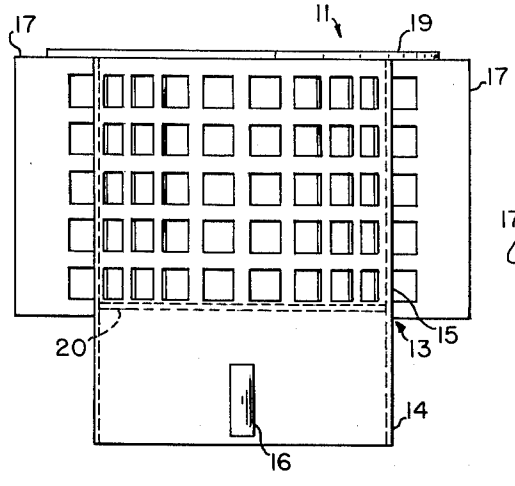


Fig. II

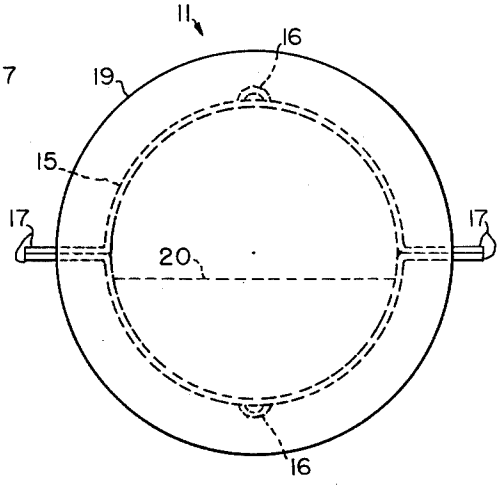


Fig. III

INVENTOR.
FREDERICK W. ROBSON

BY

Marshall, Marshall & Yeasting
ATTORNEYS

March 13, 1962 F. W. ROBSON 3,024,914

ANTI-VORTEX DEVICE FOR DISHWASHING MACHINES

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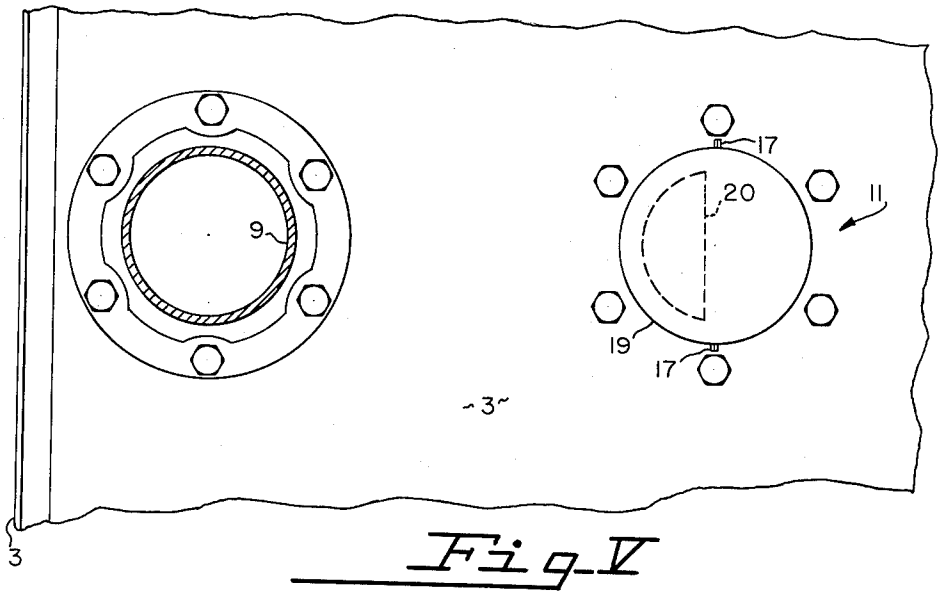


Fig V

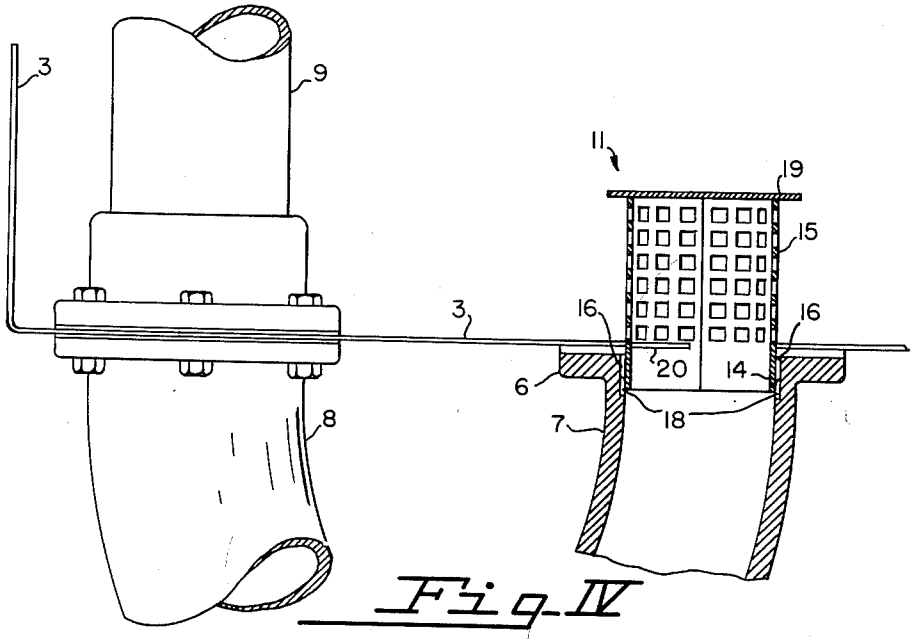


Fig IV

INVENTOR.
FREDERICK W. ROBSON

BY

Marshall, Marshall & Yeasting
ATTORNEYS

United States Patent Office 3,024,914 Patented Mar. 13, 1962

3,024,914
ANTI-VORTEX DEVICE FOR DISHWASHING MACHINES

Frederick W. Robson, Rochester, N.Y., assignor to Toledo Scale Corporation, Toledo, Ohio, a corporation of Ohio

Filed Oct. 2, 1959, Ser. No. 844,034
4 Claims. (Cl. 210—456)

This invention relates to dishwashing machines, and more particularly to anti-vortex devices for the elimination of vortex in fluids flowing into pump intakes and drain openings.

The problem of noise at pump intakes in dishwashing machines has become more acute as the pumps used in such machines have become more powerful. Pumps in modern commercial dishwashing machines may operate at 3450 r.p.m. as compared to the 1725 r.p.m. speeds of pumps used only a short time ago. It is believed that the cause of such noise is the water at the pump suction pipe entrance vortexing. This action of the water allows a column of air to enter the pump housing and strike the pump impeller. The revolving impeller forms an air cavity around the impeller which causes noise.

It is, accordingly, the principal object of this invention to provide improved anti-vortex means for the pump intakes and drain openings in dishwashing machines to insure smooth and quiet operation by the elimination of vortex in fluids flowing into such pump intakes and drain openings.

A more specific object of the invention is to provide an improved strainer assembly having baffle means for eliminating vortexing of fluid at the entrance of a pump suction pipe in a dishwashing machine, thus preventing air from entering the pump housing and causing noise.

Another object of the invention is to provide an improved anti-vortex strainer assembly which is of low cost yet, nevertheless, has a rugged construction.

More specific objects and advantages are apparent from the following description, in which reference is had to the accompanying drawings illustrating a preferred embodiment of the invention.

According to the invention, the improved anti-vortex device is made from a pair of partly perforated blanks formed into half cylinders. When the blanks are formed, an indexing dimple is punched into the lower portion of each of the blanks and a pair of opposed ears is allowed to extend from the upper portion of each of the blanks. The corresponding ears are welded together to form a reticulated cylindrical strainer having a pair of vertical fins. This is a very low cost, yet rugged, construction.

To prevent a vortex from forming at a pump intake or at a drain opening in which the strainer is located, a generally horizontal cap or baffle plate is fixed to the top of the strainer and a second generally horizontal baffle plate, which preferably covers about one-half of the area of the opening at the pump intake or drain opening, is fixed inside the strainer. The vertical fins aid the two baffle plates in breaking the swirling flow of fluid into the pump intake or drain opening by breaking up rotary flow of fluid about the strainer.

A preferred embodiment of the invention is illustrated in the accompanying drawings.

In the drawings:

FIG. I is a perspective view of the interior of a dishwashing machine, parts being broken away, showing the bottom of a fluid receptacle having a pump intake opening and a drain opening in each of which openings there is positioned an anti-vortex device constructed according to the invention;

FIG. II is an enlarged elevational view of the right hand one of the anti-vortex devices illustrated in FIG. I;

FIG. III is a top plan view of the anti-vortex device shown in FIG. II;

FIG. IV is an enlarged vertical sectional view taken along the line IV—IV of FIG. I; and

FIG. V is a plan view as seen from a position above the apparatus shown in FIG. IV.

These specific drawings and the specific description that follows merely disclose and illustrate the invention, and are not intended to impose limitations upon the claims.

Referring to FIG. I, a dishwashing machine frame 1 encloses a washing space 2 and supports a fluid receptacle or tank 3 below the washing space. The tank 3 normally contains washing liquid which is sprayed through wash tubes (not shown) mounted in and communicating with wash manifolds 4, the lower one of which is shown. A plurality of the wash tubes are located at both the bottom and the top of the washing space 2 and washing liquid is sprayed up onto and down upon articles carried in racks which are moved through the dishwashing machine by means of conveyor chains 5. Washing liquid in the tank 3 is recirculated through a pump intake or inlet 6 in a suction pipe 7 (FIG. IV) leading to a conventional pump (not shown) which forces washing liquid under pressure through a pump discharge pipe 8 communicating with the manifolds 4 through a vertical pipe 9. A gravity drain opening 10 is provided in the bottom of the tank 3 for emptying the tank when it is to be cleaned. The pump inlet 6 is defined by the walls of the suction pipe 7 and the gravity drain opening 10 is defined by the walls of a similar pipe which is not shown. The drain passages formed by such walls define the openings, i.e., the pump inlet 6 and the drain opening 10, in locations oriented in open spaces in the tank 3 for unimpeded flow of fluid from above and from the sides of the openings from the tank into the openings whereby a vortex tends to form in the fluid at each of the openings.

It is usual to provide screens or strainers over pump inlets and drain openings to separate solid material, washed from dirty articles, from the washing liquid before it is recirculated and from the waste washing liquid before it is drained from the tank 3. However, heretofore, the screens or strainers have not prevented fluid vortex and excessive air suction which produce noisy and irregular operation of the dishwashing machine. The noise is particularly loud in dishwashing machines using high speed pumps.

Anti-vortex devices 11 and 12 are provided according to the invention for the pump intake or inlet 6 and for the drain opening 10, respectively, which devices eliminate fluid vortex and excessive air suction.

The anti-vortex device 11 includes a reticulated barrier or strainer 13 having a retaining portion 14 conforming to the shape of the pump inlet 6 and an upper perforated portion 15 for straining solid material from washing liquid flowing into the pump inlet 6. The barrier 13 is in the form of a wall which is closed upon itself and which extends upward from around the pump inlet 6.

The reticulated barrier 13 is constructed from a pair of partly perforated blanks formed into half cylinders. When the blanks are formed, an indexing dimple 16 is punched into the lower portion of each of the blanks and a pair of opposed ears 17 are formed to extend from the upper portion of each of the blanks. The corresponding ears 17 of each of the blanks are welded together to form the reticulated barrier 13, the ears 17 functioning as stop means limiting the amount of barrier 13 which can extend into the pump inlet 6. The barrier 13 is so inserted into the pump inlet 6 that the dimples 16, which function as indexing means, register with notches 18 (FIG. IV) in the inner walls of the suction pipe 7 preventing rota-

tion of the barrier 13 when washing liquid flows into the pump inlet.

To prevent a vortex from forming when washing liquid flows into the pump inlet, a cap or baffle plate 19 is fixed to the top of the upper portion 15 of the barrier 13, the cap 19 being generally horizontal and extending outward from the volume enclosed by the perforated portion 15 of the barrier 13 beyond the perforated portion, and a baffle plate 20 is secured within the barrier 13 at a point just below the lower ones of the perforations in the upper portion 15 of the barrier, the baffle plate 20 being generally horizontal and covering about one-half of the area of the opening at the pump inlet 6. The cap or baffle plate 19 eleminates vortex at gravity drain openings and at pump inlets where relatively small pumps are used. However, the cap or baffle plate 19 does not completely eliminate the greater vortex resulting from the use of relatively large pumps and it is in this connection that the baffle plate 20 is necessary. When a pump having a speed of 3450 r.p.m. was used, it was found that the preferred size of the baffle plate 20 is as indicated in the drawings, i.e., the baffle plate 20 should cover just less than one-half of the area of the opening at the pump inlet 6. Tests showed, in connection with the pump having a speed of 3450 r.p.m., that a larger baffle barred the washing liquid to the inlet while a smaller baffle brought on a vortex. Also, these tests showed that preferably the orientation of the baffle plate 20 relative to the pump outlet or pump discharge pipe 8 should be as shown in FIGS. IV and V, i.e., the baffle plate 20 should be toward the pump outlet.

The ears 17 on the barrier or strainer 13 in addition to functioning as convenient places to weld the blanks together and as stop means for limiting the amount of barrier 13 which can extend into the pump inlet 6 also function as vertical fins which extend outwardly from the vertical perforated wall of the barrier to break up rotary flow of liquid about the strainer and thus aid the two baffle plates 19 and 20 eliminate vortex. A single fin performs just as well or nearly as well as the two fins.

The anti-vortex device 12 for the drain opening 10 is constructed like the anti-vortex device 11, except that the device 12 has a cap or baffle plate 21 which has a greater diameter than that of the cap or baffle plate 19 on the device 11.

Various modifications may be made in specific details of construction without departing from the spirit and scope of the invention.

Having described the invention, I claim:

1. An anti-vortex strainer for pump inlets and drain openings comprising, in combination, a perforated wall closed upon itself of a shape corresponding to and of a size to fit within the pump inlet or drain opening, a first substantially flat baffle plate fixed atop the wall extending outwardly from the volume enclosed by the wall, a second substantially flat baffle plate fixed within the wall below at least a portion of the perforations in the wall, and a fin extending from the wall generally perpendicular to the first baffle plate, the baffle plates and the fin functioning to break up swirling flow of fluid into the pump inlet or drain opening.

2. An anti-vortex strainer according to claim 1 wherein the second baffle plate covers about one-half the area of the pump inlet or drain opening.

3. An anti-vortex strainer according to claim 1 wherein the second baffle plate extends part way across the area of the pump inlet or drain opening.

4. An anti-vortex strainer for pump inlets and drain openings comprising, in combination, a perforated wall closed upon itself of a shape corresponding to and of a size to fit within the pump inlet or drain opening, a first substantially flat baffle plate fixed atop the wall extending outwardly from the volume enclosed by the wall, a second substantially flat baffle plate fixed within the wall below at least a portion of the perforations in the wall, and a fin extending from the wall generally perpendicular to the first baffle plate and defining the amount the wall can extend into the pump inlet or drain opening, the baffle plates and the fin functioning to break up swirling flow of fluid into the pump inlet or drain opening.

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