April 21, 1959 B. L. BRUCKEN 2,882,706

TYMPANIC JET WASHER

Filed Jan. 11, 1956 3 Sheets-Sheet 1

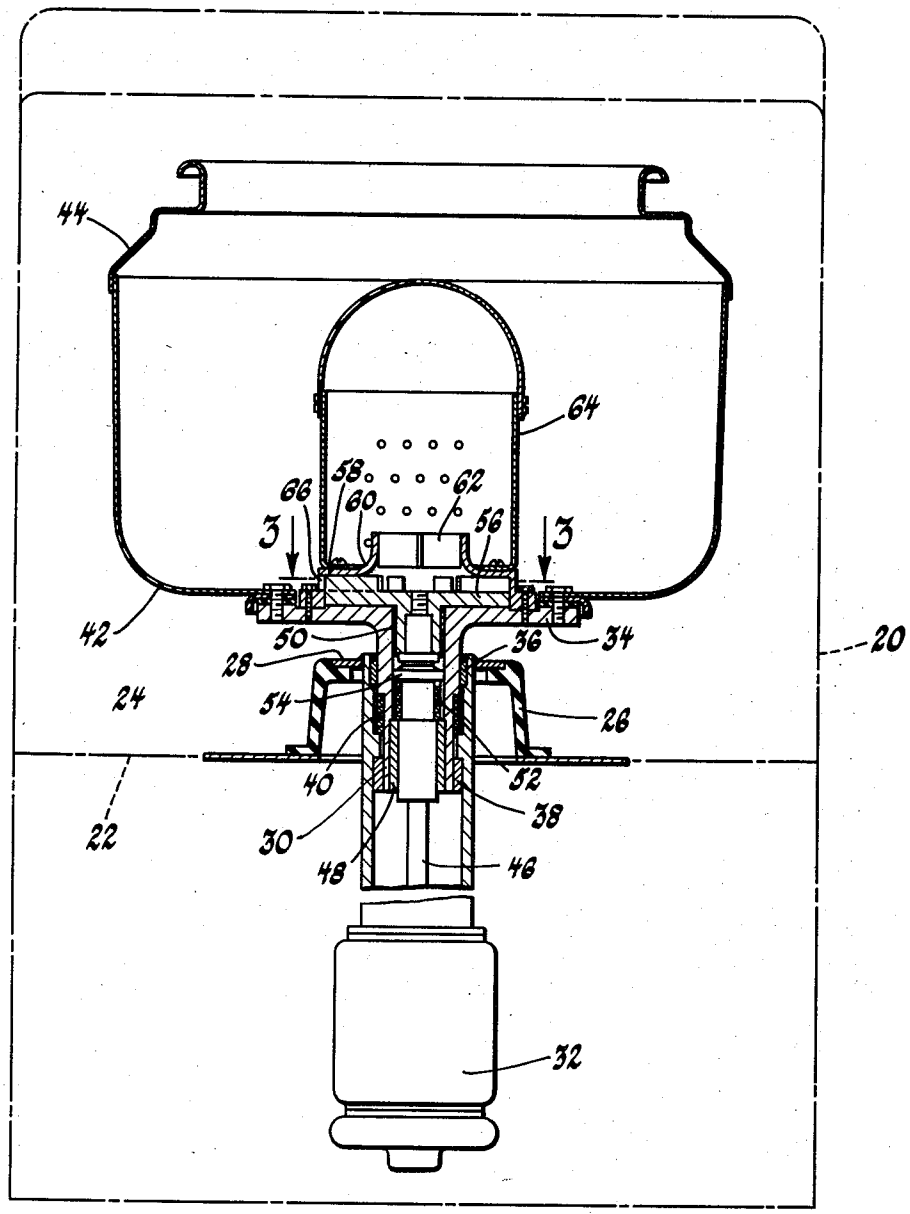


Fig. 1

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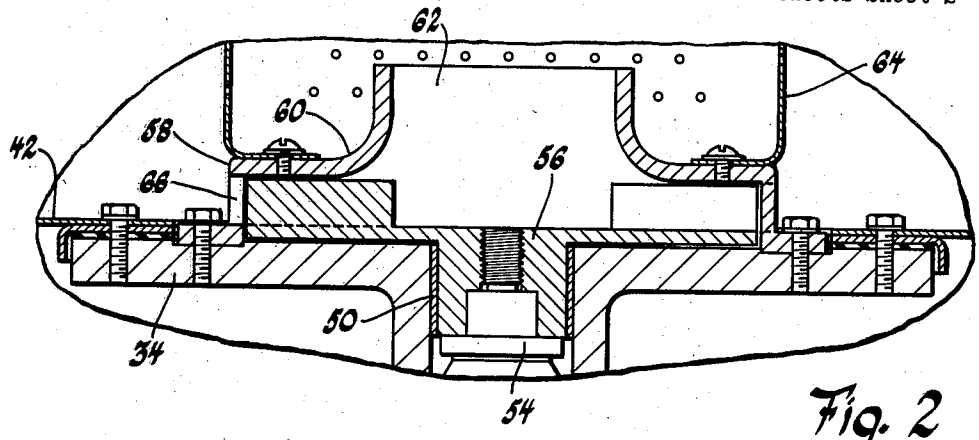


Fig. 2

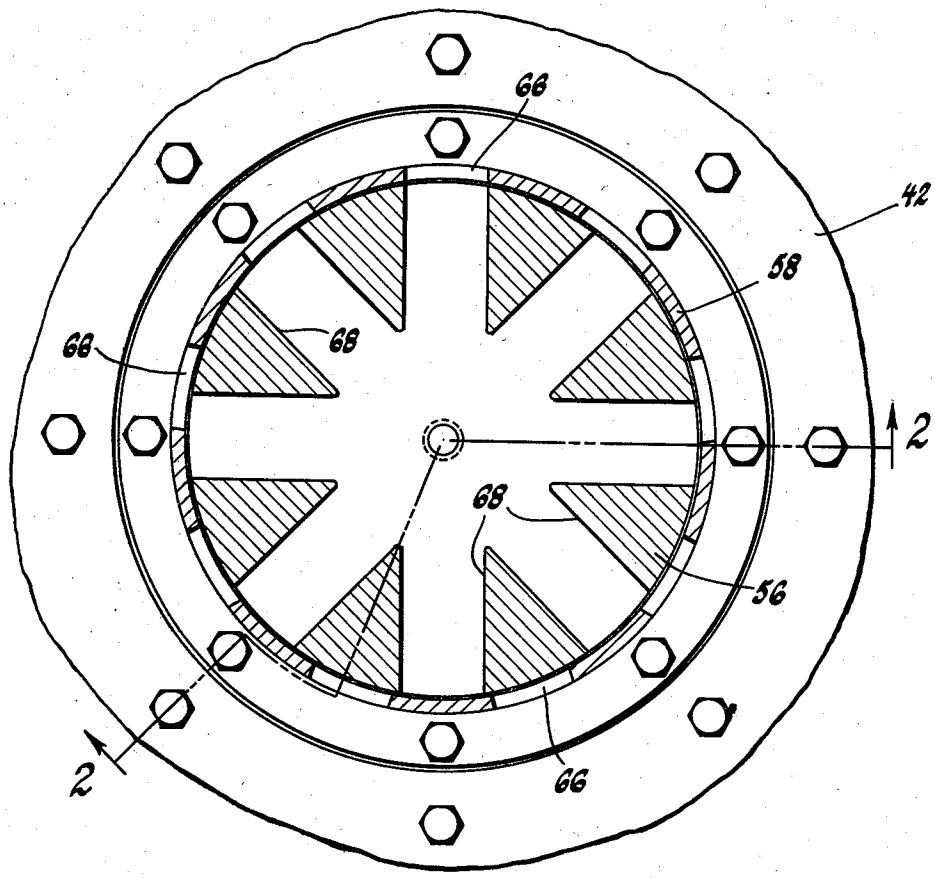


Fig. 3

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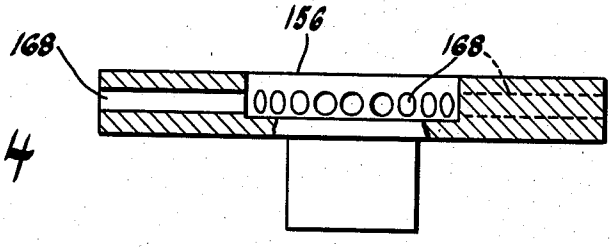


Fig. 4

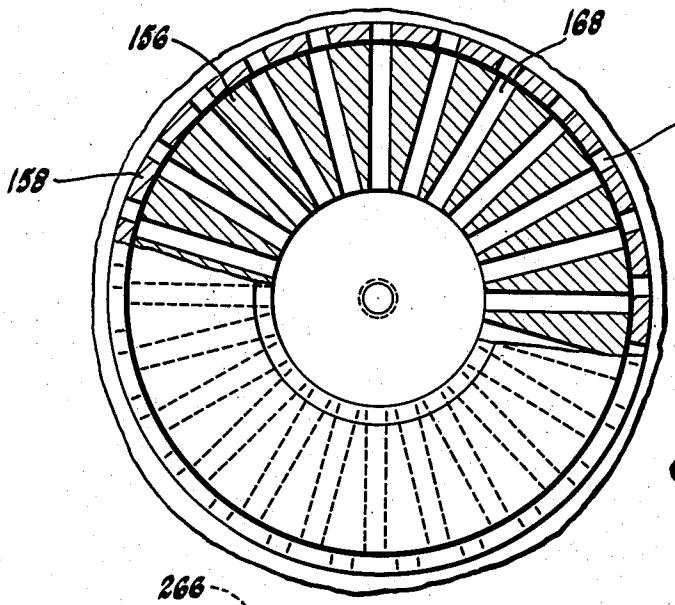


Fig. 5

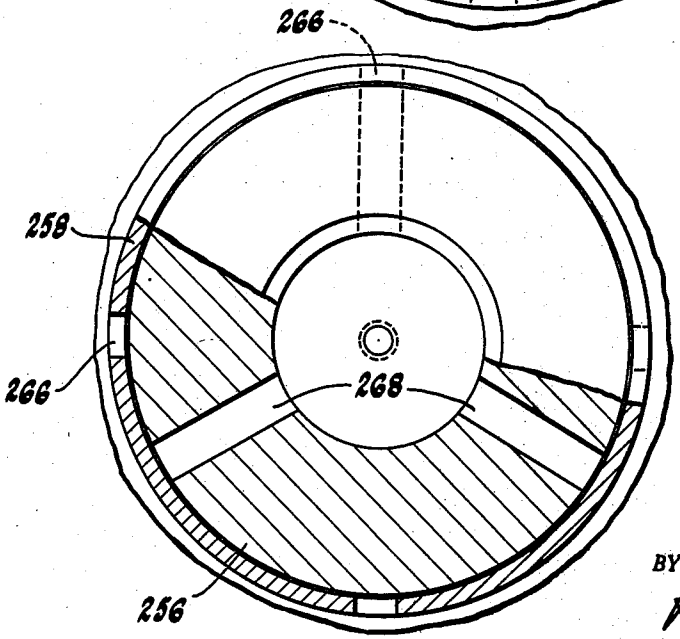


Fig. 6

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2,882,706

TYMPANIC JET WASHER

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Application January 11, 1956, Serial No. 558,469

5 Claims. (Cl. 68—23)

This invention relates to a domestic appliance and more particularly to washing machines in which clothes are washed by a series of tympanic shocks.

It is an object of this invention to provide a washer having a more rapid washing action which damages clothes less.

It is another object of this invention to provide a washing arrangement which is more effective, simpler and lower in cost and easier on clothes.

It is another object of this invention to provide a simple effective method of and apparatus for washing clothes in a tub by a series of tympanic shocks.

These and other objects are attained in the forms shown in the drawings in which a rotatable tub is resiliently mounted within a cabinet. Within the tub there is provided a rotor having passages connecting the cylindrical inlet with peripheral outlets arranged in a circle. This rotor rotates within a ring having a series of perforations extending in a circle opposite the outlets of the rotor. The closed wall spaces between the perforations are greater in area than the peripheral outlets so that the discharge is substantially cut off between each of the perforations. The tub contains a guard over the inlet. A motor is provided which rotates the rotor while the tub is held stationary to produce a washing action by providing a series of tympanic shocks which are similar to the action of a siren. The motor is clutched to the tub for centrifuging after the washing is completed.

Further objects and advantages of the present invention will be apparent from the following description, reference being had to the accompanying drawings wherein a preferred form of the invention is clearly shown.

In the drawings:

Figure 1 is a sectional view partly diagrammatic of a washing machine embodying one form of my invention;

Figure 2 is an enlarged fragmentary vertical section of the tympanic shock producing apparatus taken along the lines 2—2 of Figure 3;

Figure 3 is a horizontal sectional view taken along the lines 3—3 of Figure 1;

Figure 4 is a vertical sectional view of a modified form of rotor;

Figure 5 is a step shaped horizontal sectional view of the rotor and the peripheral ring cooperating with the rotor shown in Figure 4; and,

Figure 6 is a plan view, partly in section, of a rotor and ring of another modified form of the invention.

Referring now to the drawings and more particularly to Figure 1, there is shown diagrammatically in dot and dash lines a washing machine cabinet having a horizontal wall or bulkhead 22 providing a discharge compartment 24. This discharge compartment 24 may have any suitable form of conventional drain. The central portion of the horizontal wall 22 is provided with a resilient support 26 in the form of an inverted hat shaped member of synthetic rubber. This hat shaped member 26 is topped by a metal plate 28, fastened to the top of a vertical sleeve 30 having an electric motor 32 mounted

at its lower end. A flanged tub support 34 has a sleeve portion extending downwardly within the sleeve 30 which is rotatably mounted upon the bearings 36 and 38.

Located between the bearings 36 and 38 and between the tub support 34 and the sleeve 30 is a wound spring clutch 40 arranged to prevent counterclockwise rotation of the support 34 when viewed from the top. However, the clutch 40 permits free clockwise rotation of the tub 42. The tub support 34 supports through suitable sealing gaskets a centrifuging basket or tub 42 having a series of centrifuging outlets 44 adjacent the top of its outwardly flared side walls. These outlets are formed in the inwardly extending upper portion which serves as a guard to prevent clothes from being thrown out of the tub during the centrifuging operation.

The motor 32 is connected by a drive shaft 46 which is rotatably mounted in the lower and upper bearings 48 and 50 provided within the sleeve portion of the tub support 34. Between these bearings and between the drive shaft 46 and the sleeve portion of the tub support 34 is a second wound spring clutch 52 and a suitable thrust bearing 54. This second wound spring clutch 52 is so arranged that when drive shaft 46 turns in a clockwise direction when viewed from the top it will be connected to the tub support 34. This will cause the tub 42 to spin for centrifuging purposes.

The upper end of the drive shaft 46 is fixed to a rotor 56 which is rotatably mounted between the tub support 34 and the ring 58. The ring 58 has an integral cover portion 60 which flares upwardly into an inlet portion 62 as is better shown in Figure 2. The inlet 62 is enclosed by a large perforated guard 64 fastened to the cover portion 60 above the ring 58. The top of the guard may be closed by an inverted spherical top as shown. As shown best in Figures 2 and 3, the ring portion 58 is provided with a series of nine apertures designed by the reference character 66. The rotor 56 has a recessed open portion directly beneath the inlet 62 and eight passages 68 extending radially from the open center portion to the periphery adjacent the apertures or perforations 66 in the ring 58. The periphery of the rotor 56 extends very close to the inner surface of the ring 58. The clearance may be .001" to .002". The passages 68 are open topped and straight for convenience in manufacture and are closed by the cover 60 with a similar clearance with the top surface of the rotor. The closed wall portions between the perforations 66 in the ring 58 are sufficiently great to substantially completely cut off the flow from the outlets of the passages 68 when they are rotated successively out of registration with one aperture and into registration with a succeeding aperture in the circle.

When the outlet of one of the passages 68 is opposite a closed wall portion of the ring 58, the diametrically opposite passage 68 will be fully open and will receive the benefit of the reaction of the closing of the diametrically opposite passage. If desired, the passages 68 may be made closed topped with a slight increase in efficiency and may be made of different shapes to provide better stream line flow if desired.

If the rotor is rotated at a nominal speed of 60 revolutions per second, this rotation will by centrifugal force create a pressure within the passages 68 and against the ring 58 between the apertures 66. The successive registration of the passages with the perforations 66 by intermittently releasing the pressure will deliver about 4,000 jets or spurts of water per second in succession through the outlets 66 in the ring 58. These jets will be directed outwardly across the bottom of the tub and will induce a circulation of the liquid and clothes in the tub. The action is similar to that of a siren producing about 4,000 tympanic shocks to the liquid and the clothes which assists the detergent in removing soil from the clothes.

The cleansing action is about twice as fast as conventional means of agitation with less wear upon the clothes.

In operation, the tub **42** is filled with water and detergent by suitable manual or automatic means. The clothes may be placed in the tub either before or after the filling. The motor **32** is first rotated in a counterclockwise direction to rotate the rotor **56** to produce the tympanic shock jet action. In conjunction with the liquid and detergent this action quickly frees the soil from the clothes. The motor **32** is then reversed to centrifuge the water and detergent from the tub. The tub is then filled with rinse water and the motor is then first operated in the counterclockwise direction to again provide the tympanic shock jet action. Thereafter the motor is reversed and turned in the clockwise direction to spin the tub to centrifuge the rinse water from the clothes.

In Figures 4 and 5, there is shown a modified form of rotor **156** containing 24 radially extending passages **168** which extend from the central recessed portion to the centrifugal peripheral portion. These passages **168** cooperate and successively register with the perforations **166** in the horizontal centrifugal ring **158**. These perforations **166** are arranged in a horizontal circular row directly opposite the radially disposed passages **168** which are located in the same horizontal plane. When this rotor **156** is rotated at a nominal speed of 60 revolutions per second there are about 37,000 tympanic shock jets or spurts of water per second issuing consecutively from the perforations **166**. In this form, the movement of the water will be less but the cleansing by hydraulic vibrations will be increased.

In Figure 6, there is still a third form shown in which the frequency is reduced to about 400 pulsations or vibrations per second. In this form the rotor **256** is provided with a central opening and three radially extending passages **268** in a horizontal plane. The ring portion **258** is provided with four apertures or perforations **266** equally spaced in the same plane as the three radial passages **268**. The peripheries of the rotor and the inner surface of the ring portion **258** are cylindrical and are spaced about .001 to .002. When this rotor is rotated at a nominal speed of 30 revolutions per second it will register the passages **268** successively with the perforations **266** to provide tympanic shock jets of water issuing consecutively from the openings **266** at a rate of about 420 per second. If the rotor is rotated at 60 revolutions per second the frequency will be about 840 vibrations per second. If desired the rotors **56** and **156** may also be operated at a speed of 30 revolutions per second. The rotors may be operated over a wide range of speeds partly depending upon the most economical or desirable speed of electric motor obtainable according to the frequency of the available electric power.

While the form of embodiment of the invention as herein disclosed constitutes a preferred form, it is to be understood that other forms might be adopted as may come within the scope of the claims which follow.

What is claimed is as follows:

1. A washing machine including a tub adapted to contain washing liquid, a ring within the tub having a row of apertures therein, a rotor within the ring having an outlet opposite the row of apertures in the ring, said ring having closed wall areas between the apertures sufficient in area to successively substantially close the outlet of the rotor, said rotor having a centrally located inlet and an outwardly extending passage extending from said inlet to said outlet, and means for continuously rapidly rotating said rotor within said ring in one direction during the normal washing operation for centrifugally impelling the liquid against said ring and through said apertures to provide tympanic shocks.

2. A washing machine including a tub adapted to contain washing liquid, a ring within the tub having a row of apertures therein, a rotor within the ring having outlets arranged in a row opposite the row of apertures in the ring, said ring having closed wall areas between the apertures sufficient in area to successively substantially close the outlets of the rotor, said rotor having a centrally located inlet and outwardly extending passages extending from said inlet to said outlets, and means for continuously rapidly rotating said rotor within said ring in one direction during the normal washing operation for centrifugally impelling the liquid against said ring and through said apertures to provide tympanic shocks, the number of apertures in the ring being different than the number of outlets in the rotor.

3. A washing machine including an upright tub adapted to contain washing liquid, a horizontal ring within and adjacent the bottom of the tub having perforations arranged in a circle, a rotor within the ring having outlets arranged in a circle close to the perforations in said ring with the circle of outlets aligned with the circle of perforations, the closed wall spaces between the perforations in said ring being sufficiently large to successively substantially close the outlets in the rotor, said rotor having a centrally located inlet and passage means extending outwardly from said inlet to said outlets, and means for continuously rapidly rotating said rotor in said ring in one direction during the normal washing operation for centrifugally impelling the liquid against said ring and through said perforations to provide tympanic shocks.

4. A washing machine including a resilient support, an upright tub rotatably mounted upon said resilient support, a horizontal ring within and adjacent the bottom of said tub and being fastened to said tub, said ring having perforations arranged in a circle, a rotor within the ring having outlets arranged in a circle close to the perforations in said ring with the circle of outlets aligned with the circle of perforations, the closed wall spaces between the perforations in said ring being sufficiently large to successively substantially close the outlets in the rotor, said rotor having a centrally located inlet and passage means extending outwardly from said inlet to said outlets, said rotor being rotatably mounted relative to said tub, a drive means located below said support connected to said rotor for continuously rapidly rotating said rotor in one direction during the normal washing operation, and clutch means connecting said drive means to said tub to rotate said tub.

5. A washing machine including a resilient support, an upright tub rotatably mounted upon said resilient support, a horizontal ring within and adjacent the bottom of said tub and being fastened to said tub, said ring having perforations arranged in a circle, a rotor within the ring having outlets arranged in a circle close to the perforations in said ring with the circle of outlets aligned with the circle of perforations, the closed wall spaces between the perforations in said ring being sufficiently large to successively substantially close the outlets in the rotor, said rotor having a centrally located inlet and passage means extending outwardly from said inlet to said outlets, said rotor being rotatably mounted relative to said tub, a drive means located below said support connected to said rotor for continuously rapidly rotating said rotor in one direction during the normal washing operation, a clutch means connecting said drive means to said tub to rotate said tub, and means for preventing the rotation of said tub to rotate said rotor relative to said tub.

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