May 3, 1960 C. O. MILLER 2,935,207

RACK FOR WASHING MACHINE

Filed Dec. 9, 1953 2 Sheets-Sheet 1

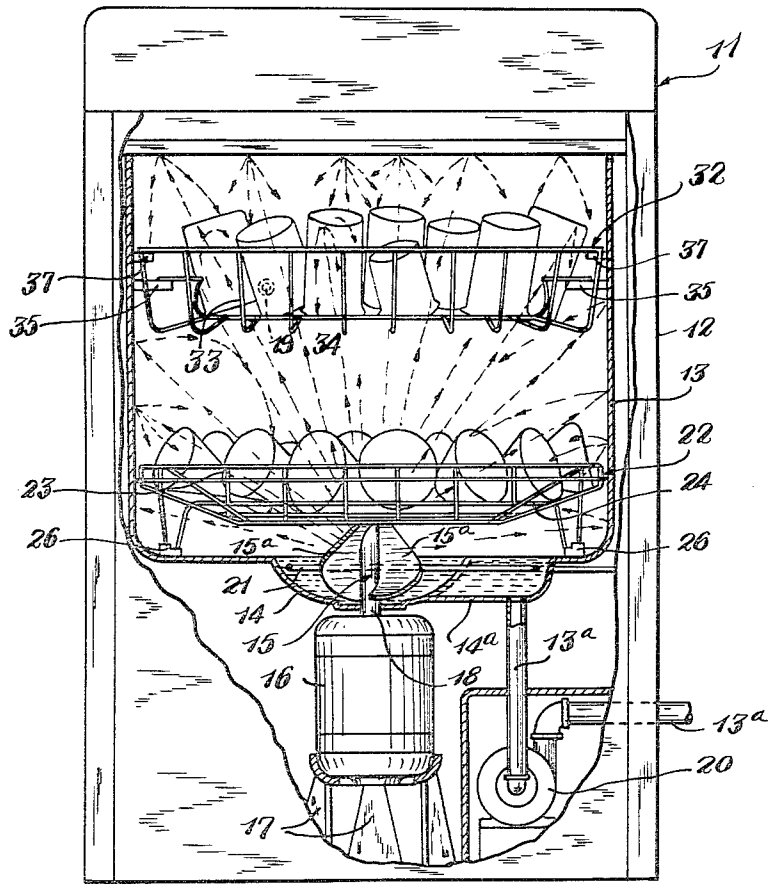


FIG. 1

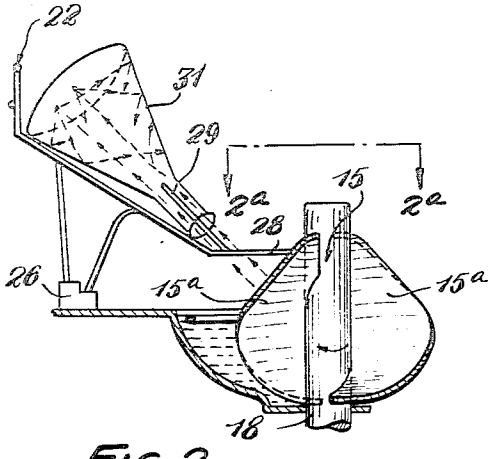


FIG. 2

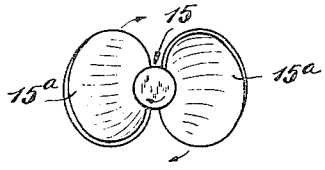


FIG. 2a

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RACK FOR WASHING MACHINE

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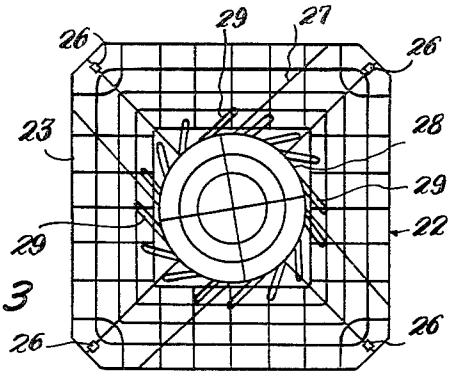


FIG. 3

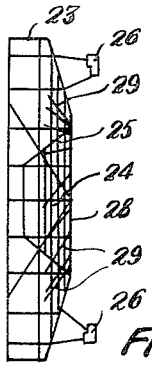


FIG. 4



FIG. 8

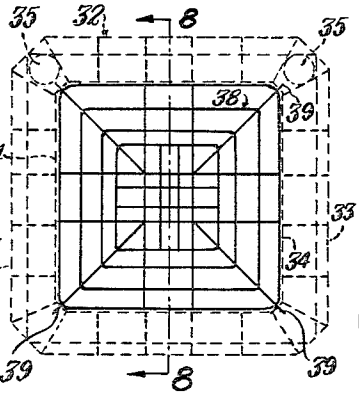


FIG. 5

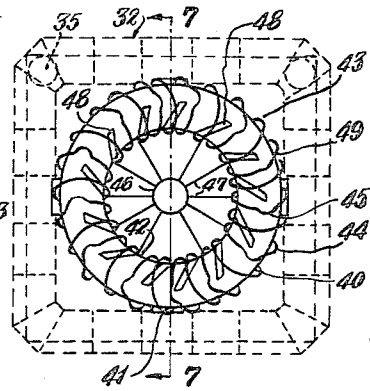


FIG. 6

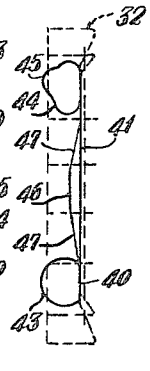


FIG. 7

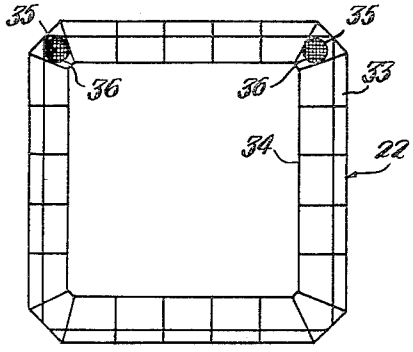


FIG. 9

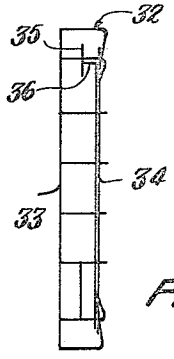


FIG. 10

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United States Patent Office 2,935,207 Patented May 3, 1960

2,935,207

RACK FOR WASHING MACHINE

Clark O. Miller, Cleveland, Ohio

Application December 9, 1953, Serial No. 397,094

4 Claims. (Cl. 211—74)

This invention relates to automatic utensil or utensil washing apparatus, and more particularly to racks adapted to be installed in conventional automatic washing machine for supporting, washing and drying laboratory glassware and equipment such as beakers, bottles, flasks, evaporating dishes and the like.

The automatic cleaning of laboratory glassware and equipment such as beakers, bottles, flasks and other articles presents special problems in automatic washing, the shape and configuration of such articles preventing satisfactory cleaning of the same as the stream of the cleaning water in conventional devices, is not properly directed into the open end of such articles, and thus only a portion of the water is effectively utilized and the articles are not properly cleaned. When it is considered that frequently such laboratory wares contain acids, various chemical and various difficult-to-remove solutions and coatings, it is readily understood that satisfactory washing can only be accomplished by disposing such articles in such angular relationship to the stream of cleaning water from the washing machine impeller that a maximum flow of swirling water is directed into the articles to be cleaned.

I have discovered, that by providing laboratory glassware supporting racks and hooks positioned and arranged in such manner, that by directing the swirling stream of cleaning water into the open end of such articles, thorough cleansing can be satisfactorily accomplished.

Therefore, an object of this invention is to provide racks for automatic washing machines, which support various types and shapes of laboratory glassware and the like in such position that a maximum volume of swirling cleaning water is directed into such articles.

Other objects are, to provide racks and holding means for the above purpose, which can be manufactured at a relatively low cost, are adapted to hold various sizes and shapes of laboratory glassware, permit ready placing and removal of such articles therefrom, are strong and sturdy in operation, may be readily installed in conventional washing machines and are simple and efficient in operation.

These and other objects will be apparent in the course of the following specification. In the drawings forming a part of this application:

Fig. 1 is a front view of an illustrative embodiment of my invention, with parts cut away showing the interior thereof, having arrows indicating the direction of flow of the water from the impeller;

Fig. 2 is a broken sectional view showing a part of the impeller and a beaker mounted on a rack with arrows indicating the flow of water from the impeller into the beaker;

Fig. 2*a* is a top plan view of the impeller taken on the line 2*a*—2*a* of Fig. 2;

Fig. 3 is a top plan view of the bottom rack;

Fig. 4 is an end view of Fig. 3;

Fig. 5 is a plan view of top outer rack with flat center rack mounted in it;

Fig. 6 is a plan view of top outer rack with circular center rack mounted on it.

Fig. 7 is a view taken on the 7—7 of Fig. 6;

Fig. 8 is a view taken on the line 8—8 of Fig. 5;

Fig. 9 is a plan view of top outer rack, while

Fig. 10 is an end view of Fig. 9.

In the drawings the numeral 11 refers generally to a washing machine illustrating an embodiment of my invention, including a conventional cabinet 12 having rectangular surfaces, while a vat 13 mounted on the upper half thereof is provided centrally on its bottom wall with depressed portion forming a sump 14 having an extension 14*a*. Water is admitted to the vat 13 by means of a jet 19 at the back of vat 13. The flow of water through the jet 19 is controlled by a conventional solenoid operated valve not shown herein.

A rotary impeller 15 provided with two generally flat blades 15*a* slightly concave on their forward faces, mounted on a vertical axis, positioned in the sump 14, and extending upwardly therefrom, is driven by a motor 16 mounted on legs 17 and carried by the bottom wall of the cabinet 12. The motor 16 has a driving shaft 18 connected to the impeller 15 in any suitable manner. Used water is removed from the vat 13 through an outlet conduit 13*a* by a small motor driven pump 20. An electric heater 21 surrounding the impeller 15, and suitably connected to a source of current, provides means for drying the articles supported on the racks. The flow of water into the vat 13 through the jet 19, the rotation of the impeller 15, as well as the cyclic operation of the heater 21 and the pump 20 are sequentially energized and deenergized by a motor driven switch, not shown herein.

A resilient bottom rack 22, illustrated in Figs. 1, 3 and 4, formed of suitable wire includes four side walls 23, and a downwardly and inwardly slopping bottom wall 24 having a centrally raised portion 25, while four feet 26 disposed at the corners thereof support the rack 22 on the bottom wall of the vat 13. Support wires 27 extending from an annular ring 28 to the upper wire of the side walls 23 support the center portion of the bottom wall 24, in an obvious manner.

A series of hooks 29, formed of resilient wires in the form of loops and having open ends secured to the ring 28, provide means for supporting such laboratory glassware as beakers, bottles, flasks or any device having narrow necks, the hooks 29 as shown in Figs. 2 and 3 projecting outwardly and upwardly from the annular ring 28 and are disposed tangentially to the direction of rotation of the impeller 15, thus the hooks are disposed in such manner that the median plane of the forward faces of the impeller blades 15*a* are disposed substantially at right angles to the axes of the hooks 29, as they pass such hooks, which causes the cleaning water to be injected into the articles mounted on the hooks 29. The rack 22 as well as other racks shown herein may be constructed of wires spot welded or otherwise bonded together at their points of intersection.

As indicated by the arrows in the above drawings, the above disposition of articles on the hooks with respect to the position of the impeller 15, causes a maximum amount of swirling cleaning water to be forced into such articles and as they are further disposed in an inclined angle to horizontal, the cleaning water can drain therefrom. This rack 22 is particularly adapted for supporting articles such as Erlenmeyer flasks 31 and the like.

A top outer rack 32, illustrated in Figs. 5 through 10, formed of wire in a manner similar to bottom rack 22, and generally of rectangular shape includes side walls 33 and a bottom wall 34 extending inwardly from the lower margins of the side wall 33. Detergent containers

35 are mounted on wire brackets 36 mounted in two corners thereof, for supplying a detergent for the machine 11. Lugs 37 extending inwardly from the vat 13 support outer rack 32 therein.

A flat center rack 38 shown in Fig. 5, similarly formed of wires and sloping slightly upwardly from its side margins is provided with hooks 39 adapted to be placed over the inner wires of the bottom walls 34 of the top outer rack 32 and thus retained thereby in a releasable position, in an obvious manner. As shown in Fig. 1 this center rack 38 is adapted to support wide mouth vessels such as beakers, funnels, etc.

A circular center rack 40, shown in Figs. 6 and 7, similarly formed of wires is provided with an outer ring 41 and an inner ring 42 connected by a series of circular brackets 43 and a second series circular brackets 44 with offset portions 45, the two sets of brackets being disposed alternately between the rings 41 and 42. A center ring 46 is connected to the inner ring 42 by a series of radially disposed wires 47. A series of resilient hooks 48 extending generally upwardly from the inner ring 42, and somewhat tangentially to the direction of rotation of the impeller 15, are disposed with one hook 48 projecting substantially into the offset portion 45 of each bracket 44. Hooks 49 provide means for releasably mounting said center rack 40 on the inner wires of the bottom walls 34 of the top outer rack 32 in an obvious manner. The rack 40 is particularly adapted to support various types of flasks, which are too large to be accommodated by the bottom rack 22.

In using the device described herein the bottom rack 22 and top outer rack 32, plus either the flat center rack 38 or the circular center rack 40 may be used simultaneously. Various types of narrow neck laboratory glassware, such as Erlenmeyer flasks and the like are mounted on a series of hooks 29 which retain such articles in angular relation to the impeller 15, so that the cleaning water is caused to enter and swirl by each article carried by the hooks 29 as the impeller rotates on its vertical axis, as illustrated in Fig. 2. After the articles are washed they may be removed by merely lifting them from the hooks 29. The flow of water into the vat 13 from the jet 19 impinges against the inner walls of the vat 13 somewhat as indicated by the arrows in Figs. 1 and 2 and dissolves the detergent placed in the detergent containers 35 disposed on top outer rack 32 forming a soapy solution, which swirls around in the interior of the vat 13 to clean the various pieces of laboratory glassware and the like, disposed on the racks 22, 32 and 40.

It will be noted that a series of resilient hooks 48 extending upwardly and outwardly from the inner ring 42 of circular center rack 40, are disposed in such manner that one hook 48 is positioned between each resilient circular bracket 43, and the somewhat similar bracket 44 having an offset portion 45 along the top. This arrangement of the hooks and circular brackets provides a construction adapted to support a relatively wide range of sizes and shapes of flasks and the like. The hooks 48 of the circular center rack 40 are disposed in a more upwardly position than the hooks 29 of the bottom rack 22.

The racks described herein are adapted to be used preferably in a washing device having a sequence switch which is advanced to a certain position by means of a handle on the outside of a washing device to initiate the operation of a timing motor which operates throughout the complete cycle to advance the sequence switch. At the beginning of the cycle a solenoid inlet valve is energized for approximately 1¼ minutes to admit water to the vat 13 and the pump 20 is operated to discharge this water as rapidly as is possible. This is a purge step during which water is removed from the pipes supplying the device and immediately discharged to a drain by the pump. Following this purge cycle the pump 20 is stopped and at the same time the impeller 15 is rotated and the fill valve is energized for 5 to 8 minutes to admit a change of water to the vat 13. The washing step of approximately 5⅝ minutes' duration follows at the conclusion of which the impeller is stopped and the pump 20 is started for about 1¼ minutes during which time the used washing water is removed.

The first rinse step is initiated by opening the fill valve for ⅝ of a minute and stopping the pump 20. The impeller 15 is operated to provide a 1⅞ minutes' rinse at the end of which the impeller 15 is stopped and the pump 20 is started for a 1¼ minute period during which the used rinse water is removed.

A second rinse of 1⅞ minutes' duration is then carried out, followed by a pump operation of 1¼ minutes, this second rinse being identical in operation to the first rinse just described. Following this 1¼ minute pump operation the impeller 15 is started and at the same time the electric heater 21 is also energized for drying the articles. This drying operation lasts for approximately 21 minutes at the conclusion of which the heater is deenergized. The impeller 15 and the motor and timing motor are deenergized ⅝ minute after the deenergization of the electric heater 21. This completes the cycle of operation and all the elements of the machine are inactive. The front wall of the cabinet 12 is then pulled out carrying with it vat 13 and the articles supported on the rack are then ready to be removed.

It is believed that the disposition and arrangement of the jet 19 and the various racks is such that a violent swirling motion takes place in the vat 13 corresponding somewhat to the arrows in Fig. 1, thus forcing the cleaning water into all surfaces of all articles to be cleaned and supported on the various racks. The effectiveness of this cleaning action is illustrated by tests showing that even though the articles supported on the various racks contain a heavy sludge coating of various compounds, oils and chemicals, the cleaning action thereof caused by the cycle of operations above described will satisfactorily clean such articles. The use of a series of rotating jets as a substitute for the impeller 15 is within the contemplated scope of the invention.

It will be apparent to those skilled in the art that the invention herein disclosed may be variously changed, used or modified, without departing from the spirit of the invention or sacrificing the advantages thereof, and that the embodiment of my invention is illustrative only, and that my invention is not limited thereto.

What I claim is:

1. A rack for a vessel washing machine comprising, spaced concentric inner and outer ring members disposed in a generally common plane, a first series of hooks in the form of circular loops projecting upwardly therefrom and having their open ends secured to said rings, a second series of similar circular hooks alternately disposed with said first series of hooks connected to said inner and outer ring members, similarly disposed with reference to said rings and having curved offset portions at their top portions offset from the plane of said hooks, a series of elongated hooks disposed generally upwardly and outwardly from said inner ring towards said outer ring and projecting toward the offset portions of said second series of hooks.

2. A rack for a vessel washing machine comprising, spaced concentric inner and outer ring members disposed in a generally common plane, a first series of hooks in the form of circular loops projecting upwardly therefrom and having their open ends secured to said rings and disposed non-radially to the axis of said rings, a second series of similar circular hooks connected to said inner and outer ring members alternately disposed with said first series of hooks similarly disposed with reference to said rings and having curved offset portions at their top portions offset from the plane of said hooks, a series of elongated hooks connected to and disposed generally upwardly and outwardly from said inner ring

towards said outer ring in a non-radial position and projecting toward the offset portions of said second series of hooks.

3. A rack for a vessel washing machine comprising, spaced concentric inner and outer ring members disposed in a generally common plane, a first series of resilient hooks in the form of circular loops projecting upwardly therefrom and having their open ends secured to said rings, a second series of similar circular resilient hooks connected to said inner and outer ring members alternately disposed with said first series of hooks and similarly disposed with reference to said rings and having curved offset portions at their top portions offset from the plane of said hooks, a series of elongated resilient hooks connected to and disposed generally upwardly and outwardly from said inner ring towards said outer ring and projecting toward the offset portions of said second series of hooks, and a center rack disposed inwardly of and connected to said inner ring.

4. A rack for a vessel washing machine comprising, spaced concentric inner and outer ring members disposed in a generally common plane, a first series of resilient hooks in the form of circular loops projecting upwardly therefrom and having their open ends secured to said rings and disposed non-radially to the axis of said rings, a second series of similar circular hooks connected to said inner and outer ring members alternately disposed with said first series of hooks similarly disposed with

reference to said rings and having curved offset portions at their top portions offset from the plane of said hooks, a series of elongated resilient hooks connected to and disposed generally upwardly and outwardly from said inner ring towards said outer ring in a non-radial position and projecting toward the offset portions of said second series of hooks.

References Cited in the file of this patent

UNITED STATES PATENTS

1,051,311	Clark	Jan. 21, 1913
1,884,181	Pauly	Oct. 25, 1932
1,888,324	Matthai	Nov. 22, 1932
1,915,079	Watt	June 20, 1933
1,919,541	Davis	July 25, 1933
1,968,657	Stoddard	July 31, 1934
2,032,156	Stoddard	Feb. 25, 1936
2,035,625	Walker	Mar. 31, 1936
2,191,693	Havlis	Feb. 27, 1940
2,262,517	Skinner	Nov. 11, 1941
2,342,995	Ballentine	Feb. 29, 1944
2,469,966	Idle	May 10, 1949
2,553,180	Fromme	May 15, 1951
2,603,097	Kelley	July 15, 1952
2,646,809	Van Hise	July 28, 1953
2,715,408	Stanitz	Aug. 16, 1955