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(54) Dishwashing apparatus

(57) Dishwashing apparatus comprises an open-work basket 2 which is shaped to fit within a sink bowl, said basket being provided with racks 19-21 for holding articles to be washed and housing a rotary spray arm 8 for spraying said articles with wash liquid, a housing 23 mounted on the basket and provided with control switches 30 and programmer 31 for regulating the operation of the dishwashing apparatus, and a seal, which, in use, seals the dishwashing apparatus against the periphery of the sink bowl. An electrical heating element 12 for heating wash liquid may be located below the spray arm. A pump may be located in the housing for pumping wash liquid to the spray-arm. The water temperature may be regulated by a thermostat and a float switch may be provided to regulate liquid level in the sink bowl. A mechanism for operating a drain plug 16 may also be provided.

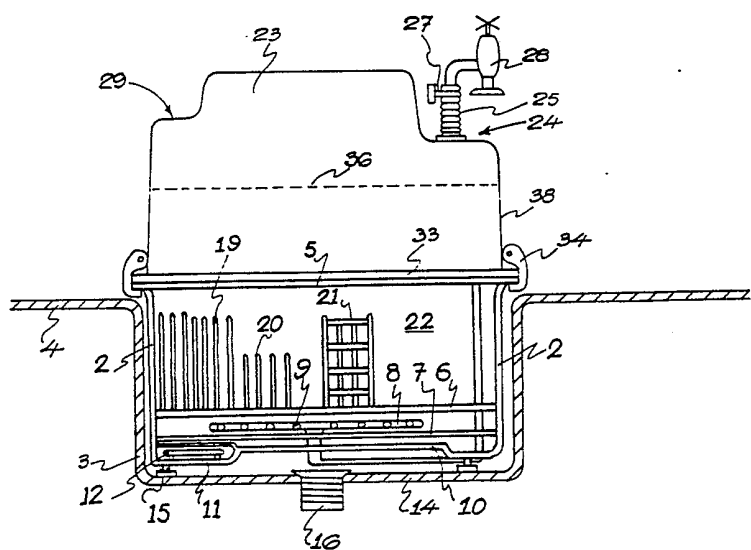


FIG. 3

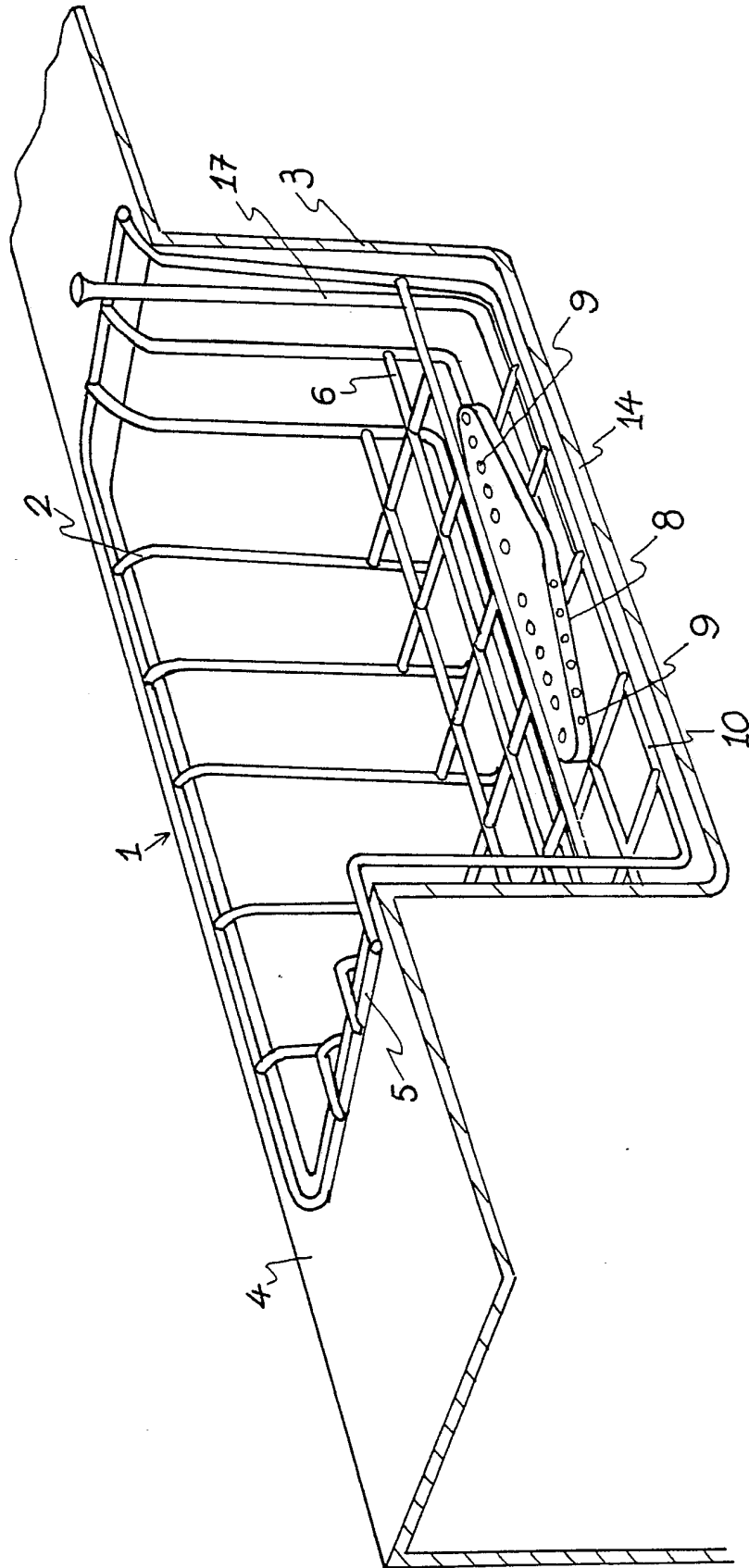


FIG. 1A.

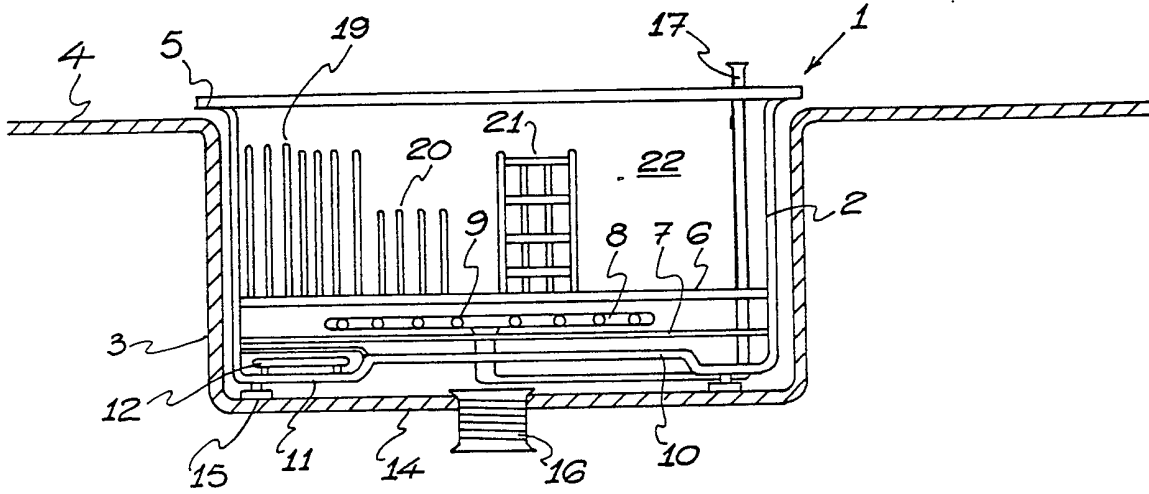


FIG. 18.

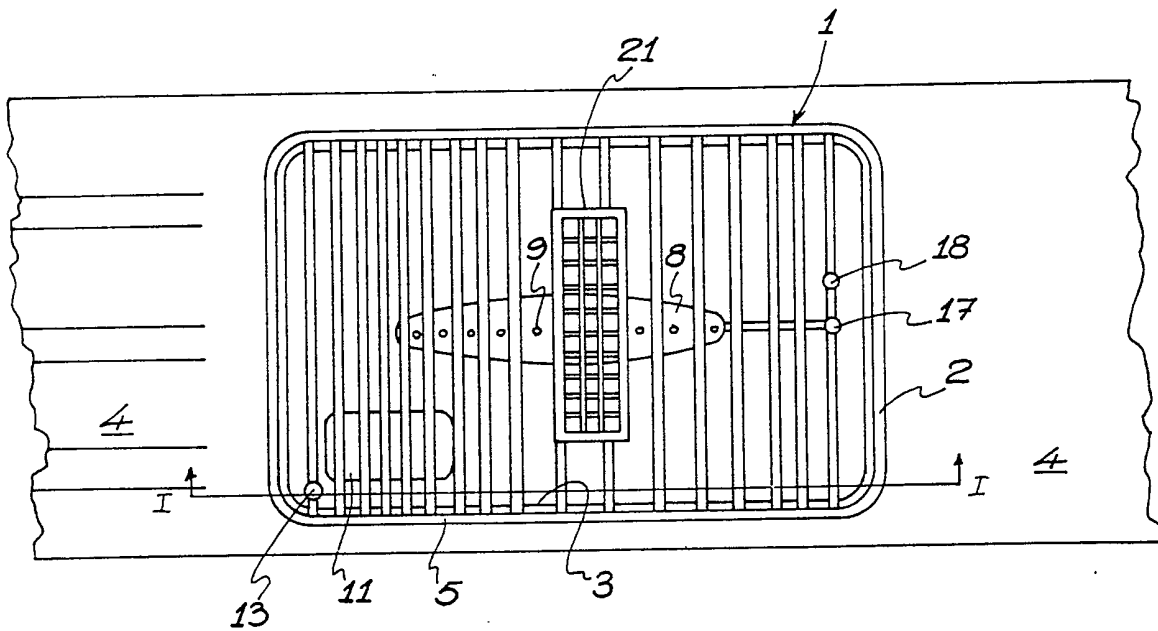


FIG. 2

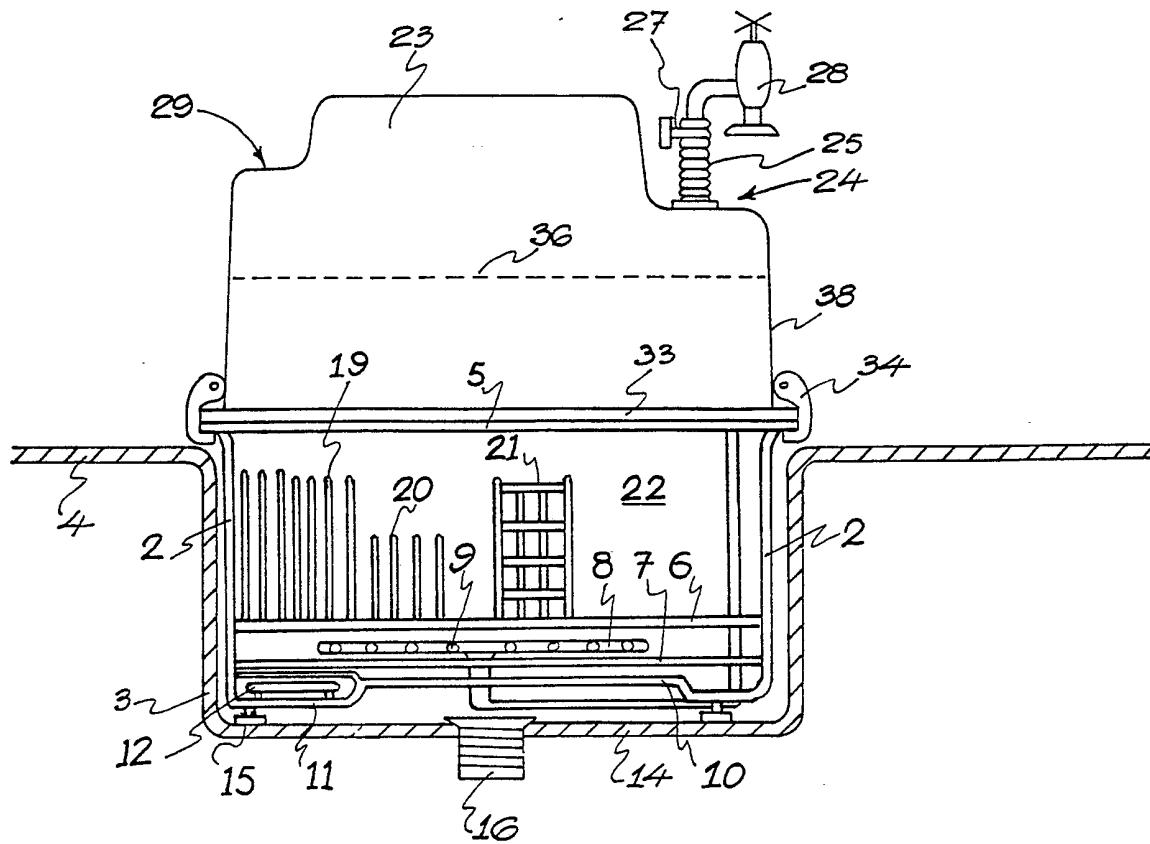


FIG. 3

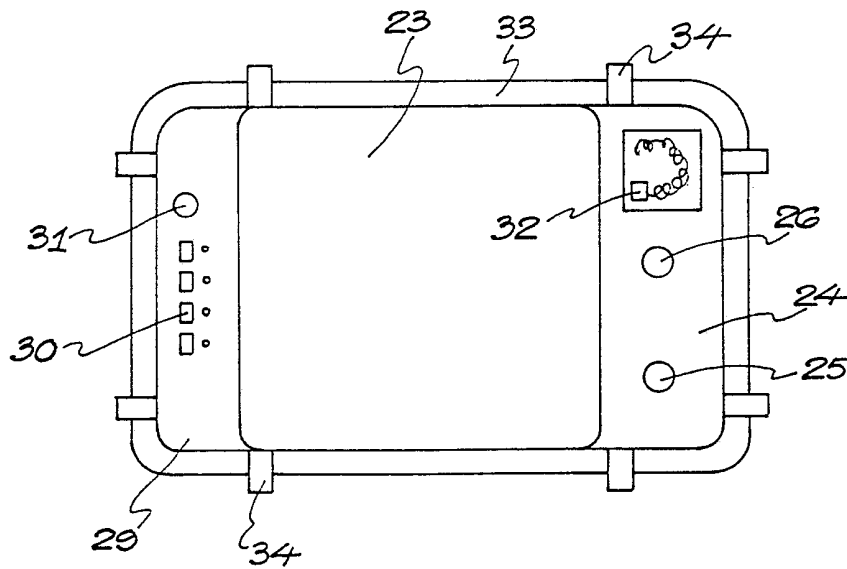


FIG. 4

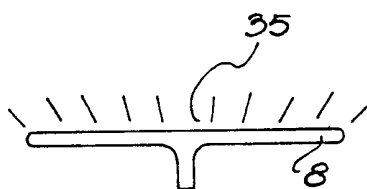


FIG. 5

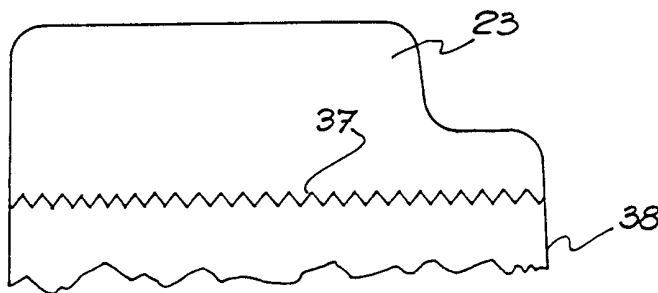


FIG. 6

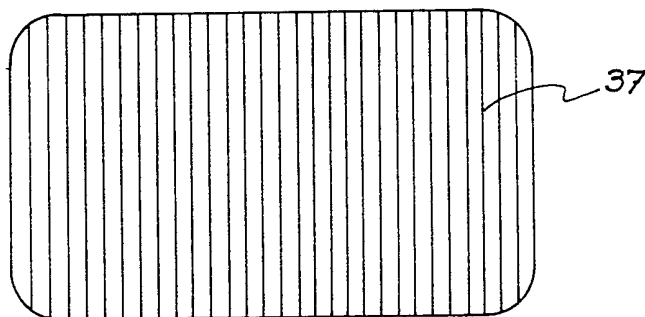


FIG. 7

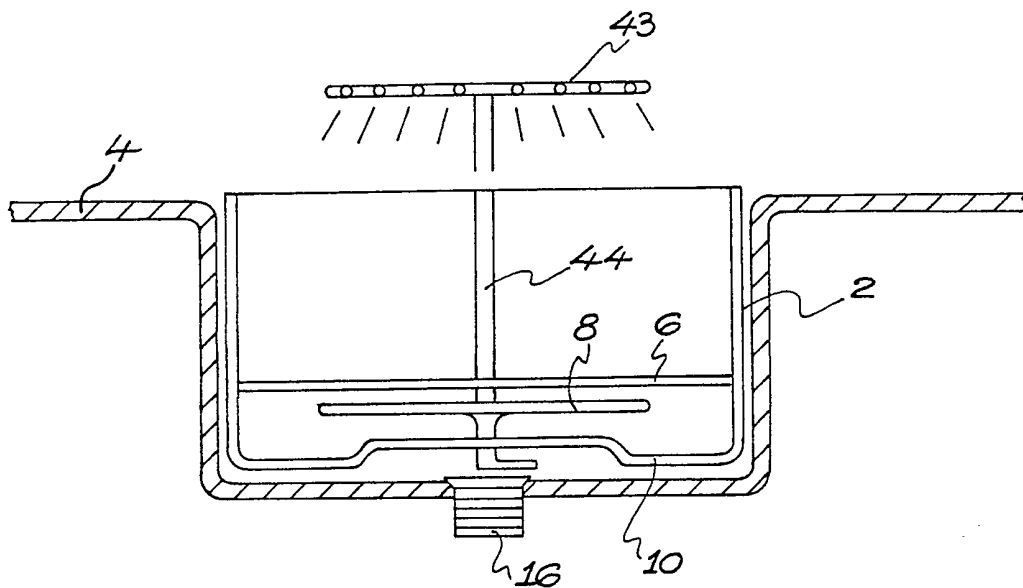


FIG. 8

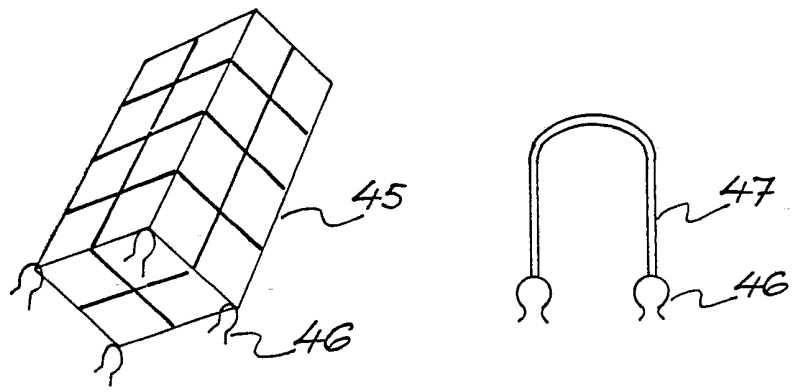


FIG. 9

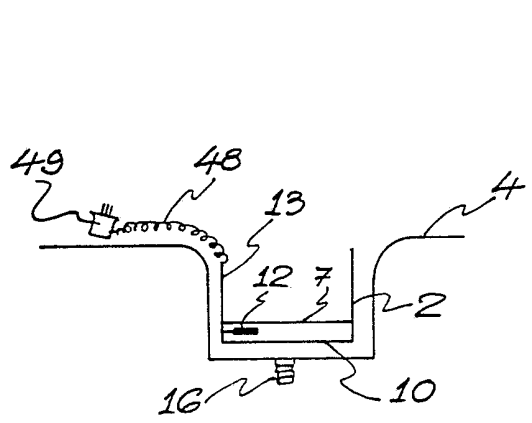


FIG. 10

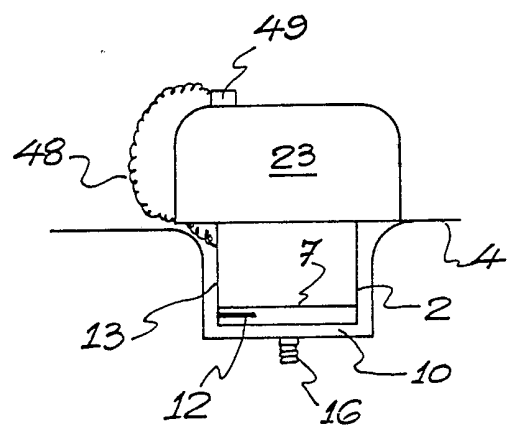


FIG. 11

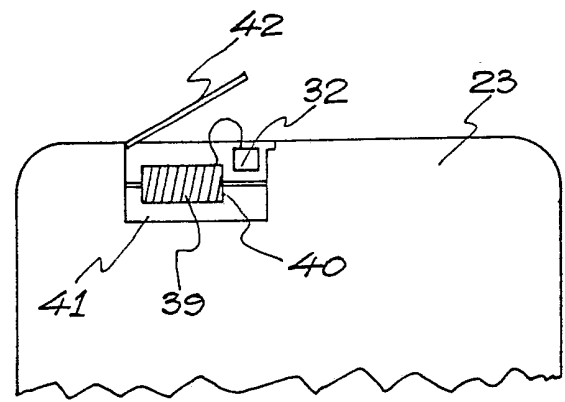


FIG. 12

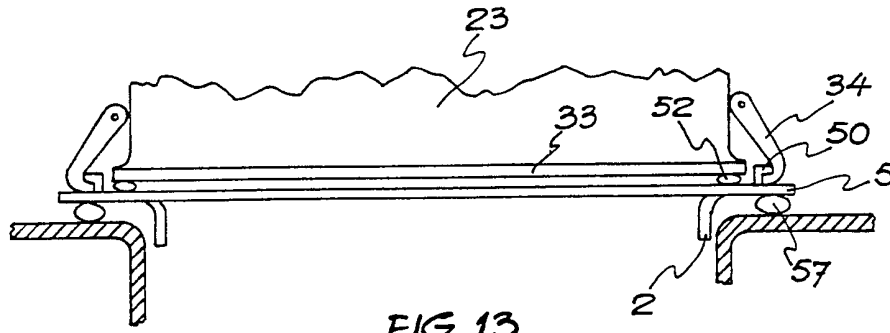


FIG. 13

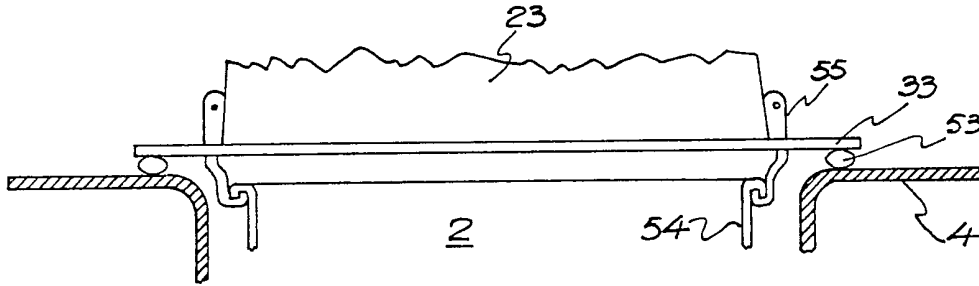


FIG. 14

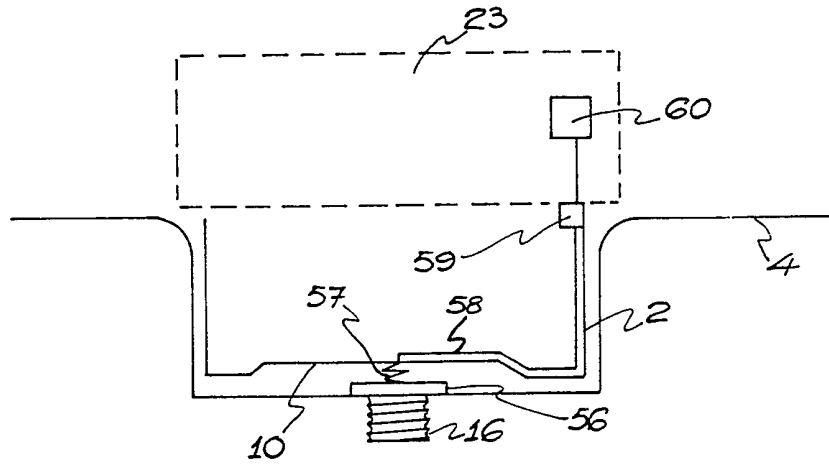


FIG. 15

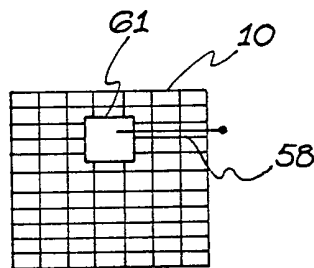


FIG. 16

5

"IMPROVEMENTS IN OR RELATING TO DISHWASHING APPARATUS"

10           This invention relates to dishwashers. A variety of arrangements  
of dishwashers is known, in the majority of which the dishwasher is a  
large free-standing unit, of a size which will accommodate a  
considerable quantity of dirty dishes and other tableware. Dishwashers  
are frequently comparable in their dimensions to clothes washing  
15           machines, and, in modern kitchens, are similarly received beneath  
worktops. The size of such units tends to be a discouragement to their  
use for small quantities of items. In addition they occupy large areas  
of kitchen space, which is frequently in short supply in modern  
20           dwellings, and require to be plumbed-in before use, thus necessitating  
the attendance of a skilled tradesman.

          It is an object of the present invention to provide a dishwasher  
which will be compact and easily used without any technical input.

25           According to the invention, there is provided dishwashing  
apparatus having a lower portion comprising an open-work basket  
receivable within a sink bowl, spray means for directing water at items  
accommodated in said open-work basket, an upper portion comprising a  
housing accommodating control means of the apparatus, said upper and  
30           lower portions being associatable together for a washing operation, and  
sealing means for interposition between one of said upper and lower  
portions and a peripheral region of the mouth of a said sink bowl in  
use of the apparatus. Preferably said upper and lower portions are  
connectible together for said washing operation and the assembly of the  
35           connected together upper and lower portions is sealingly engageable  
against said peripheral region.



At least one of the upper and lower portions preferably has a laterally extending peripheral lip or flange, said sealing means then most suitably including a sealing member underlying said lip or flange for interposition between said lip or flange and said peripheral region surrounding the mouth of a said sink bowl, outwardly of said mouth, in use of the apparatus. Said lip or flange may extend from the lower portion of the apparatus, and the upper portion may then have a further similarly laterally extending lip or flange, which in an assembled configuration of the apparatus, overlies an upper peripheral region of the lower portion, for example the upper face of said lip or flange of the lower portion. A further sealing member may then underlie said further lip or flange for interposition between said further lip or flange and said upper peripheral region of the lower portion. Means may be provided for clamping the upper and lower portions together in said assembled configuration.

Alternatively said lip or flange may extend from the upper portion of the apparatus. In this construction, the upper portion may either overlie the lower portion in an operating configuration of the apparatus without being physically connected to it, or, alternatively, said portions may again be clamped together in their assembled disposition.

The apparatus also most suitably comprises means for selectively closing or opening the drain aperture of the sink within which the lower portion is received during use. Said means may include a sealing assembly mountingly associatable with a base region of the lower portion and displaceable between drain-opening and drain-closing positions. Said sealing assembly may be biased towards a normally closed configuration. Means are preferably also provided for operatively linking said assembly with drain control means of the apparatus, which may be located in the upper portion of the apparatus. The sealing assembly may be mountable on the base region of the lower portion in a variety of locations to facilitate use of the apparatus of the invention in sinks having different drain arrangements or positions.

The lower portion of the apparatus most suitably includes a spray arm and a heating element, while the upper portion may accommodate a pump and water supply means. Water transfer ducts then preferably extend between the upper and lower portions in the connected-together condition of the apparatus and have respective coupling means so that the duct sections in each of said upper and lower portions of the apparatus may be connected together for through-flow of water in said connected-together condition of the apparatus. Power supply and control signal transfer lines may similarly extend between the upper and lower portions, and may again be couplingly connectible in the connected-together condition of the apparatus. Alternatively, these lines may be brought to the upper portion by means of a flexible cable passing outwardly of the washing region through a seal.

A particular advantage of the invention resides in its use of the existing sink bowl in a kitchen to receive the unit, the bowl acting as the wall of the base of the unit. The existing water supply to the sink is also used, as is the conventional drain from the sink, so that no special plumbing is required. Push-fit tap connectors may be employed, for either double or single taps. Either hot or cold water or both may be taken, and hot and cold supplies may be mixed as required, while independent heating of water by the apparatus may also take place as necessary. The apparatus of the invention is especially suited to small washing loads. It may be sized to suit standard sink bowls and because of its compact dimensions, it may be stored away when not in use, thereby economising in usage of kitchen space.

An embodiment of the invention will now be described, having regard to the accompanying drawings, in which:

Figure 1A is a schematic pictorial view of the lower portion of a dishwasher according to the invention in position in a sink, in section along a longitudinal substantially central plane,

Figure 1B is a schematic sectional side view of the lower portion of a dishwasher according to the invention on the line 1-1 of Figure 2,

Figure 2 is a top view of the dishwasher lower portion of Figure 1B,

5 Figure 3 is a side view of the dishwasher of the invention in position on a sink with the lower portion in sector,

Figure 4 is a top view of the top portion of the dishwasher of Figures 1B to 3,

10 Figure 5 is a side view of the sprayer of the dishwasher of Figures 1B to 3, showing the spray pattern,

15 Figure 6 is a sectional schematic side view of the top portion of a dishwasher in accordance with the invention, showing a corrugated arrangement for the rear face or roof of the recess in the downwardly facing side of the top portion,

20 Figure 7 is a bottom view of the corrugated rear recess face of Figure 6,

Figure 8 shows a variation of the dishwasher of the invention in which a further top spray arm is provided, in part-schematic side view,

25 Figure 9 shows a clip-on cutlery or crockery cage and similarly adapted snap-on supports or rack members for other items to be washed,

30 Figure 10 shows in side view an arrangement for supplying the electrical water heating element of the lower portion of the dishwasher with electricity, in a disconnected configuration,

Figure 11 shows the power supply arrangement of Figure 10 in a connected configuration,

35 Figure 12 shows a further arrangement for receiving the main power supply for the dishwasher in the top portion of the apparatus, in part sectional side view,

Figure 13 shows in schematic sectional side view, a first arrangement for sealing the dishwasher against a sink bowl,

5 Figure 14 shows a further sealing arrangement in a similar sectional side view,

10 Figure 15 is a diagrammatic sectional side view of an arrangement for controlling the flow of water through the drain from the sink bowl, and

15 Figure 16 is a schematic top view showing one location of the drain closing means on the base of the basket-form lower portion of the dishwasher of the invention.

20 As shown in outline pictorial view in Figure 1A and in more detail in Figures 1B and 2, the lower portion 1 of a dishwasher according to the present invention includes a cage-like structure or basket 2, formed from plastics-covered heavy gauge wire material and shaped so that it may be received within the bowl of a sink 3 defined by a recessed region in a kitchen unit and flanked by a draining board or boards 4. The upright members of the longer sides of this cage or basket have been omitted from Figure 1B, in the interests of clarity, but are shown in the pictorial sketch of Figure 1A. However, certain other features have been omitted from Figure 1A, to more clearly  
25 facilitate appreciation of an important feature of the invention, namely its ready association with and placement in an ordinary kitchen sink, when in use. The upper edge or rim of the cage or basket 2 has a laterally-projecting continuous flange or lip 5, which may overlies the edge or rim of the sink-bowl 3. The lower boundary of the washing  
30 region of the portion 1 is defined by a floor 6, which is also of open or cage-like construction, so that water may be driven upwardly through it against the items to be washed and may drain away again from washed items into the lowermost part of the sink bowl. A sub-floor 7 underlies this floor 6 and a spray-arm region is defined between the  
35 floor and the sub-floor, within which a spray arm 8 is rotatably mounted. Arm 8 extends laterally to each side of its central rotary

mounting or bearing and has an array of spray holes 9 distributed along its length, the holes being arranged or angled so that when water under pressure is supplied to the interior of the arm, the arm will be caused to rotate as the water emerges through the holes 9. Thus a vigorous washing and rinsing action may be achieved. As can be seen more particularly in Figure 5, the angles of the holes in the radial direction also vary along the radial extent of the arm so that the outer or end holes throw the water outwardly to the extreme boundaries of the washing region. In Figure 5, the spray pattern is indicated by reference 35. The spray arm has the maximum possible length consistent with its being rotatable within a generally rectangular sink bowl. Thus its maximum length is substantially determined by the transverse dimension of the sink. There should be a minimum clearance of approximately 10 mm between the outer ends of the arm and the nearest stationary part of the cage 2 or the sink.

Beneath and spaced from the sub-floor 7, the base 10 of the cage or basket 2 is again defined by an open-work structure through which water may pass freely during use of the apparatus. A well 11 in one corner region of the base accommodates a heating element 12, by which the washing water may be heated during use of the dishwasher. The power supply to the heating element 12 may be brought to the vicinity of the well 11 by means of a conduit 13, indicated in Figure 2. A thermostat may also be provided in an appropriate region of the lower portion 2, for establishing the temperature of the water to be used and controlling further heating of it, if required. The control signals from the thermostat may also be transferred to control means of the apparatus, housed in an upper portion thereof to be described, by a suitable control signal line accompanying the power line through duct or conduit 13. Quick connectors may be provided at the upper end of this conduit so that the power and control lines may be appropriately linked to the control mechanisms of the upper portion of the apparatus, when the upper and lower portions are assembled together, as described subsequently. The base 10 stands on the floor 14 of the sink bowl 3 on adjustable feet 15, by means of which the spacing between the base 10 and said sink floor 14 may be varied as required. The sink floor 14

has the customary drain outlet 16 by means of which waste water may be allowed to run away when required. The drain is closed off or opened up during use of the apparatus by means to be described in relation to a subsequent Figure.

5

Duct 17 supplies water under pressure to the spray arm 8 in use of the apparatus. This water transfer duct 17, which is flexible, leads downwardly from a coupling connection substantially at the level of the upper lip or rim of the cage 2 towards the base of the cage and then extends transversely across the cage beneath or in close proximity to the base 10 to the central rotary mount for the arm 8. This mount is hollow so that the pressurised water may pass through it into the interior of the rotatable arm 8 and also includes a suitable rotary seal, so that rotatability of the spray arm is maintained without loss of pressure. A return water transfer duct 18 (Figure 2), having an open lower end, leads upwardly substantially directly from the vicinity of the base of the basket 2 to a coupling connection similar to that for duct 17 by means of which it may be linked to a pump in the interior of the upper portion of the dishwasher, to be described. This return water duct incorporates a removable strainer to prevent pump blockage.

20

The upper washing region of the basket 2, defined above the floor 6 and inwardly of side walls of the cage, is provided with a dish rack 19, a saucer rack 20, a cutlery tray or basket 21 of open-work construction, while the remaining space 22 constitutes a region for accommodating items of large size, such as pots or pans, requiring to be washed. This arrangement facilitates the washing of items of awkward shape or large size.

30

The top portion of the dishwasher, indicated by reference 23 in Figures 3 and 4, consists of a plastics outer housing within which a pump and the various control aspects of the dishwasher are accommodated. The housing is of generally rectangular inverted box-shape, having a recessed region along each shorter upper edge. Recess 24 accommodates two tap connection hoses 25 and 26, one for each

35

of the hot and cold taps respectively of a conventional sink. Each hose 25 or 26 is sealingly connected by means of a clamp 27 to a respective tap, indicated schematically only by reference 28, for the flow of hot or cold water from the tap to the dishwasher.

5

The other upper recess, indicated at 29, accommodates control switches and a programmer, indicated generally by references 30 and 31 respectively. Power is supplied to the apparatus by a suitable flexible lead and plug 32, accommodated in and connected to the apparatus at the tap connection recess 24. In an alternative arrangement for accommodating the power lead, illustrated in Figure 12, the cable 39 is housed in the storage configuration of the washer in a recess 41 in the upper face of the top portion 23 on a self-winding or recoiling drum 40. Plug 32 is also received within this recess in the storage configuration, and the recess may be closed off by the lid 42. As a yet further option, a telephone type coiled cable may be employed, again accommodated within recess 41 in the storage configuration.

The interior of the lower part of the top portion, i.e. the downwardly directed side in the assembled configuration of the apparatus, is recessed or hollow to accommodate or receive the upper edges of large plates or other bulky items placed in the cage or basket 2 for washing. The upper boundary of this recess or open region is indicated by reference 36 in Figure 3. Figures 6 and 7 show a variation of the apparatus in which the surface 37 defining this boundary is corrugated or otherwise irregularly profiled so as to deflect water being sprayed upwardly back in the downward direction again onto the dishes or other items to be washed, in a distributed or broken-up manner, so that a thorough washing action is achieved. The lateral boundary of this recessed or downwardly-opening region, indicated by reference 38 in Figures 3 and 6, may also be transparent, so that a user may view the washing action in progress within the apparatus.

The lower edge or rim of the upper portion 23 has a flange or lip 33 corresponding to the flange or lip 5 of the lower portion 2,

indicated in its rim region only in Figure 3. The upper portion 23 is applied to the lower portion 2 in assembly of the apparatus so that the lips or flanges 5 and 33 abut together. Clamping means 34, which may be conventional toggle clamps such as are widely used for locking component parts of a variety of different types of apparatus together in a close and sealing manner, are provided at a plurality of locations around the periphery of the top portion 23, and engage under the lip of the lower portion 5, to pull its lip or flange against that of the upper portion. In this way the top and bottom parts of the dishwasher are clamped together for use.

In order to seal the dishwasher against the periphery of the sink bowl, a variety of sealing arrangements may be provided. A seal may underlie the lip or flange or the lower portion 2 and be held pressed against the rim of the bowl by the weight of the assembled and loaded apparatus. Alternatively, the seal may extend downwardly from the flange or lip of the upper portion 23, this being laterally enlarged so that it extends outwardly beyond the lip or flange of the lower portion 2. In this case therefore, sealing between the assembled apparatus and the periphery of the sink bowl takes place between the upper portion and said periphery rather than between the lower portion and the rim of the sink. In either case, a seal may also be provided between the upper and lower portions of the dishwasher themselves. The sealing arrangements are subsequently described in more detail in relation to later Figures.

Figure 8 shows an arrangement in which as an alternative to or in addition to the corrugated upper boundary 37 for the interior of the top portion 23, an upper or top spray arm 43 is additionally provided, fed with water from the bottom or lower spray arm 8 through an axial tube 44. Tube 44 is preferably removably connected to arm 8 by a screw connection or joint so that it may be removed by the user as required, should he or she wish to run the apparatus with only the single lower spray arm in use. Alternatively the top spray arm may be supplied as an optional extra, to be fitted by the user at their own choice or at a later date. Other features of the dishwasher are indicated by the same



reference numerals as used previously.

5 In the arrangement illustrated in Figure 9, a cutlery rack 45 is provided which has spring clips 46 so that it may be mounted or sprung onto the members of the main basket at any required location. Hoop-form cup supports or racks 47 may be similarly mounted on the basket floor, again by means of clips 46. The flexibility of washing configuration thus achieved permits the apparatus of the invention to be readily adapted to wash a multiplicity of different utensils and  
10 articles, without its being limited to any size or shape of crockery other than the overall constraints on size imposed by its total physical dimensions. Also different sizes of cutlery baskets or crockery supports may be provided, some of which may as required extend above the level of the upper edge of the basket or main cage 2, and  
15 into the recessed region within the interior of the lower part of the top portion 23.

Thus the washing space may be utilised in many different ways. An alternative arrangement for feeding electric power to the heating  
20 element 12 of the cage or basket 2, as compared with the connector at the top end of power conduit 13 mentioned in regard to Figure 2, is shown in Figures 10 and 11. In this arrangement all of the electrical feeds to the basket region, including not only the supply to the heating element but also connections to and from a thermostat for  
25 controlling the water temperature and those to and from a float switch for controlling flow into the sink bowl so that the water level does not exceed a preset value, as well as any other necessary features needing an electrical connection, are all carried together within a single waterproof flexible cable 48 having a plug or bayonet connector  
30 49 at its free end. This flex is carried upwardly through duct 13 and passes to the exterior of the apparatus through, for example, a suitable seal between the top portion 23 and the cage 2, so that it may be plugged into a connection point on the top of the casing of the upper portion 23. This arrangement obviates the necessity to guarantee  
35 the integrity of electrical connections in the relatively wet and difficult environment in the water spray region.

Figure 13 shows in greater detail, the sealing region between the lower portion of the apparatus and the sink and also that between the upper and lower portions of the apparatus themselves. In this instance the flange 5 of the lower portion or basket 2 is carried outwardly farther than the flange 33 of the top portion 23, which overlies it. The toggle clamps 34 engage in clips 50 on the upper face of flange 5, to lock the two portions of the dishwasher together. A flexible seal 51 of some suitably soft and deformable material is attached to or mounted on the underside of the flange 5 around its periphery or edge. The feet 15 on the base of the basket are adjusted so that when the lower portion is loaded and placed in the sink, it will compress the seal 51 to a sufficient degree to ensure adequate sealing between the flange 5 and the sink bowl periphery. The weight of the loaded basket will ensure that the basket remains in position and thereby also the integrity of the seal achieved. The seal is of sufficient size or depth to ensure proper sealing even in the presence of mouldings on the sink top periphery. In addition to preventing egress of water during use of the apparatus, the seal also serves a vibration-damping function in use of the washer. When the basket is full and in position in the sink, the top portion 23 is brought down onto it and the clamps 34 engaged in the clips 50 to hold the two portions together. A further seal 52 generally similar to seal 51 is interposed between the top and basket portions 23 and 2 of the apparatus, being preferably mounted on or attached to the lower face of flange 33 of the top portion 23. This seal is compressed similarly to seal 51, when the portions are toggled or clamped together, to provide a seal between the top and bottom portions of the apparatus.

An alternative sealing arrangement is shown in Figure 14, in which the basket 2 terminates below the level of the draining board or sink periphery and does not have a flange. Flanging of the basket is not an essential requirement of the invention, although it offers an advantageous construction of sealing arrangement. In the construction now described, the flange 33 of the top portion 23 is carried outwardly to overlie the edge of the sink, and a flexible watertight seal 53, similar to those already described, is mounted on or attached to the

lower side of the flange 33 to form a seal directly between the top portion and the sink region. The top portion may then not necessarily be connected to the lower portion of the apparatus during a washing operation and may simply overlie it, the sealing action being achieved merely by virtue of the weight of the top portion. Alternatively, and as shown in this Figure, a connection may be established between the top and bottom portions of the apparatus by the upper edge of the basket being turned-over as indicated by reference 54 to define a downwardly-opening hook-shape along the upper periphery of the basket, in which corresponding upwardly-opening hook-shaped ends of toggle clamps 55 may engage to lock the washer portions together. These clamps extend downwardly through suitable apertures in the flange 33 inboard of the seal 53, which apertures are then themselves suitably also provided with sealing means permitting the clamping action while still preventing the passage of water. By togglingly clamping the upper and lower portions together, the rigidity of the assembled structure in use may be improved, while the weight bearing down on the seal 53 is also enhanced, depending on the degree of uplift achieved by the clamps and the adjustment of the feet.

Since, in the apparatus of the invention, the sink bowl serves as the container within which the dishwashing takes place, it is necessary to be able to control the opening and closing of the drain 16 during a washing operation. It must be open during draining or rinsing and closed during washing. Figure 15 illustrates an arrangement by which this may be achieved. A drain sealing rubber plug and backplate assembly 56 is mounted on the base 10 of basket 2 for translational displacement towards and away from the drain 16, the assembly 56 overlying and sealingly closing off the drain 16 in a closed configuration. A spring 57 urges the assembly 56 into a sealing disposition. A linkage 58 couples the assembly 56 to a connection 59 by means of which it may be operatively associated with switch or control means 60 in the top portion of the apparatus. The linkage 58 may be a control cable, such as a Bowden cable, or a lever mechanism. The switch 60 may be a solenoid or a motor driven cog shaft device under the control of the programmer.

In order to facilitate use of the apparatus in non-standard sinks, the drain seal is adjustable in position on the base 10 of the basket. As shown in Figure 16, the plug or assembly 56 is displaceably mounted on a plate 61, which is itself clipped onto the base 10, such as by spring clips, in the position appropriate to the location of the sink drain 16. There is a measure of tolerance in its positioning, in that assembly 56 is sufficiently large to cover a substantially greater area than that of the sink drain proper. In this instance linkage 58 must be flexible, viz. a cable, in order to accommodate the variable positioning of the plug 56. The cable or linkage may also be clippable to the members of the basket 2 so that it can be brought from the connection point 59 to the location of the plug.

Connection 59 may be made automatically on assembly of the top and bottom portions and released on separation of these portions by suitable manual means such as a release button on the exterior of the upper portion. Alternatively the operative connection of the linkage and the control means in the top portion may take place without any actual coupling action. In yet another arrangement, one of the toggle clamps may also serve to make the connection between the linkage 58 and the control means 60 of the top portion. In this case separation then also takes place automatically on parting the two portions of the apparatus.

The use of a solenoid type switch for item 60 obviates the need for any kind of rotating motor in the case of a washer using gravity feed for the water spray. This significantly cuts down the number of components and the cost of the apparatus.

In use of the dishwashing apparatus of the invention, the lower portion is placed into the sink and loaded within whatever crockery or other kitchen equipment is to be washed. Dirty dishes must of course be scraped free of any solids before loading, as in the case of conventional dishwashers. The upper portion is then placed over the lower portion and clamped to it. Couplings within the upper portion sealingly interconnect with the upper ends of the pressure and return

ducts 17 and 18. The tap connections 25 and 26 are coupled to the hot and cold taps of the sink within which the apparatus is located, and the unit is also connected to the electrical supply by the lead and plug 32. The drain 16 has of course already been sealed off by the  
5 placing of the basket in the sink, assembly 56 being held against the drain under the urging of spring 57. Assembly 56 must obviously also be positioned on the base of the basket in a location appropriate to the position of the drain outlet in the sink to be used, before the basket is lowered into the sink. A pocket is also most suitably  
10 provided in the basket to accommodate the normal plug and chain for the sink during use of the present apparatus. The taps are then opened and the apparatus is switched on, with a suitable programme being selected for the items to be washed. Mixing valves within the upper portion control the relative rates of admission of hot and cold water in  
15 dependence on the water temperature in the sink as detected by the thermostat so that a suitable washing water temperature is achieved. If the hot tap cannot provide water of sufficiently high temperature to meet the particular need, the heating element 12 may be brought into action. The sink bowl is filled with water to a level substantially  
20 coincident with the sub-floor 7. The height to which the water is allowed to fill may be regulated by a level switch, not shown, controllingly linked with the control circuitry of the upper portion 23.

When a suitable water level and temperature prevails, the washing  
25 cycle commences. Water is withdrawn through duct 18 from the lower region of the sink bowl by a pump housed within upper portion 23, and is forced under pressure back down through duct 17, to emerge through the spray holes or orifices 9 of the spray arm 8 and wash the crockery etc. in conventional manner. If necessary, auto-priming of the pump  
30 may be provided at the start of the washing cycle by directing at least a part of the incoming water flow into and through the pump to enable suction lift from the sink bowl to take place. The walls of the sink bowl define the sides of the washing container within which the spray action takes place, and the sealing of the edges or flanges 5 or 33  
35 against the periphery of the sink prevents any water from splashing out of the sink. Detergent or another wetting agent may be added to the

water by suitable means in upper portion 23, for example, by electrical release in dependence on a signal from the programmer. Further additives may also be fed in, for example, a material for improving the shine of glassware.

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Further options include gravity spraying rather than use of the pump, where the water pressure is sufficient. A relatively modest head is in fact more than adequate to achieve suitable spray performance, and gravity drive is an option even in a bungalow. Where pump drive is used or where there is a hot water supply, the final rinse may be carried out using water which is sufficiently hot to permit the dishes to dry when the washing operation finally stops. The unit may also incorporate a water softening chamber to hold salt crystals which are added to the water during its supply to the apparatus.

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Particular further features of the invention, apart from its use of the sides of the sink to define the walls of the washing container, are its ability to be connected to conventional taps, so that it may take in either hot or cold water or any mixture thereof, together with its capability of heating the water, should this be too cold. The tap connections may be arranged to fit either conventional taps or a single mixer-type tap, such as is increasingly frequently coming to be used in kitchens. An especial advantage of the present invention is that it is of compact dimensions and may readily be stored away when not in use, thus saving kitchen space, which is often scarce, especially in modern houses and apartments. Its relatively small size is also advantageous in that it is suited to relatively small washing loads, which form the norm in the smaller households of today. It may also be proportioned and dimensioned to suit the standard sizes of sink in common use.

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Since in most embodiments of the invention, the pump will generally be located above the level of the water well, it is desirable that the pump be self-priming. This may be achieved by a variety of methods, including the use of either an expansion pipe or a capillary tube. With the former arrangement, water is heated in the well and expands upwardly through the expansion pipe into the pump. An

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automatically-venting air eliminator is then provided on the pump, so that air may be cleared from the pump according as the water rises up the expansion pipe to fill it. In the capillary tube variant of the pump-priming facility, the same effect is achieved by use of a  
5 small-bore tube and capillary action.

In order to adapt the unit of the invention to non-standard sizes of sink, the sealing means may take the form of a blank or infill component, to bridge the space between the dishwashing unit and the  
10 sink wall. The dishwasher lower or upper portion then sealingly engages the periphery of an opening in the infill unit, and the outer periphery of the infill device seals against the periphery of the sink.

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CLAIMS

1. Dishwashing apparatus having a lower portion comprising an open-work basket receivable within a sink bowl, spray means for directing water at items accommodated in said open-work basket, an upper portion comprising a housing accommodating control means of the apparatus, said upper and lower portions being associatable together for a washing operation, and sealing means for interposition between one of said upper and lower portions and a peripheral region of the mouth of a said sink bowl in use of the apparatus.
2. Dishwashing apparatus as claimed in Claim 1, wherein said upper and lower portions are connectible together for said washing operation and the assembly of the connected together upper and lower portions is sealingly engageable against said peripheral region.
3. Dishwashing apparatus as claimed in Claim 1 or 2, wherein at least one of the upper and lower portions has a laterally extending peripheral lip or flange and said sealing means includes a sealing member underlying said lip or flange for interposition between said lip or flange and said peripheral region surrounding the mouth of a said sink bowl, outwardly of said mouth, in use of the apparatus.
4. Dishwashing apparatus as claimed in Claim 3, wherein said lip or flange extends from the lower portion of the apparatus, and the upper portion has a further similarly laterally extending lip or flange, which in an assembled configuration of the apparatus, overlies an upper peripheral region of the lower portion.
5. Dishwashing apparatus as claimed in Claim 4, wherein said further lip or flange overlies the upper face of the lip or flange of a lower portion and a further sealing member underlies said further lip or flange for interposition between said further lip or flange and said upper peripheral region of the lower portion.
6. Dishwashing apparatus as claimed in any of the preceding claims



comprising means for clamping the upper and lower portions together in said assembled configuration.

5 7. Dishwashing apparatus as claimed in Claim 3, wherein said lip or flange extends from the upper portion of the apparatus.

8. Dishwashing apparatus as claimed in Claim 7, wherein the upper portion overlies the lower portion in an operating configuration of the apparatus without being physically connected to it.

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9. Dishwashing apparatus as claimed in any of the preceding claims wherein the lower portion of the apparatus includes said spray means and a heating element, and the upper portion accommodates a pump and water supply means, and said upper and lower portions have respective water transfer ducts the said water transfer ducts having respective coupling means for connecting together the ducts in each of said upper and lower portions of the apparatus for through-flow of water in the connected-together condition of the apparatus.

15 20 10. Dishwashing apparatus as claimed in any of the preceding claims including means for selectively closing or opening a drain aperture of the sink within which the lower portion is received during use of the apparatus.

25 11. Dishwashing apparatus as claimed in Claim 10, wherein said drain aperture opening and closing means includes a sealing assembly mountingly associatable with a base region of the lower portion, displaceable between drain-opening and drain-closing positions, and biased towards a normally closed configuration.

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12. Dishwashing apparatus as claimed in Claim 11, comprising means for operatively linking said assembly with drain control means of the apparatus, located in the upper portion of the apparatus.

35 13. Dishwashing apparatus substantially as hereinbefore described with reference to the accompanying drawings.