

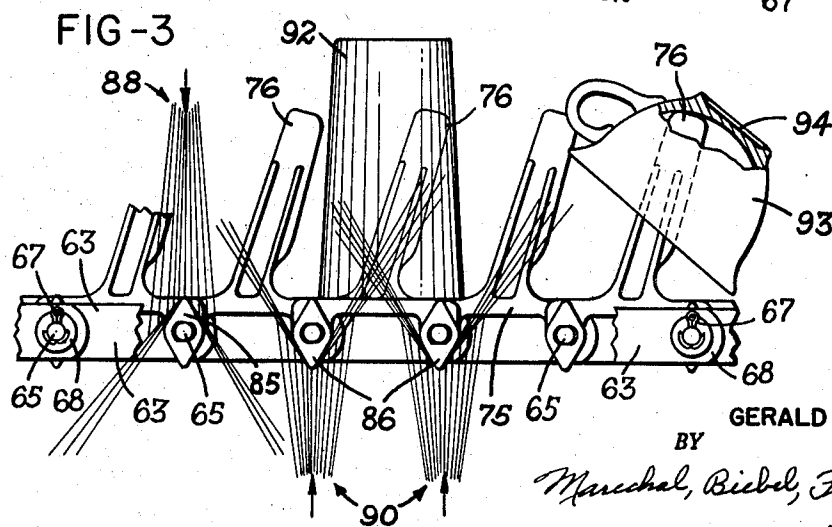
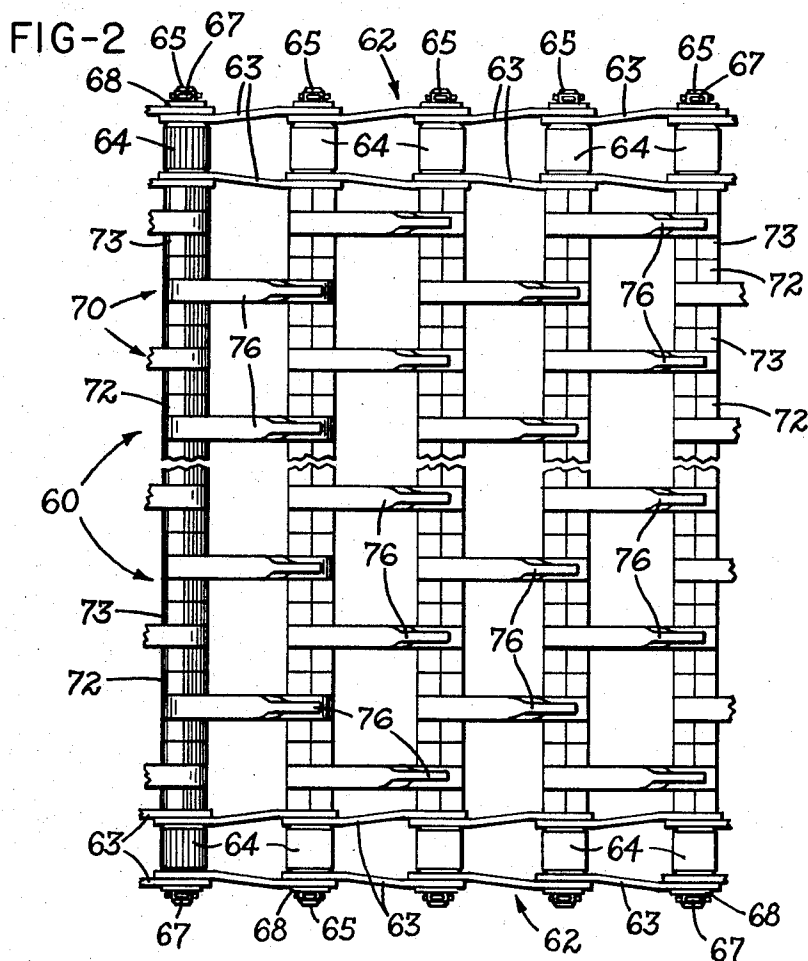
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DISHWASHER

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3 Claims. (Cl. 134—72)

This application relates to dishwashers, particularly to dishwashers of the continuous open conveyor type.

According to this invention a dishwasher is provided with a conveyor of such construction that the dishes and other articles to be washed may be positioned directly upon the conveyor and carried through the washing and rinsing mechanisms of the dishwashers without the use of racks, although racks may be used upon the conveyor, and the dishes and other articles are properly supported for thorough washing and rinsing by the liquid sprayed thereon in the dishwasher. The conveyor is of essentially open construction for the passage therethrough of liquid sprayed from above and below, and it supports the dishes in positions inclined slightly with respect to vertical so that the liquid is sprayed over all surfaces of the dishes and is rapidly drained therefrom after they are cleansed.

The general arrangement of such a conveyor may be as shown in Patent No. 2,644,473, issued July 7, 1953, assigned to the same assignee as this application, and includes a pair of continuous side members extending parallel to each other through the dishwasher, and a plurality of cross rods are supported between the side members at regularly spaced intervals. In accordance with this invention a plurality of flight links are supported by the cross rods, and each flight link includes two hub portions mounted on adjacent cross rods and connected by a web having an upwardly extending finger member thereon for supporting the dishes and other articles. These flight links are preferably formed of a molded plastic material such as nylon which is adapted to mass production techniques by the use of injection or other high capacity type molding apparatus.

The flight links are supported on the rods in staggered relation, with the front and rear hubs of each link extending about adjacent cross rods. Such an arrangement provides rows of finger portions extending above the upper flight of the conveyor for supporting the dishes in a preferred position inclined slightly with respect to vertical so that the dishes are thoroughly cleansed and rapidly drained.

The primary object of the present invention is to provide an endless conveyor for a dishwasher embodying a plurality of flight links supported between moving side members, wherein the flight links include hub portions interfitted to provide an open framework for the passage of sprayed liquid through the conveyor and wherein the hub portions include lower sections of streamlined configuration offering a minimum resistance to the passage of the sprayed liquid and thereby providing for minimum deflection of liquid sprayed against the hub portions.

Another object of this invention is to provide an endless conveyor for a dishwasher embodying continuous side members having a plurality of cross rods extending between them, and a plurality of flight links each of which has a pair of hub portions fitted about adjacent cross rods and including upper and lower sections tapered to provide a vertically elongated diamond shape in vertical section which affords a streamlined configuration sur-

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rounding the cross rods and minimizes deflection of liquid sprayed through the open framework of the conveyor.

An additional object of this invention is to provide a flight link for an endless conveyor in a dishwasher including spaced parallel hub portions having longitudinal bores for mounting on spaced cross rods of the conveyor and a web connecting the hub portions and providing a substantial open space between the hub portions for passage of liquid sprayed from above and below the conveyor, and wherein the hub portions include tapered upper and lower sections above and below the bores for minimizing deflection of liquid sprayed against the hub portions.

Other objects and advantages of the invention will be apparent from the following description, the accompanying drawings and the appended claims.

In the drawings—

Fig. 1 is a somewhat schematic view of a typical dishwasher according to the present invention, showing both dishes and racks supported upon the conveyor and passing through the various sections of the dishwasher;

Fig. 2 is a broken top plan view of a portion of the endless conveyor incorporated in the dishwasher of Fig. 1;

Fig. 3 is a side view of a portion of the conveyor, including a diagrammatic representation of the action of the sprayed liquid striking against the streamlined hubs of the flight links;

Figs. 4 and 5 are, respectively, side and front elevations of one of the conveyor flight links in accordance with the invention; and

Fig. 6 is a perspective view of a portion of the conveyor illustrating the interfitting of the flight link hubs over the cross rods.

Referring to the drawings, which illustrate a preferred embodiment of the present invention, Fig. 1 shows an automatic dishwasher having a base 10 supported on a plurality of legs 12 and in turn supporting a housing 14 and a hood 15 covering the central part of the housing between the entrance or loading end 16 and the exit or unloading end 18. The space beneath hood 15 is divided to provide a scrapping chamber 20 including a tank 22 and a pump 23 for recirculating water from the tank to a plurality of upper spray nozzles 25 and a lower spray manifold 26, to spray water over the dishes as they pass through chamber 20 and wash off particles of food. These particles fall into tank 22 and are collected at a removable filter 27 from which they are subsequently removed for disposal. A curtain 28 covers the entrance to chamber 20 to reduce splashing of water out of the machine.

Adjacent the scrapping chamber is a washing chamber 30 and a rinsing chamber 32, separated from each other by a deflector 33 and a flexible curtain 34. A tank 35 extends beneath washing chamber 30, and liquid from tank 35 is delivered by a pump (not shown) to upper and lower revolving washing arms 36 and 37, respectively, for spraying the washing liquid over the dishes as they are conveyed through the washing chamber. Similarly, a tank 40 extends beneath rinsing chamber 32, and liquid from this tank is recirculated by a power rinse pump (not shown) through revolving upper and lower power rinse arms 42 and 43. In addition, final rinse manifolds 45 and 46 are provided adjacent the exit of rinsing compartment 32, just within the exit deflector curtain 47, and are connected to a source of hot water under pressure for giving the cleansed dishes a final rinse of clear hot water.

The water supply to the scrapping section is provided partially from detergent overflow water from wash tank 35, passing into tank 22 through a connecting pipe 48, and partially from a connecting pipe 49 to the final rinse supply. Part of the fresh final rinse water is thus diverted to tank 22 as make-up water, and the spray from the

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final rinse manifolds drains into tank 40 as make-up water in the power rinse section.

A shaft 50 carrying a pair of sprockets 52 is journaled transversely of the unloading end of the machine, and is driven by a motor 53 and speed reducer unit 54 suitably connected to shaft 50, as shown schematically at 55. A similar shaft 56 is supported across the loading end of the machine and sprockets 58 are rotatably supported thereon, with the conveyor 60 extending around the sprockets for driving through the hood 15 with the upper flight thereof passing from the loading to the unloading ends of the machine. It will be understood that the above describes a suitable type of machine in which the present invention may be advantageously used.

Referring to Fig. 2, conveyor 60 includes a pair of identical side members indicated generally at 62 and extending substantially parallel to each other. Each side member includes a plurality of connected links formed by side bars 63 separated by cylindrical roller spacers 64, and having the forward ends of bars 63 received within the rearward end of successive such bars. A plurality of cross rods 65 extend through the thus overlapped ends of bars 63 and through the spacer rollers 64, transversely of the conveyor and at regularly spaced intervals thereon. Each rod 65 is held in place at its opposite ends by a cotter pin 67 locking against washer 68 to prevent transverse movement of the cross rods with respect to the conveyor.

Since liquid is sprayed from above and below the upper flight of the conveyor from the various spray arms identified above, the conveyor is formed as a relatively open framework including cross rods 65 and a plurality of flight links 70 supported by the cross rods. Referring to Figs. 4 and 5, each such flight link includes front and rear hub portions 72 and 73 adapted for mounting on cross rods 65, and connected by a web 75 which in turn supports an upwardly extending finger member 76. The flight links are preferably formed from a moldable plastic material such as nylon which is substantially inert and thus unaffected by corrosive action of the liquids, and from which food particles are easily washed off. Such a molded construction of flight link is suitable for mass production techniques with the use of high capacity molding apparatus, and yet is sufficiently rigid and inert so as to be suitable for use in a dishwasher conveyor.

The flight links are supported on rods 65 in staggered relation, with the front hub 72 of each link having a transverse bore 78 therein which receives one of the rods 65 therethrough. Each front hub 72 fits between the rear hubs 73 of a pair of other links, which rear hubs are also provided with transverse bores 79 for receiving the rods 65. It will be noted that each of the bores 78 and 79 is elongated in a horizontal direction, as shown at 80 in Fig. 4, to allow for expansion of the plastic link hub portions under the effects of water and heat. This arrangement prevents binding of the hub portions on rods 65 when the rods pass around the sprockets 52 and 58, with consequent turning movement of the link hubs upon the rods.

Referring to Figs. 2 and 6, the flight links provide rows of fingers 76 extending across the conveyor in staggered relation, with consecutive rows of fingers being transversely staggered with respect to their adjacent rows fore and aft of the conveyor flight. Thus referring to Fig. 2, the fingers 76 in the second row from the left are horizontally aligned with the spaces between fingers in the first row from the left. In one commercial embodiment of such a conveyor, alternate rows of seven and six fingers provide satisfactory results, with the spaces between the fingers in rows of seven aligned with the fingers in rows of six.

It will be noted that the hubs 72 and 73 substantially completely cover rods 65 between the side members 62, and thus the hubs are directly exposed to the liquid sprays from the various spray heads of the machine.

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Referring to Fig. 4, each hub includes an upper section 85 tapered from the center of the hub to a substantially inverted V-shape, and similarly each hub includes a lower section 86 tapered away from the bore through the hub to a substantially upright V-shape with the vertical dimension greater than the cross dimension. This construction of the hubs provides streamlined generally plane portions intersecting at an acute angle to provide a generally diamond shape in vertical section, and minimizing deflection of the sprayed liquid.

Such streamlining of the flight link hubs considerably reduces the dispersion of the liquid particles striking the hubs, and thus results in a minimum of reduction of velocity of the sprayed liquid. Referring to Fig. 3, a typical situation within the dishwasher is illustrated in a schematic manner, with a spray of liquid from above indicated at 88 and a spray of liquid from below at 90. A glass or tumbler 92 is illustrated as supported in inverted fashion over one of the fingers 76 in the usual manner, and it will be noted that the lower liquid sprays 90 striking the streamlined hub portions of the flight links are deflected only to a slight extent with respect to the initial direction of the spray, and that the deflected portions of the spray effectively enter the interior of the tumbler. In a similar manner, the upper spray 88 impinges upon the upper tapered section of the hubs, and is deflected but slightly in its downward path, minimizing splashing of the liquid.

This latter action is important with regard to the scrapper spray 25 and the final rinse upper manifold 45, since an operator may be standing adjacent the loading or unloading ends of the machine. If the liquid were deflected laterally to any great extent as it would be from hubs generally circular in cross section, it would be splashed outside of the hood 15, wetting the operator as well as the floor, since the curtains covering the entrance and exit to the hood are pushed away by dishes passing through the entrance and exit.

Another important advantage of the present conveyor results from the spacing of the fingers 76 of adjacent flight links. The fingers are spaced sufficiently close to prevent placing a cup or the like in perfectly flat inverted position, supported upon only the hub portions of the flight links. For example, Fig. 3 shows a cup 93 hanging in inverted relation over the tip of a finger 76, as it must be placed on the conveyor, and the shallow depression 94 within the bottom of the cup is thus supported at an angle and will drain itself after passing through the sprays in the machine.

Referring to Fig. 1, a typical operation of the machine is shown wherein dishes are illustrated at 95 as having been placed on the conveyor at the loading end of the machine, and supported in a generally upright position, and other dishes are shown at 96 being carried along the unloading end of the machine. If desired, suitable racks may be used to support silver and other small pieces which might become entangled in the conveyor or dropped through to the tanks during the course of its passage through the dishwasher. Such a rack is shown at 97, resting upon the upper ends of the fingers 76.

It is sometimes desirable for the sake of ease and expediency in handling to place glasses or tumblers in inverted positions in suitable racks, and to place such racks upon the conveyor and wash the dishes while so carried in the racks, much the same as rack 97 for carrying silver and the like. Due to the streamlined hub portions there is a minimum of dispersion of the lower sprays, and thus a minimum reduction in the velocity thereof, with the result that the sprays pass effectively through the open framework of the conveyor and through the framework of the rack into the interior of the inverted tumblers and cleanse such tumblers properly.

While the form of apparatus herein described constitutes a preferred embodiment of the invention, it is to be understood that the invention is not limited to this precise

form of apparatus, and that changes may be made therein without departing from the scope of the invention which is defined in the appended claims.

What is claimed is:

1. In a dishwashing machine having means for spraying washing and rinsing liquids from above and below over dishes and like articles to be washed, the combination of an open framework type conveyor comprising continuous side members at opposite sides of said conveyor and supported for movement through said machine past said spraying means, a plurality of cross rods extending between said side members, a plurality of flight links including hub portions received on adjacent said rods and substantially covering said rods between said side members, said hub portions being tapered to a generally diamond shape in vertical section providing a streamlined configuration above and below said rods to minimize deflection of liquid sprayed against said hub portions and providing for passage of substantially all the sprayed liquid through the open framework of said conveyor.

2. In a dishwashing machine having means for spraying washing and rinsing liquids over dishes and like articles to be washed, the combination of an open framework type conveyor comprising continuous side members at opposite sides of said conveyor and supported for movement through said machine past said spraying means, a plurality of cross rods extending between said members, a plurality of flight links including hub portions received on adjacent said rods and substantially covering said rods between said side members, said hub portions being tapered toward an apex in the direction of said spraying means presenting a streamlined configuration thereto for minimizing deflec-

tion of liquid sprayed against said hub portions and providing for passage of substantially all the sprayed liquid through the open framework of said conveyor.

3. In a dishwashing machine having means for spraying washing and rinsing liquids over dishes and like articles to be washed, the combination of an open framework type conveyor comprising continuous side members at opposite sides of said conveyor and supported for movement through said machine past said spraying means, a plurality of cross rods extending between said side members, a plurality of flight links connecting adjacent said rods, each said flight link including spaced parallel hub portions received on adjacent said rods, a web connecting said hub portions of each said link, a finger extending upwardly from said web for supporting dishes and the like on said conveyor, said hub portions including tapered sections extending away from said cross rods and decreasing in thickness in the general direction of said spraying means providing a streamlined configuration to minimize deflection of liquid sprayed against said hub portions, and said hub portions of adjacent said flight links cooperating to cover said rods over the full length thereof between said side members.

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