

June 24, 1958

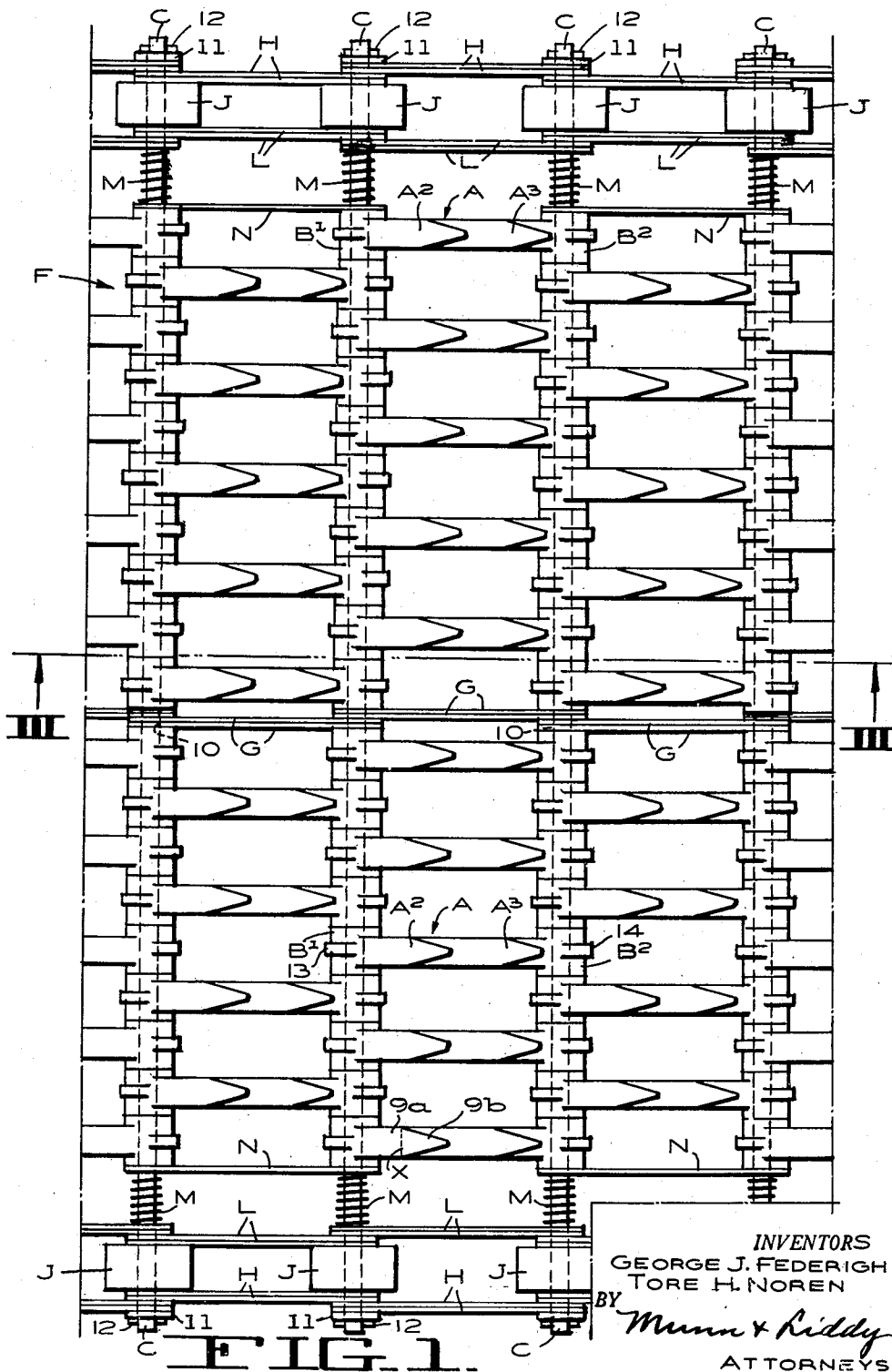
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2,840,227

ENDLESS CONVEYOR FOR DISHWASHING MACHINE

Filed Dec. 31, 1956

2 Sheets-Sheet 1



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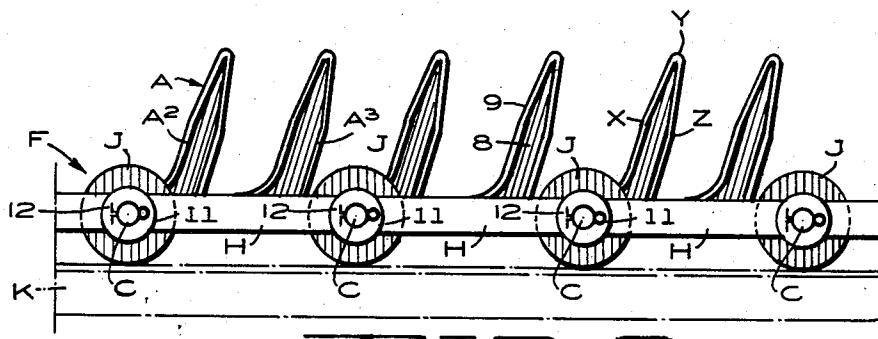


FIG. 2

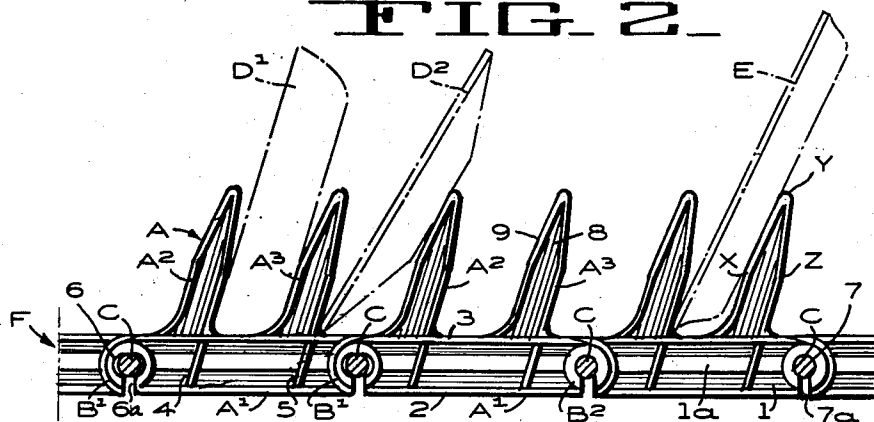


FIG. 3

FIG. 5

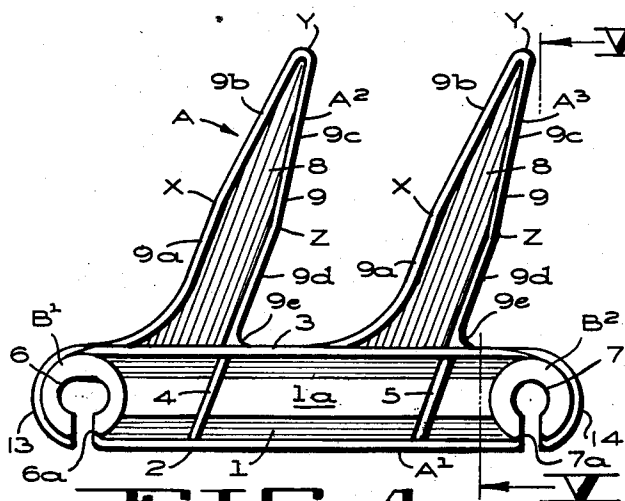
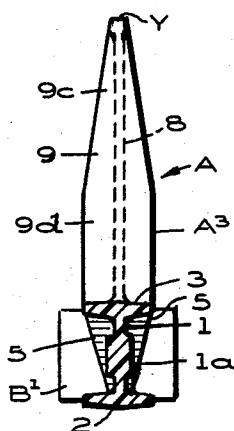


FIG. 4



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1

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ENDLESS CONVEYOR FOR DISHWASHING MACHINE

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4 Claims. (Cl. 198—131)

The present invention relates to improvements in an endless conveyor for dishwashing machine. It consists of the combinations, constructions and arrangement of parts, as hereinafter described and claimed.

An object of our invention is to provide an endless conveyor for dishwashing machine in which the links have novel means for permitting them to expand or contract due to temperature changes without affecting the overall length of the conveyor. The endless conveyor also has novel means for permitting any transverse expansion or contraction of the links due to temperature changes without affecting the overall width of the conveyor.

A further object of our invention is to provide a device of the type described in which each link is provided with a rod-receiving circular bore at one end, and a rod-receiving oval-shaped bore at the other end; the oval-shaped bore having its longer axis lying in a plane that extends through both axes of the two bores. The oval-shaped bore permits lengthwise expansion or contraction of the link due to temperature changes, without any binding effect of the wall of the oval bore on the rod that is received in the bore. Both bores in the link have rod-release slots communicating therewith and these slots have a width slightly less than the diameter of the rods received in the bores so that the links can not accidentally pull free of the rods while the endless conveyor is in operation.

Still a further object of our invention is to provide a device of the type described in which each link is provided with integral upstanding pegs, and these pegs are spaced apart and inclined so as to hold dishes or dish trays therebetween and at the proper angle for washing purposes. The links are preferably molded from a synthetic material such as nylon, and the various adjacent surfaces are interconnected by fillets so as to avoid sharp angles or corners where any two surfaces meet. This type of structure dissipates any strain placed on the link due to a load and/or temperature change, and the link will have less tendency to fracture because the excess strain at any given point on the link will be dispersed through the entire link body and thereby lessened and finally relieved. If a peg on a link should become broken, the damaged link may be removed and a new one substituted.

A further object of our invention is to provide a device of the type described which is simple in construction and which is durable and efficient for the purpose intended.

Other objects and advantages will appear as the specification continues, and the novel features of the device will be particularly pointed out in the appended claims.

Drawings

Our invention is illustrated in the accompanying drawings forming a part of this application, in which:

Figure 1 is a top plan view of a portion of the endless conveyor;

Figure 2 is a side elevation of Figure 1;

2

Figure 3 is a longitudinal section taken along the line II—III of Figure 1;

Figure 4 is a side elevation of one of the links of the endless conveyor, and is shown full size; and

5 Figure 5 is a transverse section of the link and is taken along the line V—V of Figure 4.

While we have shown only the preferred form of our invention, it should be understood that various changes or modifications, may be made within the scope of the appended claims without departing from the spirit and scope of the invention.

In carrying out our invention, we will first describe one of the peg-carrying links, and then will set forth how they are interconnected to form an endless conveyor.

Peg-carrying link

One of the peg-carrying links is shown full size at A in Figures 4 and 5. Each link A comprises an elongated body A¹ and upwardly inclined integral pegs A² and A³. The body A¹ has a central vertical web 1 with an integral base flange 2 and a top flange 3. The two flanges 2 and 3, and the vertical web 1, form an I-beam construction in cross section which is clearly apparent in Figure 5. The central web 1 is thickened at 1a to give the body A¹ additional strength. The vertical web 1 and the lower and upper flanges 2 and 3, extend between front and rear bearings B¹ and B², respectively (see Figure 4), and merge into these bearings. Figure 5 shows how all flat surfaces do not form sharp angles with other flat surfaces at the junction of the two surfaces. Instead, the molded peg-carrying link A has curved fillets at the juncture of flat surfaces and this will dissipate any local strain placed on the link due to an external force or a temperature change, and diffuse the strain over a wide area. In this way, any tendency of the link to break, is sharply reduced if not entirely eliminated.

Again it will be seen from Figure 4, that the top flange 3 is reinforced by integral struts 4—4 and 5—5, disposed at the places where the rear sides of the inclined pegs A² and A³, merge into the flange (see also Figure 5). These pairs of struts have a width at their tops, equal to the width of the top flange 3, and then the width narrows down until the lower ends of the struts practically merge into the central web 1 at its place of joining with the lower flange 2.

The front bearing B¹ of the link has an oval bore or opening 6 whose shorter axis width is substantially the same diameter as that of a transverse stainless steel rod C (see Figure 3), that connects adjacent links A together. The longer axis of the oval opening or bore 6, lies in a plane paralleling the lower and upper flanges 2 and 3 of the elongated body A¹. The long axis of the oval opening 6, is sufficient for a rod C to be received in the opening and permit the link A to either expand or contract due to changes in temperature, without the end wall portions of the opening 6, binding on the rod. This will be explained more fully hereinafter when the assembly of the links A to form an endless conveyor, is described.

The oval opening or bore 6 in the peg-carrying link A of Figure 4, is shown provided with a rod-release slot 6a that communicates with the bottom of the bore. The slot 6a is of less width than the diameter of the rod C so as to prevent the link from accidentally becoming detached from the rod. The link A is preferably made of nylon, and can be placed in warm water of about 160° F., long enough to expand the bearing B¹. The slot 6a will also be expanded and the rod C can be slipped into place. When the link A cools, the width of the slot 6a will contract and thereby hold the rod in the oval bore 6.

The rear bearing B² has a bore 7 of the same diameter as the rod C. Each link A has two rods C extending through the bores 6 and 7. The bore 7 is also provided

with a rod-release slot 7a that communicates with the bottom of the bore. The width of the slot 7a is similar to the width of the slot 6a. A rod C received in the bore 7, cannot accidentally pass through the release slot 7a. It is possible to force the rod through the slot, but it is better to heat the link A in warm water to expand the slot before trying to move the rod therethrough.

The link A has two upstanding and slightly inclined pegs A² and A³, although we do not wish to be confined to any particular number of pegs. The pegs A² and A³ are spaced along the body A¹ at predetermined points so when a plurality of links are pivoted in succession, the pegs A² and A³ between successive links will be spaced the same distance apart as the pegs on one link. The completed conveyor made up of numerous links A in a manner hereafter described, will have the pegs A² and A³, throughout the entire length of the conveyor, all disposed the same distance apart.

The peg A² of the link A (see Figure 4), has a vertical central web 8 that lies in the same plane as the web 1 for the link body A¹. A boundary flange 9 extends around the web 8 of the peg A², and the flange extends transversely from opposite faces of the web. The front portion 9a of the flange 9, has a width equal to the width of the flange 3, and the portion 9a extends upwardly in a graceful curve from the flange 3, and then the curve straightens out into an upwardly inclined line to the point X of Figure 4. At the point X, and upwardly to the top Y of the peg A², the flange width gradually reduces in size, as shown in plan view at 9b, in the lowermost link A, illustrated in Figure 1.

The web 8 is wedge-shaped from the points X and Z on the peg A², up to the top Y (see Figure 4). The portion 9c of the flange 9, extending from the top Y, to the point Z, has the same shape as the flange portion 9b. From the point Z, to the top flange 3 of the body A¹, the flange portion 9d has the same width as the flange 3 and as the flange portion 9a. The flange portion 9d merges into the top flange 3 with a curved fillet 9e. It will be noted that the flange portion 9d of the front peg A² lies in the same plane as the front struts 4 and therefore any pressure of the dishes on the peg A², will be carried to the top flange 3, the struts 4—4, and the web 1 of the body A¹, and thus the strain on the peg will be distributed over a wide area and breakage will be reduced to a minimum.

The second or rear peg A³ on the body A¹, is of identically the same shape and size as the peg A², and therefore no further description of the peg A³ need be given and corresponding parts will be given like reference numerals and letters. The pegs A² and A³ cooperate with each other for holding dishes D¹ and D², and dish trays E. (see Figure 3). The forward curve of the lower part of the flange portion 9a on each peg A² and A³, will force the rim of the bowl D¹, and the plate D², against the rear flange portion 9d of the preceding peg.

The positions of the pegs A² and A³, on the link body A¹, are such that when the links A are interconnected by the rods C, the spacing between the pegs A² and A³ on one link, will be the same as the spacing between the rear peg A³ on one link and the front peg A² on the succeeding link. The advantage of this will be set forth when the structure of the entire endless conveyor is described.

Endless conveyor

The endless conveyor F is illustrated in Figures 1-3, inclusive, and it is made up of a plurality of links A interconnected to each other by the rods C. In Figure 1, we show a rod C, at the left-hand end of the figure, and this rod extends through the rear bores 7 of certain links A that project forwardly of the rod; and the same rod extends through the front bores 6 of alternate links A, that are placed between the first mentioned links, and the second group of links project rearwardly of the rod.

A second rod C, extends through the rear bores 7 of the set of links A that project rearwardly of the left-hand rod C, shown in Figure 1. The second rod C projects through the front bores 6 of a third set of links A that alternate with the second set. In this way the various transverse sets of links A are interconnected to adjacent transverse sets by the rods C.

We have illustrated three full transverse sets of links A in Figure 1, and show parts of two other sets. The number of links in each transverse set can be changed according to the width of the conveyor desired. Since the links A are made of a synthetic material such as nylon, we have strengthened the midpoint of the conveyor F by providing pairs of rust-proof metal links G that are pivotally connected to the rods C. The conveyor F is endless and only a portion is shown in Figure 1. The looped back portions of the conveyor are not illustrated and it should be understood that the endless conveyor has upper and lower reaches although only a portion of the upper reach is shown.

At each looped end of the conveyor F, we provide an axle, not shown, and each axle has a disc, not shown, of the required diameter to receive the pairs of links G. Each disc has an outer edge in the shape of a polygon, not shown, and each straight portion of the polygon has a length equal to the distance between adjacent rods C. The polygon-shaped discs will receive the pairs of links G as they pass from the upper to the lower reach of the conveyor and vice versa. Therefore the polygon-shaped discs, not shown, will aid in pulling on the pairs of links G, and this will relieve the strain on the links A. It will further be noted from Figure 1, that the openings 10 in the pairs of links G, are circular and have a diameter which is equal to the diameter of the rods C. The peg-carrying links A have the elongated slots 6 to permit expansion and contraction of the links A due to changes in temperature, without in any way affecting the metal linkage between the rods C, provided by the pairs of metal links G.

From the showing of the conveyor F in Figure 1, it will appear that each side of the conveyor is the same in structure. Therefore, a description of one side will suffice for both. The structure of the conveyor side shown at the top of Figure 1, will therefore be set forth in detail and corresponding parts on the other side of the conveyor, will be given like reference numerals and letters.

The ends of the rods C shown at the top of Figure 1, are interconnected by pairs of metal rust-proof links H, and these are held in place by washers 11 and cotter pins 12, the latter extending through openings in the rods C (see Figure 2). Wheels or rollers J are mounted on the rods C and are disposed adjacent to the links H (see Figure 1). These rollers or wheels J, ride on rails K, indicated by the dot-dash lines in Figure 2.

Additional pairs of rust-proof links L are placed on opposite sides of the wheels or rollers J, from the links H. The links L have their ends pivotally connected to the rods C. Coil springs M, of stainless steel, are mounted on the rods C, and bear against the adjacent surfaces of the links L. The opposite ends of the springs M, bear against rust-proof links N, that are connected to the rods C. The links N do not form an endless chains as do the pairs of links H and L. The links N are for the purpose of constituting metal bearing surfaces against which the coil springs M can press. Each link N also acts as a connection between a peg-carrying link A, that extends forwardly from the left-hand rod C, for example (see the portion of the upper left-hand link A in Figure 1); and another peg-carrying link A, that extends rearwardly from the next rod C (see the next link A, that is in line with the first-named link, and is connected to the second and third rods C, reading from the left in Figure 1). In this way there is a continuous linkage between the top longitudinal row of links A in the conveyor F, shown in Figure 1.

Sprocket wheels, not shown, are placed at the looped ends of the conveyor F, and the teeth on the sprocket wheels will enter the spaces between adjacent rollers or wheels J, and will constitute the driving force for the conveyor F, for moving it. The coil springs M keep the links A on each rod C in lateral contact with each other and yet permit expansion and contraction of the links due to heat changes. It will thus be seen that we provide means for automatically absorbing any lateral expansion or contraction of the links A. We have already described how the elongated openings 6 in the front bearings B¹, permit longitudinal expansion or contraction of the links A, without affecting the overall length of the endless conveyor F. Figures 1, 3 and 4 disclose how the forward half of the front bearing B¹ on each link A, is strengthened by a central rib 13, that is integral with the bearing. Also the same three figures disclose how the rear half of the rear bearing B² on each link A, is strengthened by a central rib 14, that is integral with the bearing.

Operation

The endless conveyor F can be made to extend over any desired distance in length, and it can also be made to cover any desired width. The links A and the rods C are interconnected in the manner indicated in Figure 1. There will be a central metal linkage G, and side metal linkages H and L, for the conveyor. These metal linkages G, H and L take the pull on the conveyor F, and relieve any pulling strain on the peg-carrying links A.

The links A are designed to support the load of dishes and to move them continually through the dishwashing machine, not shown, from the entrance to the exit end. Usually there is a portion of the upper reach of the conveyor F, that projects in front of the dishwashing compartment, and the operator can stand alongside of this portion and roll the dishes onto the conveyor. The pointed tips Y on the pegs A² and A³ will separate the dishes D¹ and D², as they are rolled onto the conveyor F, from one side thereof. The upper faces of the dishes will face toward the forward end of the conveyor F, as the stack of dishes is laid on its side and then the dishes rolled onto the conveyor.

The pegs A² and A³ will not only separate the stack of dishes and space individual dishes one from the other, but the inclination of the pegs will incline the dishes at the right angle so that the soiled surfaces of the dishes will be thoroughly washed and rinsed as the dishes move through the machine. The backs of the dishes will also be washed.

The wash water is usually at a lower temperature than the rinse water and therefore the links A will be subjected to at least two different temperatures as they move the dishes through the machine. The expansion and contraction of the links A are automatically compensated for by the means already described and therefore the overall length of the conveyor F, as well as the width of the conveyor, will not be altered. There can be no buckling of the conveyor F, due to heat expansion. The elongated bore 6 is made for the maximum contraction or expansion of the link.

The pegs A² and A³ are equally spaced from each other throughout the length and width of the conveyor. The curved lower ends of the flange portions 9a on the front of each peg, will tend to force the lower part of the dish or tray forwardly against the rear flange portions 9d of the preceding peg.

In case a link A breaks, or should a peg A² or A³ break, the damaged link can be removed and a new one substituted. The slots 6a and 7a leading to the undersides of the bores 6 and 7, permit this removal of a damaged link and the substitution of a new one. A new link A is preferably heated in warm water before it is applied in order to enlarge the slots 6a and 7a so that they can receive the rods C.

We claim:

1. In an endless conveyor for supporting and moving dishes and the like through a dishwashing machine: a plurality of peg-carrying dish-supporting links; each link having a circular rod-receiving bore at its rear end and an oval-shaped rod-receiving bore at the front end; and a plurality of transversely-extending rods received in the bores of the links; each rod extending through the circular rear bores of a first set of links that extend forwardly of the rod, and also extending through the oval-shaped front bores of a second set of links that extend rearwardly from the same rod; the links in the second set alternating with the links in the first set; the oval-shaped front bore in each link having its longer axis lying in a plane that extends through the axes of the two bores in each link to thereby permit the link to expand or contract in the direction of its length due to changes in temperature without affecting the overall length of the conveyor; each of said links having a pair of upwardly-extending and rearwardly-inclined pegs; the pegs on each link being spaced apart to receive a dish or the like therebetween and against which the dish or the like may rest.

2. In an endless conveyor for supporting and moving dishes in a dishwashing machine: a dish-supporting link made of plastic and consisting of an elongated body that has a vertical central web and upper and lower integral flanges that project laterally the same distance from opposite faces of the web; said elongated body having an integral bearing at each end into which the web and flanges merge; the bearings having transversely-extending rod-receiving bores therein; said link having a pair of upwardly-extending and rearwardly-inclined pegs integral with the elongated body; said pegs being spaced apart to receive dishes or the like therebetween and against which the dishes or the like may rest; each of said pegs having an integral central web that lies in the same plane as the central web of the body; each of said pegs having an integral border flange that projects laterally the same distance from opposite faces of the central web of the peg; each of the pegs having a pointed top.

3. In an endless conveyor for supporting and moving dishes in a dishwashing machine: a dish-supporting link made of plastic and consisting of an elongated body that has a vertical central web and upper and lower integral flanges that project laterally the same distance from opposite faces of the web; said elongated body having an integral bearing at each end into which the web and flanges merge; the bearings having transversely-extending rod-receiving bores therein; said link having a pair of upwardly-extending and rearwardly-inclined pegs integral with the elongated body; said pegs being spaced apart to receive dishes or the like therebetween and against which the dishes or the like may rest; each of said pegs having an integral central web that lies in the same plane as the central web of the body; each of said pegs having an integral border flange that projects laterally the same distance from opposite faces of the central web of the peg; each of the pegs having a pointed top; the central web on the elongated body having laterally-projecting struts that are integral with the web and with the upper flanges on the body; these struts being positioned under the portions of the flanges of the pegs that extend along the rear of the pegs, respectively, whereby the pegs are reinforced in their connections with the elongated body.

4. In an endless conveyor for supporting and moving dishes in a dishwashing machine: a dish-supporting link made of plastic and consisting of an elongated body that has a vertical central web and upper and lower integral flanges that project laterally the same distance from opposite faces of the web; said elongated body having an integral bearing at each end into which the web and flanges merge; the bearing having transversely-extending rod-receiving bores therein; said link having a pair of

upwardly-extending and rearwardly-inclined pegs integral with the elongated body; said pegs being spaced apart to receive dishes or the like therebetween and against which the dishes or the like may rest; each of said pegs having an integral central web that lies in the same plane as the central web of the body; each of said pegs having an integral border flange that projects laterally the same distance from opposite faces of the central web of the peg; each of the pegs having a pointed top; one of the rod-receiving bores being oval-shaped and the other circular in shape; both bores having entrance slots that

communicate with the bores from the underside thereof; the slots having a width slightly less than the diameter of the circular bore.

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