

FIG - 1A

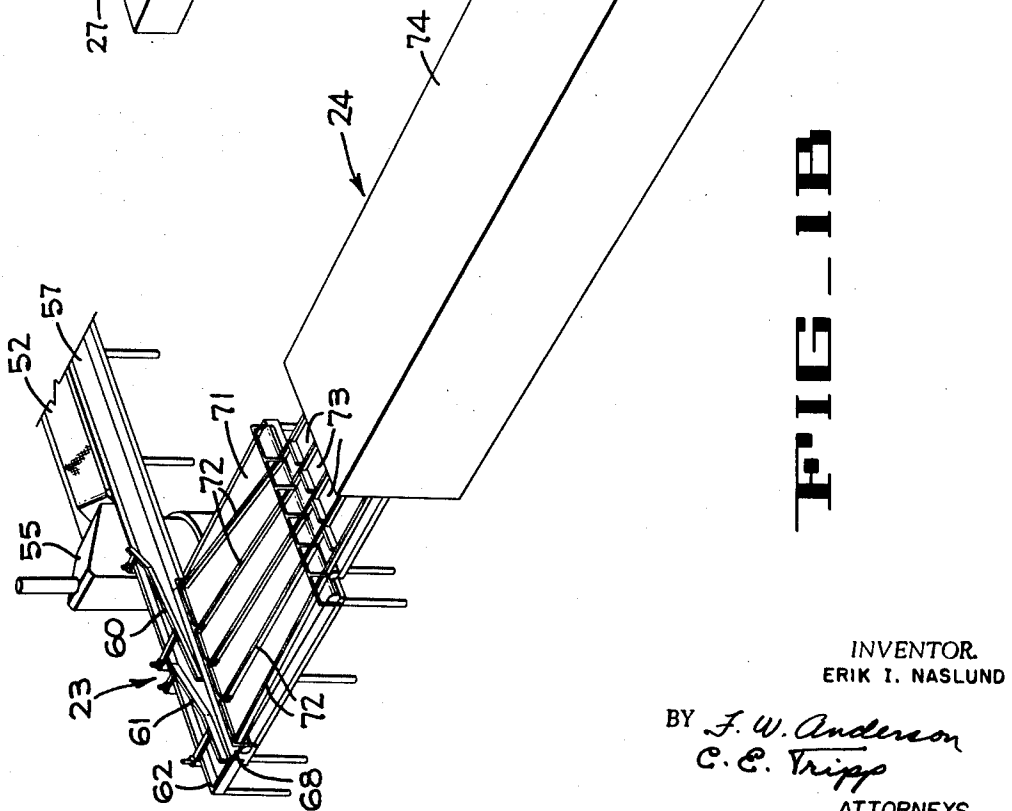


FIG - 1B

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FIG 2

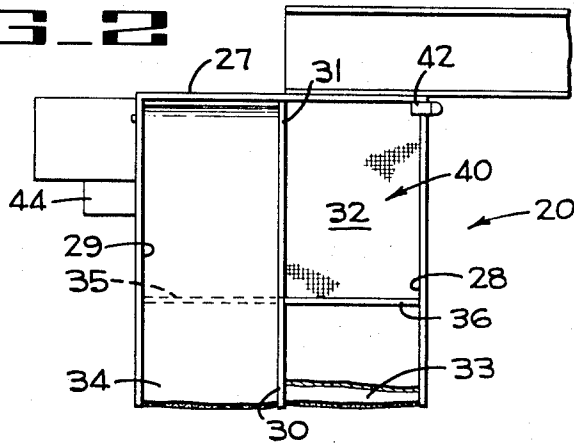


FIG 3

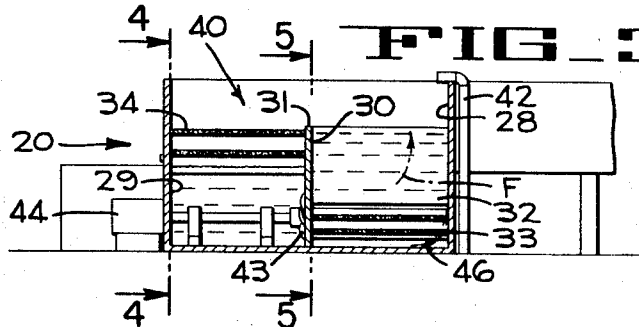


FIG 4

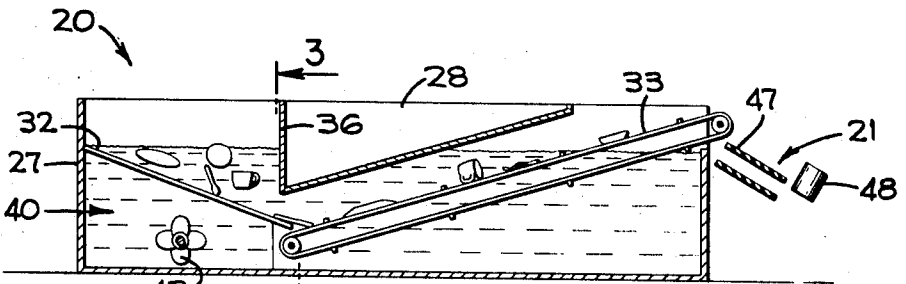
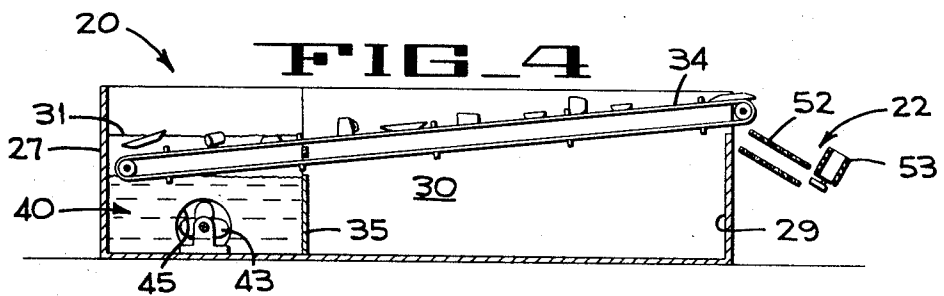
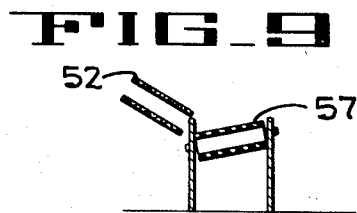
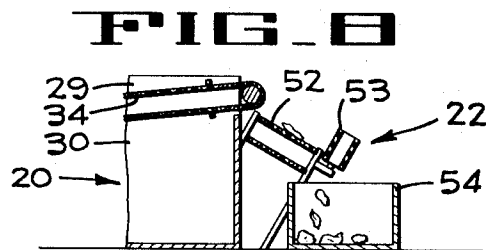
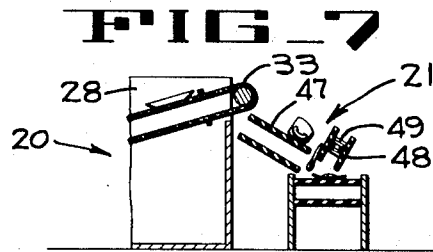
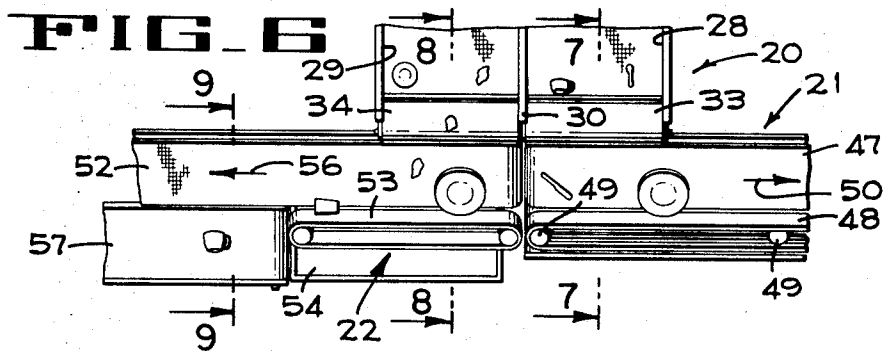


FIG 5

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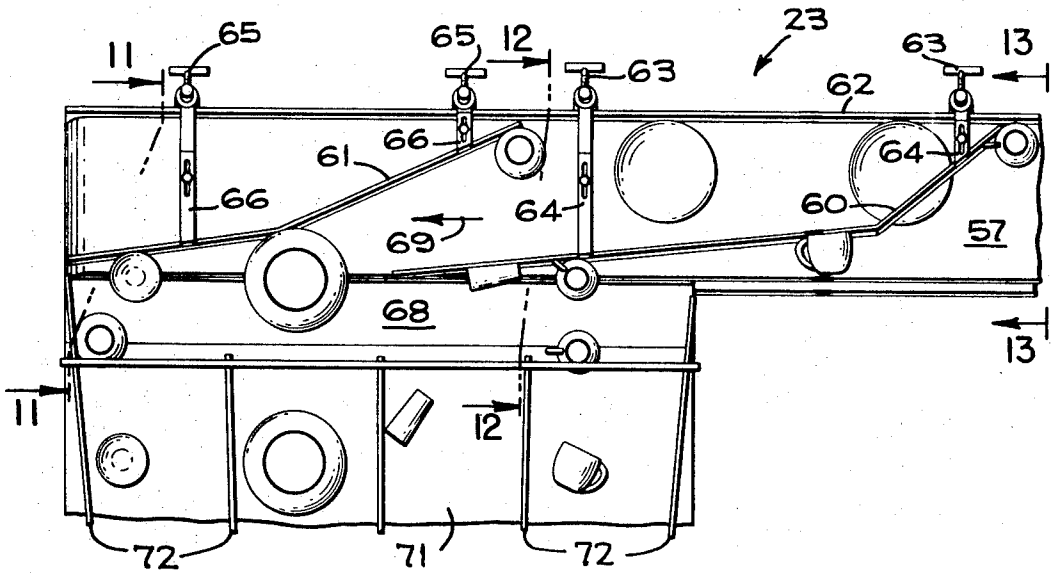


FIG. 10

FIG. 11

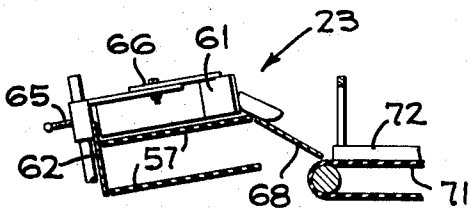


FIG. 12

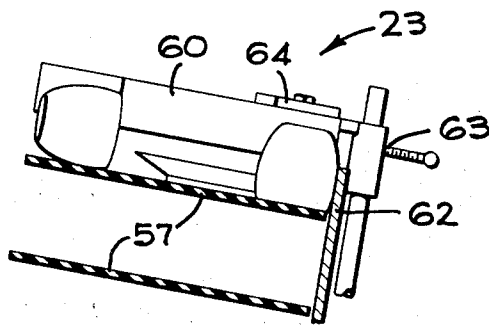
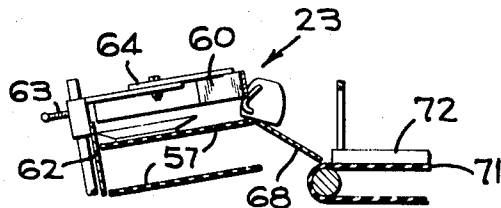
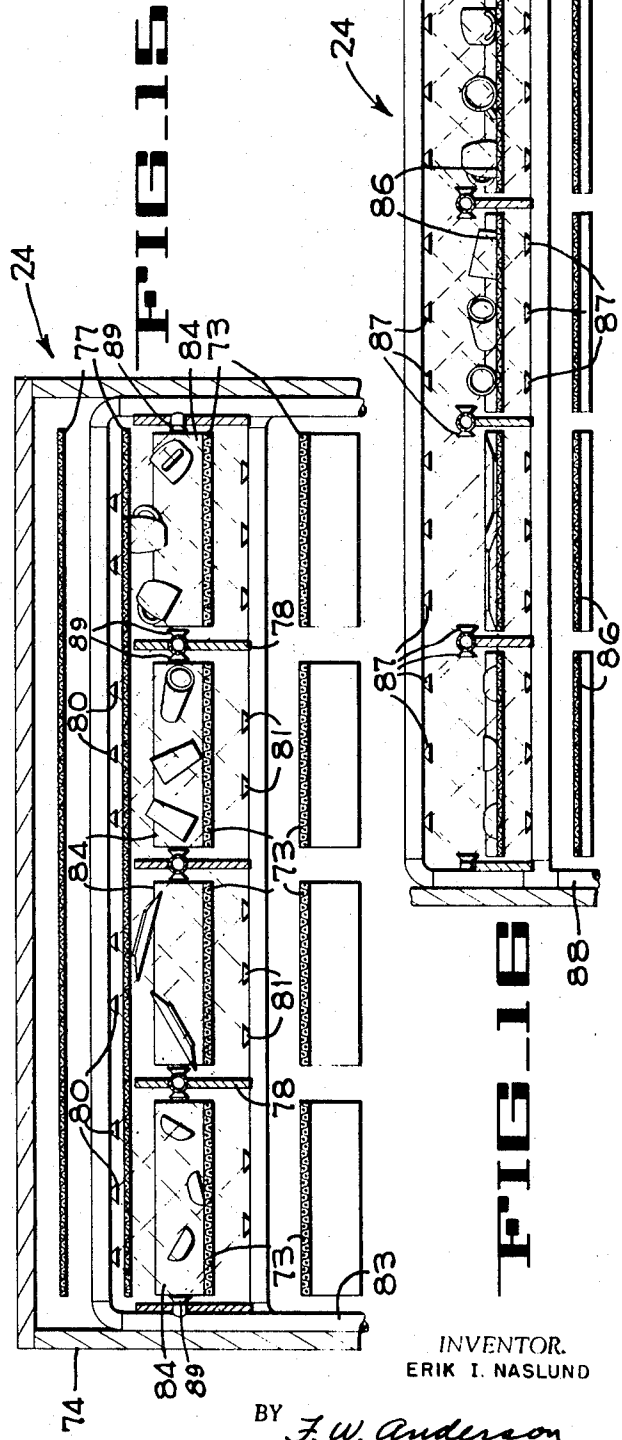
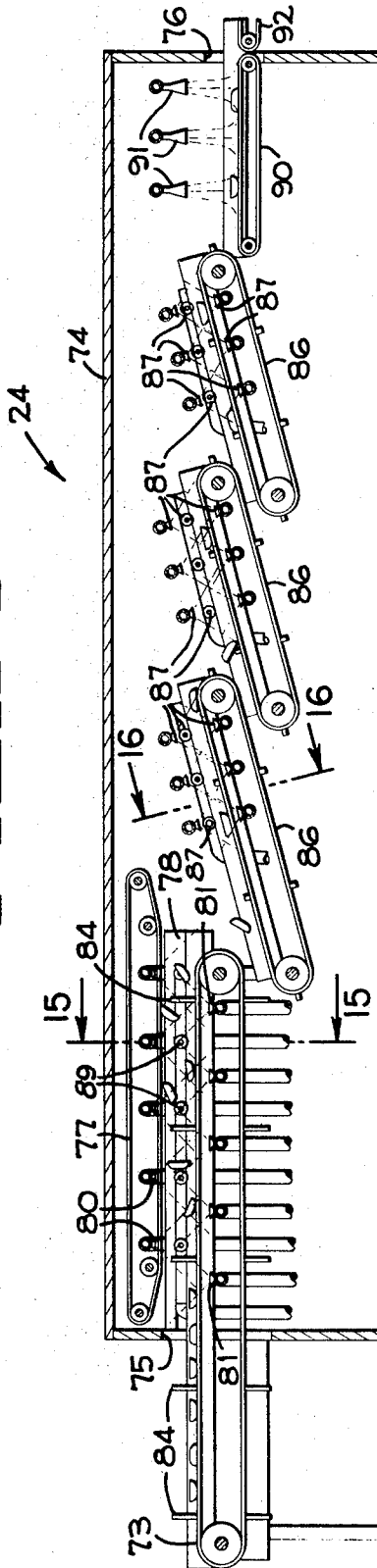


FIG. 13

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FIG 1A



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AUTOMATIC SCULLERY APPARATUS

CROSS-REFERENCE TO RELATED APPLICATION

This is a division of application, Ser. No. 628,957, filed Apr. 6, 1967, and now U.S. Pat. No. 3,483,877.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The respective fields of the inventions are automatic scullery systems, sorters, and dishwashers.

2. Description of the Prior Art

The prior art systems of which applicant is aware are directed primarily to handling breakable, heavy tableware, which particularly when being washed must be stacked and held against movement.

SUMMARY

Applicant's invention is directed to overcoming the unique problems presented by the handling, sorting and cleansing of lightweight plasticware and has taken advantage of this light unbreakable nature in providing a unique solution. The system takes particular advantage of the fact that most of the debris napkins, wrapping paper, food items etc., are of a weight light enough to be removed with the plasticware and to be later removed from the plasticware prior to the final sorting or washing operation.

The light plasticware and debris are removed from the heavy flatware and heavy tableware after being dropped into a tank of circulating water. The water is circulated over a barrier or weir, which divides the tank into two sections, so that the light items pass over the weir with the water while the heavier items drop to the bottom of the tank. Conveyors remove the separated items from each half of the tank.

The debris sorter takes advantage of the fact that the debris is wet and generally has an uneven surface so that it will cling to an inclined wire mesh belt whereas the smooth hard plasticware slides toward one edge of the belt. The plasticware is retained by a barrier belt that is spaced from the wire mesh conveyor belt a distance sufficient to permit slidable debris to slip off the wire mesh belt and be discarded.

The size sorter is a simple and inexpensive apparatus which utilized the size and shape of the plasticware to deflect it off a belt at predetermined locations. An upstream diagonally disposed barrier is spaced vertically above a conveying belt to permit passage of the shorter items, such as plates and saucers, which are then deflected by a downstream barrier that is also diagonally disposed across the conveying surface. Both the upstream and downstream barriers deflect intercepted plasticware off the conveying surface in each case with the plasticware having the largest dimension perpendicular to the barrier being urged off first.

The washer takes advantage of the lightness and unbreakable nature of the plasticware to obtain effective cleansing in the shortest possible time by directing high velocity sprays at the plasticware from offset nozzles that cause the plasticware to be vigorously tumbled and thrown about in the washer. This, of course, exposes all areas of the plasticware to the high velocity sprays in the shortest possible time. The unbreakable nature of the plasticware is again utilized in the rinsing sections of the washer where high volumes of water are used and the plasticware is occasionally tumbled to expose all its surfaces.

The drying section of the washer may or may not be used depending on whether sufficient time is available for air drying.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1A is a schematic perspective that shows a portion of an automatic scullery system.

FIG. 1B is a schematic perspective that shows a second portion of an automatic scullery system. This portion is joined with the first portion along the indicated breaklines.

FIG. 2 is an enlarged schematic plan of the weight sorter.

FIG. 3 is a vertical transverse section of the weight sorter taken along the line 3-3 of FIG. 5.

FIG. 4 is a vertical longitudinal section of the weight sorter taken along the line 4-4 of FIG. 3.

FIG. 5 is also a vertical longitudinal section taken along the line 5-5 of FIG. 3.

FIG. 6 is an enlarged fragmentary plan of a portion of the automatic scullery system showing the flatware sorter and debris sorter.

FIG. 7 is a vertical section of the flatware sorter taken along the line 7-7 of FIG. 6.

FIG. 8 is a vertical section of the debris sorter taken along the line 8-8 of FIG. 6.

FIG. 9 is a vertical section downstream of the debris sorter and taken along the line 9-9 of FIG. 6.

FIG. 10 is an enlarged plan of a portion of the automatic scullery system showing the size sorter.

FIG. 11 is a vertical section of the size sorter taken along the line 11-11 of FIG. 10.

FIG. 12 is also a vertical section of the size sorter taken along the line 12-12 of FIG. 10.

FIG. 13 is an enlarged, fragmentary section looking generally in the direction of the arrows 13-13 in FIG. 10.

FIG. 14 is an enlarged, longitudinal vertical section of the washer.

FIG. 15 is a vertical transverse section of the washer taken along the line 15-15 of FIG. 14.

FIG. 16 is a vertical transverse section taken along the lines 16-16 of FIG. 14.

DESCRIPTION OF THE PREFERRED EMBODIMENT

In general, the automatic scullery system comprises a weight sorter 20, a flatware sorter 21, a debris sorter 22, a size sorter 23, and a washer 24. In successive operations (1) the weight sorter removes plasticware and debris from heavy tableware and flatware (2) the debris sorter removes both soft and hard debris from the plasticware (3) the size sorter separates the plasticware into similar types and (4) the washer cleanses and dries the plasticware. The flatware sorter removes flatware from the heavy tableware.

WEIGHT SORTER

As best shown in FIGS. 1A and 2-5 the weight sorter 20 consists of a tank 27 divided into a heavy-item section 28 and a light-item section 29 by a center wall 30. The center wall is recessed to form a weir 31 for a purpose to be later described. In the heavy-item section is fastened an inclined screen 32 which overlies the lower end of an endless screen belt 33. In the light-item section is fastened an endless screen belt 34. Two vertical walls 35 and 36 separate the light-item section and the heavy-item section, respectively, into a circulation compartment 40. Water is introduced into the tank through a pipe 42 and fills the tank to about the level of the weir 31. An impeller 43 is mounted in the bottom of the tank and when rotated by a motor 44 creates a circulatory flow from the light-item section of the tank, through an opening 45 in the center wall 30, upwardly through the inclined screen 32, and over the weir in the center wall. A curved baffle 46 assists in directing the flow upwardly as indicated by the arrow F. Debris and light plasticware are carried by the flow over the weir and are screened out of the water by the endless screen belt 34. Heavy items, such as flatware and heavy dishes, fall toward the bottom of the heavy-item section of the tank, slide off the inclined screen and are removed by the endless screen belt 33.

FLATWARE SORTER

The flatware sorter 21 is best shown in FIGS. 1A, 6 and 7. In the flatware sorter the heavy dishes and flatware are dropped from the endless screen belt 33 onto a smooth endless belt 47. The belt 47 is transversely inclined to permit the items to slide toward its lower longitudinal edge. An endless barrier belt 48 is entrained around guide pulleys 49 which position it at right angles to the smooth conveying belt. The barrier belt is spaced

from the smooth conveying belt a distance which is larger than the width of the flatware to be sorted but is less than the diameter of the dishes. A typical spacing would be approximately $1\frac{1}{4}$ inches. Both belts are moved in the direction of the arrow 50 and, consequently, as the dishes and flatware arrive on the smooth conveying belt they slide toward its lower edge with the flatware passing through the gap between the belts while the dishes rest against the barrier belt. The flatware and dishes are then carried through further treating apparatus, not shown.

DEBRIS SORTER

The debris sorter 22 is best shown in FIGS. 1A, 6 and 8, and consist of an inclined wire mesh belt 52. The wire mesh belt may be of any conventional construction with the openings being large enough to snag rough surfaced debris but small enough to allow slippage of the smooth hard plasticware toward its lower edge. Adjacent the lower edge of the wire mesh belt is a guide belt 53 disposed at right angles thereto. The guide belt is spaced from the wire mesh belt a distance less than the radii or half the width of the plasticware but great enough to allow hard debris items, such as small disposable dressing containers, small sticks and the like, to pass off the wire mesh belt into a receptacle 54. A typical spacing is again about $1\frac{1}{4}$ inches. Plasticware and debris fall from the endless screen belt 34 onto the wire mesh belt 52. The debris which clings to the belt will be carried to a disposal apparatus, such as the grinder 55 (FIG. 1B). The debris that slides on the wire mesh belt will fall through the gap between the lower edge of the belt and the guide belt and into the receptacle. Plasticware will rest against the guide belt and be carried along in the direction of the arrow 56 where it passes off the end of the guide belt onto an inclined smooth conveying belt 57 (FIG. 9).

SIZE SORTER

The size sorter 23 is best shown in FIGS. 1B and 10—13. The size sorter consists of the smooth conveying belt 57 shown in FIG. 9 and upstream and downstream cam diverters 60 and 61, respectively. A longitudinal barrier 62 is provided along the lower longitudinal edge of the smooth conveying belt to prevent the plasticware from sliding from the belt. The upstream cam diverter is spaced above the smooth conveying belt 57 a distance just greater than the height of a relatively flat bowl, plate or saucer. A typical spacing would be $1\frac{1}{2}$ inches. The upstream cam diverter is fastened for vertical adjustable movement by conventional clamps 63 and for transverse and diagonal adjustment by slotted brackets 64. The downstream cam barrier 61 is spaced closely to the surface of the smooth conveying belt to intercept all of the dishes passing under the upstream cam diverter and is adjustably mounted for vertical, diagonal and transverse adjustment by clamps 65 and slotted brackets 66. An inclined chute 68 is positioned adjacent the upper longitudinal edge of the smooth conveying belt and receives the plasticware deflected therefrom by the cam diverters.

As may be readily apparent the vertical height and diagonal position of each cam diverter is determined by the size and shape of the plasticware being sorted. At each location where a piece of plasticware is to be deflected off the smooth conveying belt the diverter is spaced from the edge of the belt a distance slightly less than the largest transverse dimension of the piece to be diverted. Additional diverters may also be employed if the plasticware consists of a large number of different pieces. As the plasticware is carried along in the direction of the arrow 69 the highest pieces, such as cups and tumblers, are deflected by the cam diverter 60 off the smooth conveying belt at different points along its length. The cups, as shown, are of greater diameter than the tumblers and will be deflected off the smooth conveying belt prior to the tumblers. Likewise, large dinner plates will be deflected by the downstream cam diverter 61 off the smooth conveying belt prior to the smaller diameter bowls.

WASHER

As shown in FIG. 1B the plasticware after leaving the chute 68 passes onto a wide, endless belt 71. Guide plates 72 form narrowing channels over the wide belt and move the plasticware into a more compact arrangement. Next the plasticware is transferred onto a plurality of parallel lower wire mesh belts 73, and is carried into the washer 24. The washer is best shown in FIGS. 1B and 14—16. It includes an enclosure 74 having an inlet opening 75 and an outlet opening 76. An endless wire mesh cover belt 77 overlies the lower wire mesh belts and is spaced therefrom a distance approximately equal to twice the diameter or length of the average piece of plasticware. This spacing is not critical but is provided to allow the plasticware to be tumbled and displaced between the belts in a manner to be described.

Dividing plates 78 are interposed between each of the lower wire mesh belts to separate the enclosure into longitudinal compartments. It is also realized, however, that should the plasticware be admitted to the washer without being sorted these dividing plates may be removed and a single compartment extending the width of the enclosure may be used. A set of upper spray nozzles 80 are arranged in longitudinally offset relation to a set of lower spray nozzles 81. The upper spray nozzles are also offset transversely with respect to the lower spray nozzles as shown in FIG. 15. The spray nozzles are connected to a high-pressure water supply line 83 and emit a high velocity spray which displaces and tumbles the dishes vigorously throughout their passage between the lower wire mesh belts 73 and the upper cover belt 77. Detergent may be added to the water in the supply line and due to the high velocity will effect a quick and efficient cleaning of the entire surfaces of the plasticware. Particularly is this so due to the vigorous tumbling caused by the offset relationship of the spray nozzles. To prevent the plasticware from being moved longitudinally of the belts, however, a plurality of transverse plates 84 are fastened perpendicularly to them in a conventional manner.

The plasticware leaving the lower wire mesh belts 73 tumble onto a series of inclined overlapping belts 86 in the rinsing section of the washer. At a first rinsing station, the plasticware are rinsed by low velocity but high volume, recirculated, non-detergent water emitted from sets of nozzles 87 that are supplied from a water line 88 and a tank (not shown). The first rinsing station is followed by two similar rinsing stations which utilize hot tap water of moderately high velocity and of relatively low volume. As the plasticware tumble from one belt to another they are inverted so that all surfaces are reached by the rinse water.

Upon leaving the rinse section the plasticware are tumbled onto a set of discharge belts 90 to remove entrapped water and then pass beneath a set of air nozzles 91 connected to a source of heated air, not shown. This portion of the washer constitutes a dryer and is required only where immediate use of the plasticware is required, since the plasticware may be air dried if allowed to set.

The plasticware then passes out of the enclosure 74 through the outlet opening 76 and is transferred to a takeaway conveyor 92. The plasticware is then collected in baskets 93 as shown in FIG. 1B.

OPERATION

The operation of the entire system and each component should be readily apparent. Trays of plasticware, debris, flatware and heavy breakable tableware are dumped into the water in the weight sorter 20. The circulation of the water carries the light items, such as the plasticware and debris, over the weir in the center wall 30 whereas the heavy items are removed by the endless screen belt 33. The heavy dishes and flatware are separated at the flatware sorter 21 whereas the plasticware and debris that are removed from the weight sorter by the endless screen belt 34 are separated at the debris sorter 22. The plasticware is then carried to the size sorter 23 and then into the washer 24. In the washer the plasticware is

vigorously tumbled and scrubbed by the high velocity detergent sprays and passes to the rinse section. In the rinse section the plasticware is flooded with a high volume of water to remove any detergent remaining on the surfaces. Finally, the plasticware is dried by the hot air from the nozzles 91 and is collected in the baskets 93.

It should also be apparent that the system provides a unique and efficient manner of handling a wide assortment of tableware and its components are particularly well suited for handling plasticware.

In view of this disclosure variations and modifications may be readily evident and therefore the inventions are to be limited only by the scope and interpretation of the accompanied claims.

I claim:

1. An automated scullery system comprising a washing enclosure with jet sprays therein, means for conveying plasticware through said washing enclosure in compartments isolated for tumbling action of plasticware therein responsive to jet sprays, means for sorting the plasticware according to height and greatest transverse dimension prior to washing, and means for feeding the sorted plasticware to the isolated compartments in a manner for proper tumbling.

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2. An automated scullery system as described in claim 1, wherein said plasticware conveying means follows a linear path through the washing enclosure which is divided into a plurality of longitudinal lanes, transverse dividers mounted on the plasticware conveying means separate the longitudinal lanes into isolated compartments, and said feeding means directs plasticware of sorted sizes to corresponding longitudinal lanes at a rate for loading an isolated compartment with an amount of plasticware that will enable proper tumbling therein.

3. An automated scullery system as described in claim 1, including means for removing light debris from the plasticware prior to sorting the plasticware for size.

4. An automated scullery system as described in claim 3, including means for sorting the plasticware from heavy items such as heavy tableware and flatware prior to removing light debris from the plasticware.

5. An automated scullery system as described in claim 4, wherein said means for sorting the plasticware from heavy items includes a water flow for lifting the plasticware from the heavy items.