

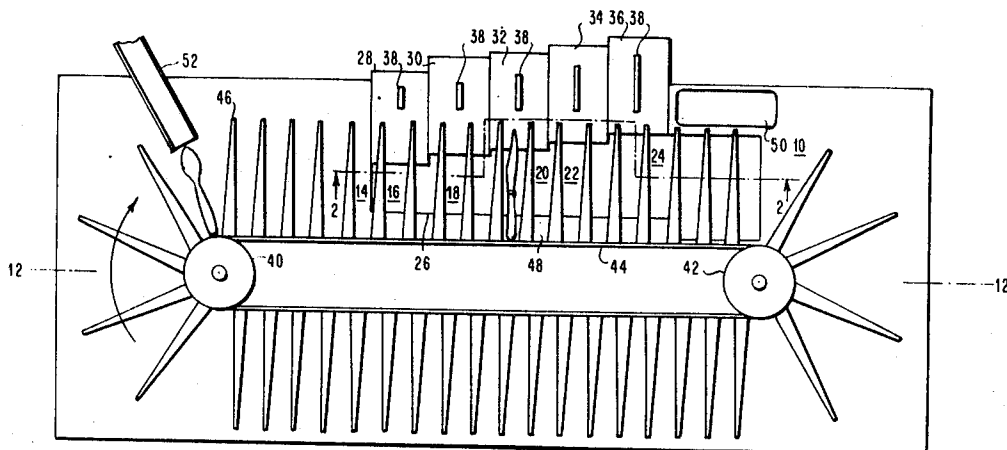
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 [21] Appl. No. **766,861**
 [22] Filed **Oct. 11, 1968**
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Primary Examiner—Richard A. Schacher
Attorney—Mc Lean, Morton and Boustead

[54] **SORTING VARIOUS PIECES OF SILVERWARE BY
 KIND AND SIZE**
4 Claims, 7 Drawing Figs.

[52] **U.S. Cl.**..... **209/85,**
193/43, 198/33, 209/97
 [51] **Int. Cl.**..... **B07c 1/14**
 [50] **Field of Search**..... **209/73, 97,**
99, 106, 107, 83, 85; 193/43; 198/33(RI)

ABSTRACT: Apparatus for sorting silverware utensils of various kinds which conveys individual silverware utensils along a path on a table provided with slots such that the utensils are separately graded by lengths alone, or combined with apparatus for thereafter orienting the separated utensils of each kind uniformly.



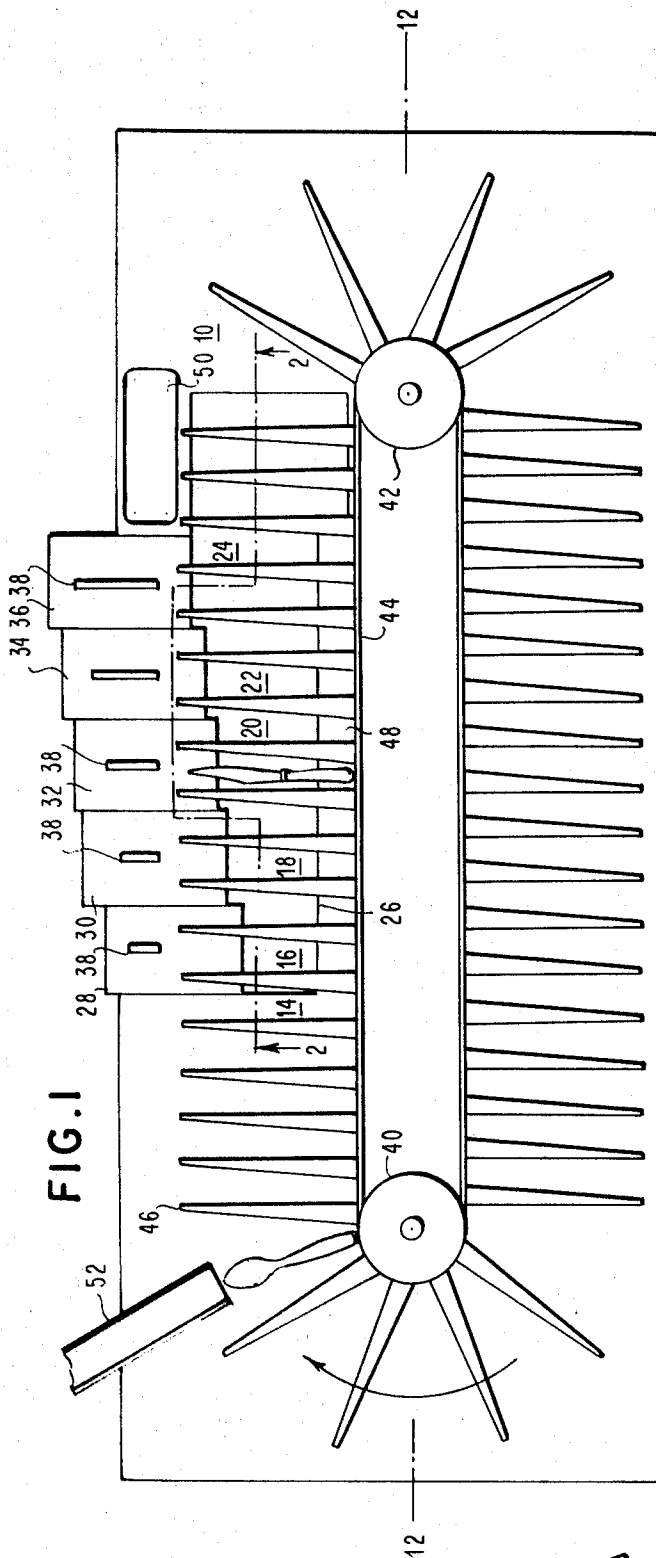


FIG. 2



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FIG.3

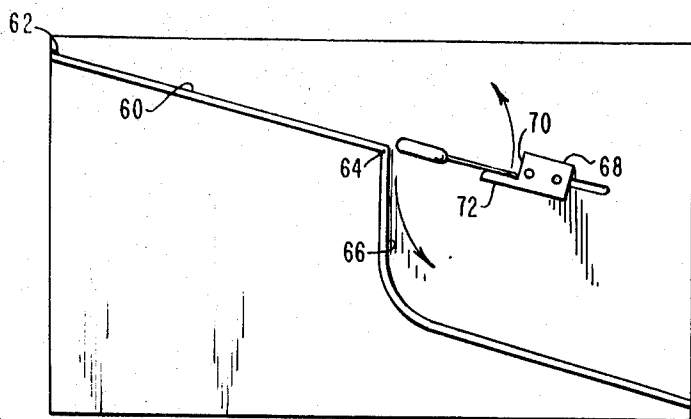
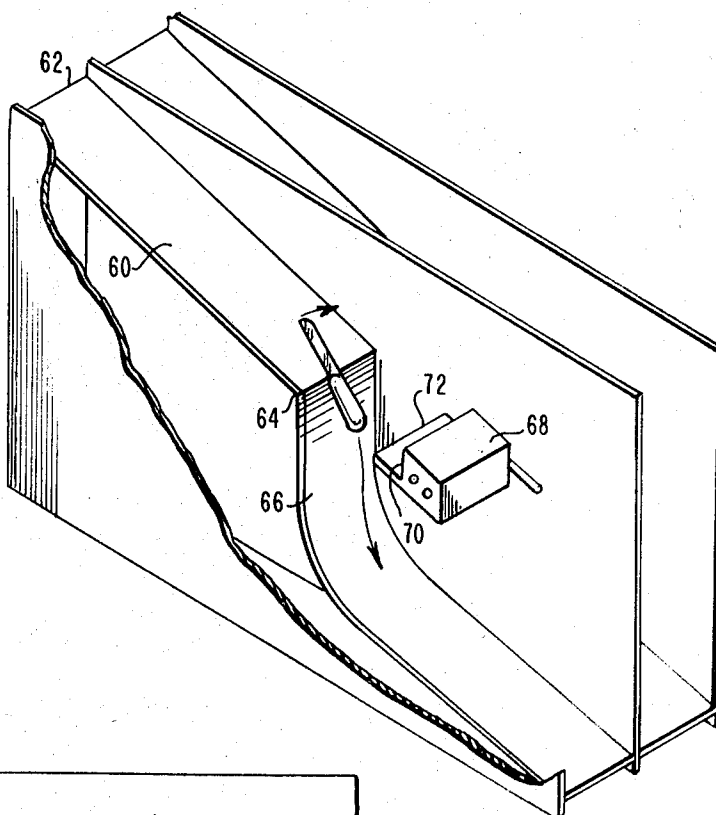


FIG.4

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FIG. 5

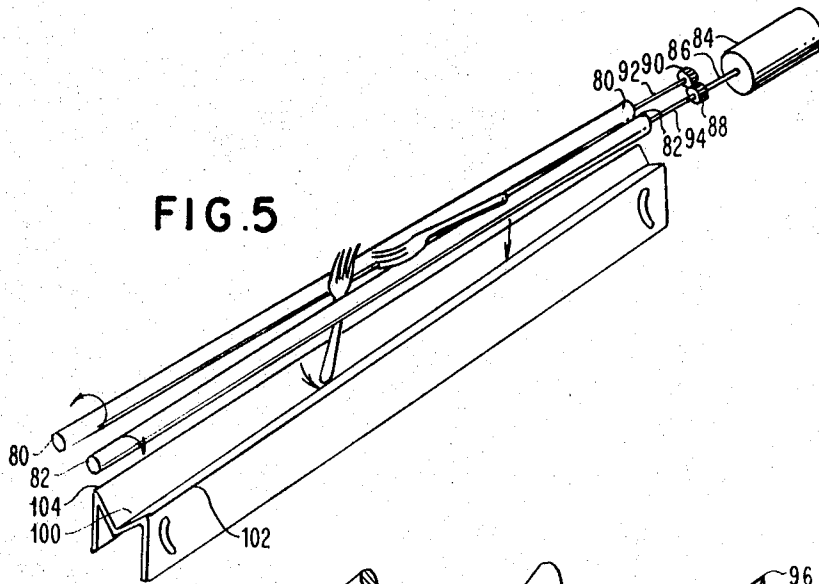


FIG. 6

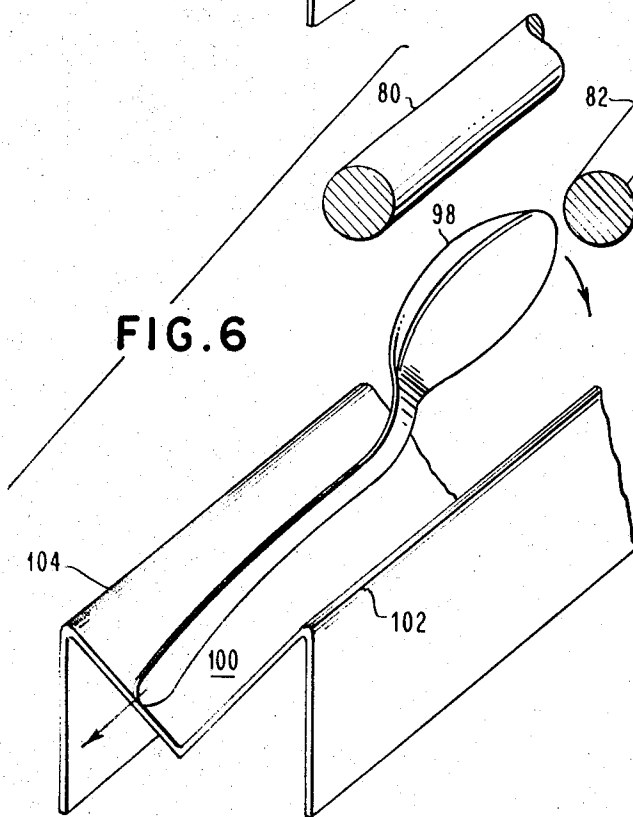
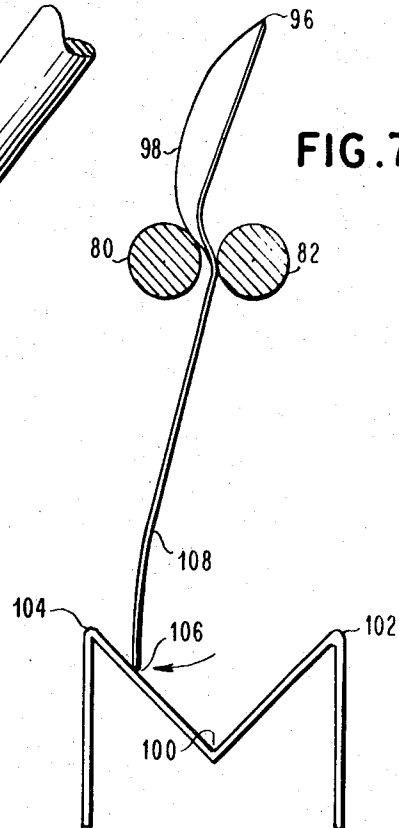


FIG. 7



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SORTING VARIOUS PIECES OF SILVERWARE BY KIND AND SIZE

This invention relates to an apparatus for sorting silverware utensils. more specifically this invention relates to an apparatus for sorting silverware utensils including knives, forks, and spoons and thereafter orienting the sorted utensils so that all handles face in the same direction.

In commercial and institutional kitchens there is a need for efficient apparatus to clean, sort, and handle silverware. Automatic cleaners are used to remove soil from dirty silverware but sorting clean silverware is an operation often carried out by hand and is time consuming and expensive.

Silverware sorters which have been used to separate a mixture of eating utensils into component utensils are cumbersome and leave much room for improvement. Known devices sort silverware, for example, by means of traps sized to distinguish between the different widths of knives, forks, and spoons. In known devices there are no means for orienting sorted silverware so that all handles face in the same direction. Where large numbers of utensils are used per unit time, as in hotels, schools, and other institutions, it is important that the cleaned silverware have uniform handle orientation so that the sorted utensils may be immediately used again. This reduces handling time and permits the institution to maintain a lower inventory of silverware for a given feeding demand.

It is thus a primary object of this invention to provide an apparatus which sorts silverware utensils into component groups.

It is still a further object of this invention to provide apparatus which automatically orients the sorted silverware uniformly.

These and other objects are obtained in accordance with the present invention utilizing a sorting table having an upwardly facing surface inclined to the horizontal, a plurality of parallel slots through the surface of the table disposed along a path on the table surface, the slots increasing in length from one end of the path to another, and the slots extending longitudinally upwardly on the table surface from a common baseline along the path. Also provided is a conveyor including one or more pockets on the table surface adjacent the end of the path having the shortest slot. The pockets are positioned to receive lengthwise a utensil sliding downwardly on the slanted table surface and to retain the utensil positioned parallel to the slots. The conveyor also includes a drive for moving the pockets along the path from one end to the other, along the baseline and over said slots, whereby each utensil is deposited in the first slot over which it travels in a pocket of sufficient length to receive it. The slots lead to means for receiving the sorted knives, forks and spoons and to means for orienting the utensils so that all handles face in the same direction. The final sorted silverware may thus be used immediately for its intended purpose.

The knife orienting means include a narrow feed chute down which the knives slide, a ledge in that feed chute over which the longitudinally aligned knives pass and a reversing block down from and opposite the ledge. The blades of knives proceeding blade first strike the reversing block because the heavier handle maintains the blade parallel to the chute. A lip on the reversing block holds the blade up while the handle falls and the knife then proceeds handle first down the chute to a bin. Knives proceeding handle first in the feed chute do not strike the reversing block because the weight of the handle causes them to tip over the ledge.

The spoon and fork orienting means include a pair of counterrotated rollers tilted from the horizontal along their longitudinal axes, the rollers diverging downwardly from a substantially contiguous relationship to a distance greater than the maximum width of a fork or spoon. The sorted utensil is deposited on and aligned with the rollers and proceeds downwardly along the rotating and diverging rollers until its handle, which is its narrowest portion, falls between the rollers. The utensil continues to slide downwardly on the rollers and finally falls between them, the handle of the utensil striking

ing the further inclined bottom of a trough located below the rollers and the utensil sliding down the trough to a bin. The utensil is thus caused to fall in a handle-first orientation and proceeds downwardly in the trough to the bin.

The invention is more fully described in the drawings:

FIG. 1 is a plan view of the sorting table, the sorting slots and the silverware conveying means;

FIG. 2 is a side elevation taken along lines 2-2 of FIG. 1;

FIG. 3 is a perspective view of the knife orienting means situated adjacent and below the sorting table;

FIG. 4 is a side elevation of the knife orienting means taken along lines 4-4 of FIG. 3;

FIG. 5 is a perspective view of the orientation means for forks and spoons, which is located adjacent and below the slots in the sorting table;

FIG. 6 is an enlarged perspective view of a spoon oriented by the means of FIG. 5; and

FIG. 7 is an endwise elevation of a spoon in the orienting trough showing more particularly the function of the trough.

In FIGS. 1 and 2 reference numeral 10 refers to a sorting table. It has an upwardly facing surface inclined to the horizontal about axis 12-12 with the upper half of the table, as shown in the drawing, having a higher elevation than the lower half. The table has a series of slots in its surface which are designated by reference numerals 14, 16, 18, 20, 22, and 24. These slots extend transversely of axis 12-12 from a common baseline 26 which is parallel to axis 12-12. The slots are of greater length proceeding from left to right and the length of each is set so that silverware moved across it by the conveyor arms discussed below will drop into the slot and be collected in a suitable bin or be subjected to handle orientation, as is discussed below. The length of several slots is adjustable by means of sliding drawers 28, 30, 32, 34, and 36, mounted flush within sorting table 10. These drawers have handles 38 to facilitate adjustment of the slot size mounted flush so that no impedance to the passage of silverware is presented.

Silverware is conveyed across the series of apertures in a direction parallel to axis 12-12 and are maintained in an alignment transverse to that axis. The conveyor means comprises two driving wheels 40 and 42 at either end of the sorting table, an endless belt 44 around those wheels and a plurality of closely spaced conveyor members 46 attached to the endless belt. These members extend transversely of axis 12-12 and are spaced to provide pockets so that a single utensil placed between them is maintained in the necessary alignment as it passes over slots 14 through 24. As shown, silverware is conveyed across the slots due to the tilt in the sorting table, with one end sliding along shelf 48, and the other end sliding along the ends of the drawers which determine the slot size. Eventually each spoon, fork, and knife drops into a slot and is sorted. A trap aperture 50 is provided at the end of the series of sorting slots and at the upper extension of conveyor arms 46. Silverware that has been improperly fed to the conveying means is trapped therein and can be returned to the sorting apparatus.

In operation, silverware utensils are fed singly via chute 52 to the pockets between conveyor arms 46. A device which can be used for aligning a mixture of silverware is described in my copending U.S. Pat. application Ser. No. 766,766, filed Oct. 11, 1968, onto

The knife orienting means is shown in FIGS. 3 and 4. It comprises a narrow, declining feed chute 60, the upper end 62 of which is located just below the slot into which knives are sorted. The knives are in an axial alignment as they are received into feed chute 60 and the chute is sufficiently narrow so that the axial alignment is not lost. The knives slide downwardly along the feed chute at an angle sufficiently steep so that the knives slide easily therealong. The knives slide over a ledge 64 in the feed chute. If the knife is proceeding handle first, it tilts and drops over ledge 64 onto a steeply declining discharge chute 66 and continues along said discharge chute into a collection bin. If the knife is proceeding blade first along feed chute 60, it has a higher trajectory over ledge 64 than

that of a knife proceeding handle first and it collides with a reversing block 68 located in its flight path. The reversing block has a knife blade impact face 70 opposite ledge 64 in feed chute 60 and is located directly in the flight path of a knife proceeding blade first. The impact face is located greater than a knife length from ledge 64. The reversing block also has a step 72 at its lower extremity extending toward ledge 64. The purpose of this step is to support the knife blade momentarily while gravity acts upon the knife handle, now free of ledge 64 because of the location of impact face 70, and effects reversal thereof. Although substantial variation in design is possible to provide maximum efficiency for various knives, it is important only that the step have a width sufficient partially to support a knife blade during the reversal process, but not such width as to interfere with the passage of knives proceeding handle first. Thus the discharge chute and the reversing block must be sufficiently distant from each other to permit reversal of knives proceeding blade first.

The orienting means associated with the slots into which forks and spoons are sorted is shown in FIGS. 5, 6, and 7. It comprises a pair of rollers 80 and 82 which decline from the horizontal at the same angle. The high ends of the rollers can be, for example, directly beneath a slot into which forks or spoons are sorted. The rollers 80 and 82 are substantially contiguous at that point. The rollers diverge from one another, however, at their lower extension. Means are provided to rotate the two rollers counter to one another and this is shown simply as a motor 84, axle 86, gear 88, reversing gear 90, and driver axles 92 and 94. As shown more clearly in FIG. 5, forks are deposited from the sorting aperture bin onto rollers 80 and 82, either tines first or handle first, and proceed downwardly along the rollers. The rollers diverge from a contiguous relationship at the upper end to a divergence at the lower end which is greater than the maximum width of the fork or spoon being sorted. By maximum width is meant generally the maximum dimension transverse to the handle axis of the utensil and more specifically the width across the tines of a fork or the bowl of a spoon. At an intermediate point, the divergence of the rollers is equal to the width of the handle of the fork or spoon being oriented, and the handle drops through the rollers and hangs vertically therebelow. This is shown more clearly in FIG. 7 where the handle of spoon 96 has fallen between the rollers and the spoon is supported by its bowl 98.

Below rollers 80 and 82 is trough 100 which is shaped in the manner of a V and runs beneath the entire length of the rollers and parallel thereto. Trough 100 has upwardly extending sides 102 and 104 which prevent any substantial movement of the utensil handle transverse to the axis of rollers 80 and 82. This is shown more clearly in FIG. 7 and 106 where spoon handle 108 is contacting side 104 of trough 100. Trough 100 declines from the horizontal in the same direction as do rollers 80 and 82. Its purpose is to provide a slanting impact surface for the handle of the silverware utensil dropping between rollers 80 and 82. The utensil handle, as mentioned above, first drops through the rollers and hangs vertically above trough 100. As the utensil continues its passage along rollers 80 and 82, the divergence of those rollers increases and finally the utensil falls downward onto trough 100. Upon impact with the declining surface of trough 100, the utensil retains its handle-first orientation and slides in that orientation down trough 100 to a collection bin.

Trough 100 may alternatively decline in the opposite direction from rollers 80 and 82 and preferably it declines at a relatively steep angle to the horizontal so that handle-first orientation of the sorted utensil is ensured.

I claim:

1. An apparatus for sorting silverware utensils including knives, forks, and spoons, comprising:

a sorting table having an upwardly facing surface inclined to the horizontal;

means defining a plurality of parallel slots through the surface of said table, said slots being disposed along a path on said surface, said slots increasing in length from one

end of said path to the other, and said slots extending longitudinally upwardly on said surface from a common baseline along said path;

conveyor means including means for defining a pocket on said surface adjacent said one end of said path positioned to receive lengthwise a utensil sliding downwardly on said surface and to retain said utensil positioned parallel to said slots, said conveyor means further including means for moving said pocket along the said path from said one end to the other, along said baseline and over said slots; whereby each utensil is deposited in the first slot over which it travels in said pocket of sufficient length to receive it; means associated with a said slot for receiving utensils deposited in said slot; and

orientation means associated with said slot into which knives are sorted including:

a narrow declining feed chute into which sorted knives are received and down which said knives slide in lengthwise alignment;

a ledge terminating said feed chute;

a reversing block having a knifeblade impact face confronting said ledge, the reversing block being located greater than a knife length from said ledge in the flight path of a knife proceeding blade first over said ledge;

a step at the lower extremity of said impact face extending toward said ledge, said step having a width sufficient to support a knifeblade tip during reversal of knives proceeding blade first; and

a steeply declining discharge chute below said ledge, said discharge chute being at all points sufficiently distant from said reversing block to permit the reversal of knives proceeding blade first.

2. An apparatus for sorting silverware utensils including knives, forks, and spoons, comprising:

a sorting table having an upwardly facing surface inclined to the horizontal;

means defining a plurality of parallel slots through the surface of said table, said slots being disposed along a path on said surface, said slots increasing in length from one end of said path to the other, and said slots extending longitudinally upwardly on said surface from a common baseline along said path;

conveyor means including means for defining a pocket on said surface adjacent said one end of said path positioned to receive lengthwise a utensil sliding downwardly on said surface and to retain said utensil positioned parallel to said slots, said conveyor means further including means for moving said pocket along the said path from said one end to the other, along said baseline and over said slots; whereby each utensil is deposited in the first slot over which it travels in said pocket of sufficient length to receive it; means associated with a said slot for receiving utensils deposited in said slot; and

orientation means associated with said slot into which one of forks and spoons are sorted including:

a pair of adjacent rollers having coplanar axes and diverging surfaces defining a diverging vertical opening between the surfaces of the rollers such that the distance between the rollers at one set of ends is less than the cross section of the handle of the utensil to be oriented and the distance between the rollers at the other set of ends is greater than the maximum cross section of the utensil to be oriented, the upper surfaces of the rollers declining downwardly from said one set of ends, and means for delivering said utensils aligned lengthwise over said vertical opening adjacent said one set of ends;

means associated with said rollers to provide counter rotation thereof such that the roller surfaces rotate upwardly adjacent the vertical opening;

a declining trough positioned generally parallel to said rollers beneath and aligned lengthwise with said vertical opening to catch utensils falling therethrough and to

restrain lateral movement of utensils falling therethrough; and

the declining trough being positioned a sufficient distance beneath said vertical opening to permit free longitudinal movement of a handle of a utensil depending through the vertical opening.

3. An apparatus for orienting knives in in uniform handle relationship comprising:

a narrow declining feed chute into which knives are received and down which said knives slide in lengthwise alignment;

a ledge terminating said feed chute;

a reversing block having a knifeblade impact face confronting said ledge, the reversing block being located greater than a knife length from said ledge in the flight path of a knife proceeding blade first over said ledge;

a step at the lower extremity of said impact face extending toward said ledge, said step having a width sufficient to support a knifeblade tip during reversal of knives proceeding blade first; and

a steeply declining discharge chute below said ledge, said discharge chute being at all points sufficiently distant from said reversing block to permit the reversal of knives proceeding blade first.

4. An apparatus for orienting one of forks and spoons in

uniform handle relationship comprising:

a pair of adjacent rollers having coplanar axes and diverging surfaces defining a diverging vertical opening between the surfaces of the rollers such that the distance between the rollers at one set of ends is less than the cross section of the handle of the utensil to be oriented and the distance between the rollers at the other set of ends is greater than the maximum cross section of the utensil to be oriented, the upper surfaces of the rollers declining downwardly from said one set of ends, and means for delivering said utensils alined lengthwise over said vertical opening adjacent said one set of ends;

means associated with said rollers to provide counter rotation thereof such that the roller surfaces rotate upwardly adjacent the vertical opening;

a declining trough positioned generally parallel to said rollers beneath and alined lengthwise with said vertical opening to catch utensils falling therethrough and to restrain lateral movement of utensils falling therethrough; and

the declining trough being positioned a sufficient distance beneath said vertical opening to permit free longitudinal movement of a handle of a utensil depending through the vertical opening.

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