June 25, 1968 C. J. SLAYTON 3,389,711

SILVERWARE SORTING MACHINE

Filed July 7, 1966 3 Sheets-Sheet 1

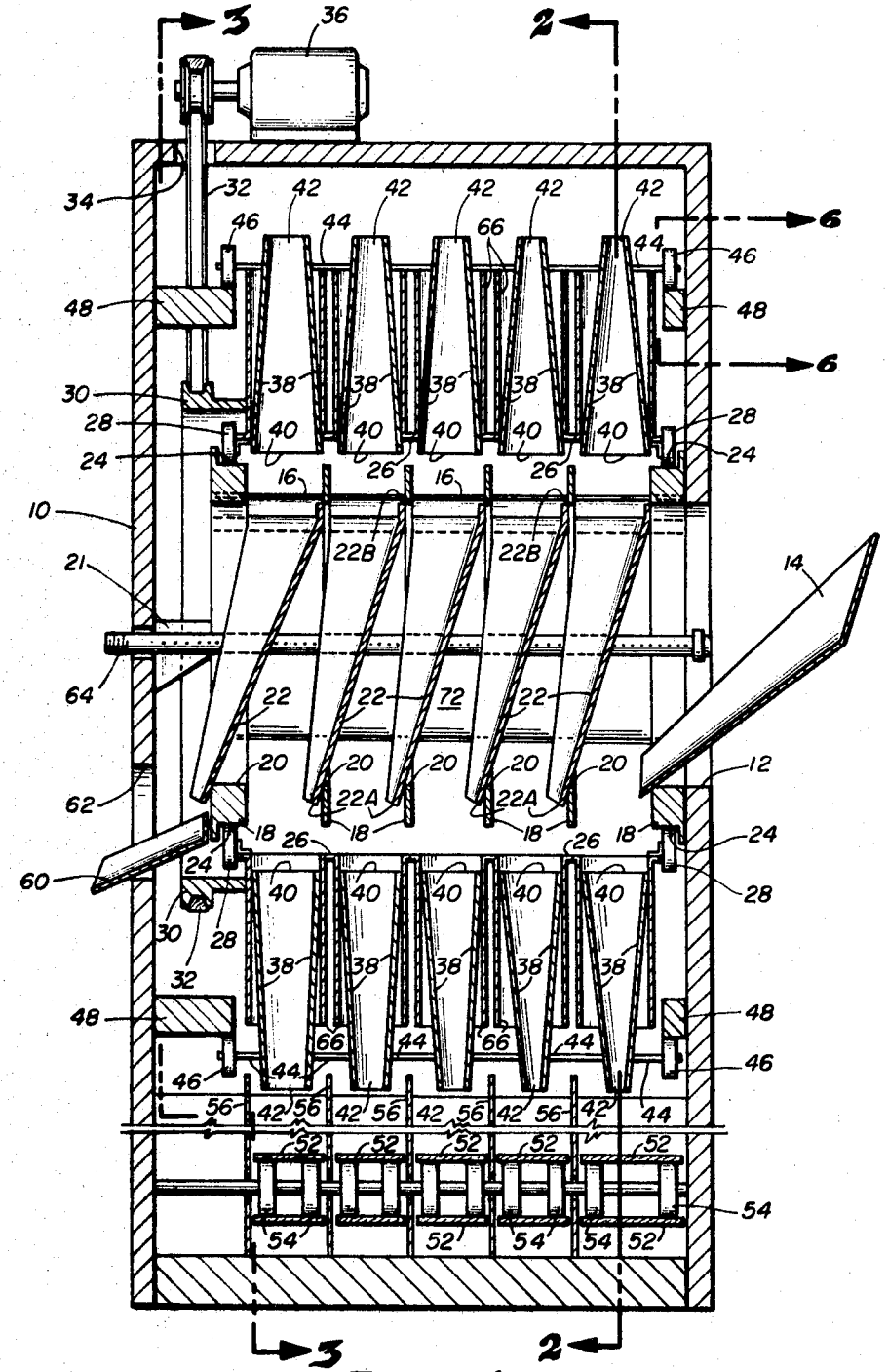


Fig. 1.

INVENTOR.
CLAUDE J. SLAYTON

BY

ATTORNEYS

June 25, 1968 C. J. SLAYTON 3,389,711

SILVERWARE SORTING MACHINE

Filed July 7, 1966 3 Sheets-Sheet 2

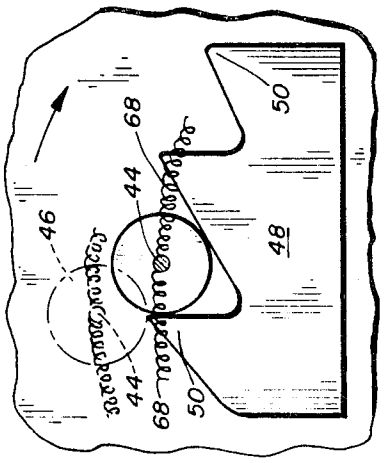


Fig. 6.

Fig. 2.

INVENTOR.
CLAUDE J. SLAYTON

BY

Head & Johnson

ATTORNEYS

June 25, 1968 C. J. SLAYTON 3,389,711

SILVERWARE SORTING MACHINE

Filed July 7, 1966 3 Sheets-Sheet 3

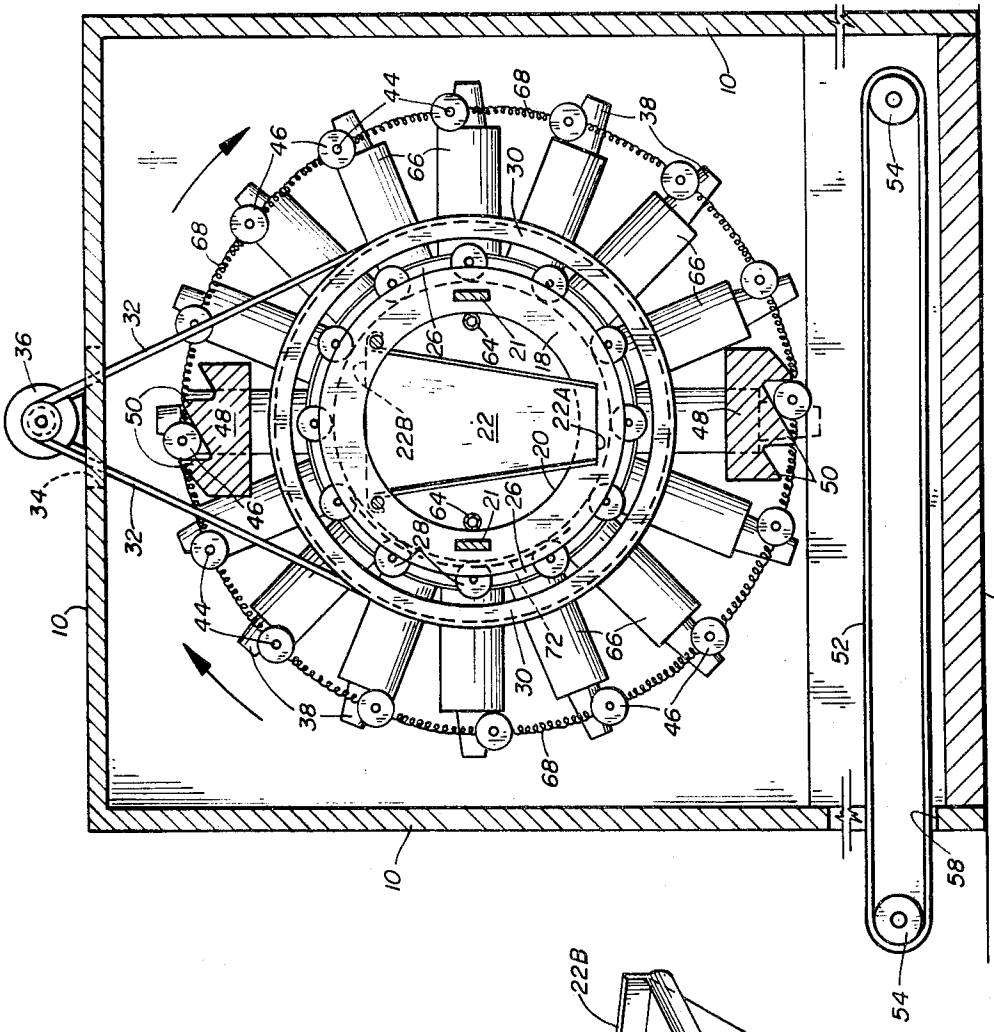


Fig. 3.

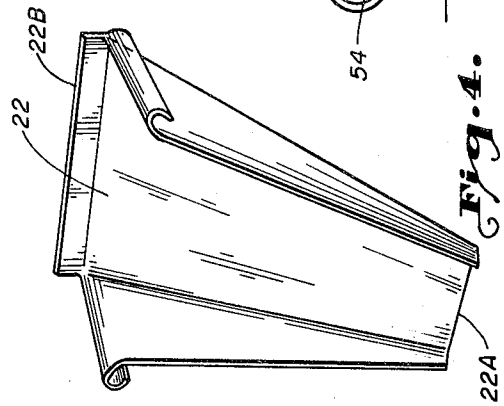


Fig. 4.

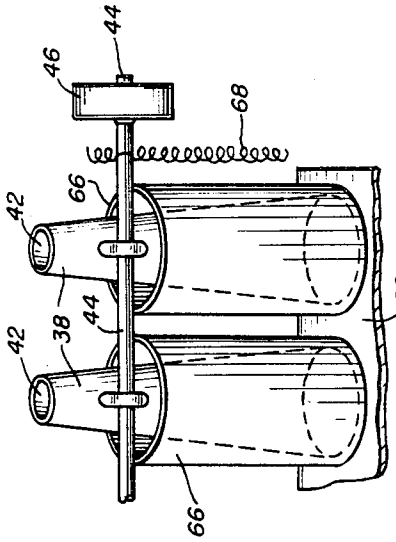


Fig. 5.

INVENTOR.
CLAUDE J. SLAYTON

BY

Head & Johnson

ATTORNEYS

United States Patent Office 3,389,711 Patented June 25, 1968

3,389,711

SILVERWARE SORTING MACHINE

Claude J. Slayton, 1931 N. Lewis Place, Tulsa, Okla. 74110

Filed July 7, 1966, Ser. No. 563,562
8 Claims. (Cl. 134—63)

This invention relates to a silverware sorting machine. Particularly, the invention relates to a device into which silverware, such as knives, forks, spoons, etc., in mingled arrangement, may be deposited, the machine serving to sort the silverware and discharge each type into a separate container.

One problem encountered in large restaurants or other dining facilities wherein large numbers of items of silverware are utilized is the sorting of the silverware into separate types after it has been machine washed. Up to the present time no successful and accepted method has been devised. Silverware sorting is now done manually.

It is an object of this invention to provide a silverware sorting machine.

Another more specific object of the invention is to provide a machine into which silverware of various types, such as knives, forks and spoons, may be deposited in intermingled relationship, the machine serving to separate the silverware and deposit the different components into a separate place.

These and other objects of the invention will be explained and a better understanding of the invention had by referring to the following description and claims taken in conjunction with the attached drawings in which:

FIGURE 1 is a cross-sectional view of an embodiment of the silverware sorting machine of this invention.

FIGURE 2 is a cross-sectional view taken along the line 2—2 of FIGURE 1.

FIGURE 3 is a cross-sectional view taken along the line 3—3 of FIGURE 1.

FIGURE 4 is an isometric view of a discharge slide as used in the machine of this invention.

FIGURE 5 is an enlarged isometric view of the tubular and conical members as utilized in the machine of this invention.

FIGURE 6 is an enlarged segmented view showing means whereby the conical members are shaken to augment removal of silverware therefrom.

Referring now to the drawings and first to FIGURE 1, the illustrated embodiment of the invention is shown including an enclosure or base 10 having an inlet opening 12 in one side thereof into which silverware to be sorted is deposited. A chute 14 may be utilized for depositing the mingled silverware therein.

Horizontally positioned in the enclosure 10 is a fixed cylindrical member 16 formed of vertical spaced walls 18, each of the walls having an opening 20 therein. Positioned in each of the openings 20 is a slide 22 having an upper end 22A and a lower end 22B communicating the upper portion of the area between one set of walls 18 with the lower portion of the adjacent set of walls so that as silverware falls into the slide it is deposited into the lower portion of the adjacent spaced walls.

The end walls 18 are of heavy construction, the exterior peripheral surfaces 24 thereof providing or serving as raceways.

Rotatably positioned exteriorly of the fixed cylindrical member 16 is a cylindrical cone supporting frame 26. By means of wheels 28 which run upon raceways 24 the cone supporting frame 28 is rotatable about the cylindrical member 16. A sheave 30 is affixed to the cone supporting frame 26, the sheave receiving a belt 32 which passes through an opening 34 in the top of enclosure 10 where it is driven by a motor 36.

A cone supporting frame 26 supports a plurality of

hollow truncated conical members 38 in several paralleled planes. Each plane consists of a number of conical members arranged in such a way that the larger diameter base portions 40 are substantially contiguous. Each of the cones 38 has a smaller diameter opening 42 at the truncation thereof. All of the openings 42 in each plane of cones 38 are of the same diameter. The diameter of openings 42 of each plane of the conical members is of increased diameter away from chute 14 as the plane of conical members displaced from the inlet opening 12.

Conical members 38 are aligned in spaced parallel planes and, in addition, in the preferred embodiment, the conical members of each plane are aligned in rows with the adjacent planes, as illustrated.

A plurality of rods 44 are affixed to the outer surfaces of the aligned conical members 38 at the periphery of the cone supporting frame 26 and each of the rods 44 terminates at the outer end thereof with a wheel 46. Supported to the enclosure 10 are toothed blocks 48 (see FIGURES 1, 3 and 6) each of which have sawed tooth-shaped protrusions 58 extending therefrom arranged to engage wheels 46 at both the upper and lower segments of travel as the cone supporting frame 26 is rotated.

Below each plane of cones 38 is a flat belt 52 supported on rollers 54. The belts 52 are separated from each other by partitions 56 and receive the silverware falling from the cones thereon. The belts deliver the separated silverware exteriorly of the enclosure through an outlet opening 58 (see FIGURE 2).

A final discharge chute 60 is provided beneath the slide 22 furthest removed from the inlet opening 12 and receiving the silverware which does not pass through any of cone openings 42. The discharge chute 15 extends through opening 62 in the housing. It can be seen that discharge chute 60 may be eliminated permitting silverware to fall directly downwardly onto a belt as occurs when the silverware falls through any of the conical member openings.

Perforated water pipes 64 (two are illustrated in FIGURES 2 and 3) may extend within openings 20 in walls 18 adjacent the slides 22. This permits water to be sprayed on the silverware as it is sorted as a washing or rinsing process. It can be seen that the sorter of this invention can be adapted to function as a silverware washing machine concurrently with the sorting operation such as by immersing the lower portion thereof in soaping water.

As best disclosed in FIGURES 2 and 3 in the preferred embodiment of the invention, the cone supporting frame 26 consists of planes formed of radially extending tubular members 66. The internal diameter of the radial tubular members is such as to closely receive the large diameter base portion 40 of the conical members 38. This permits the conical members 38 to slide in the cylinder 66 as the device rotates.

In the arrangement wherein the conical members 38 are free to slide within the cylinders 66, one arrangement for retaining the conical members 38 is by means of springs 68 extending between the parallel rods 44. By this arrangement the conical members are free to vibrate up and down as the cone supporting frames 26 rotate wheels 46 over the tooth blocks 48 to more effectively dislodge any silverware caught in the cones.

As shown in FIGURE 2, bins 70 are provided as receiving means at the end of each of the belts 52 to receive the discharge of sorted silverware therein. This is exemplary as belts 52 may be eliminated and the sorted silverware discharged directly into bins located beneath the machine.

A semi-cylindrical shield 72 is placed around a portion of the exterior of fixed cylindrical member 16 (see FIGURES 1, 2 and 3) to prevent silverware from being dis-

charged before the conical members **38** are over the upper end **22B** of a chute **22**.

Operation

Motor **36** rotates belt **32** running on sheave **30** to cause the cone supporting frame **26** to continuously rotate. Mingled silverware deposited on chute **14** falls downwardly into the first plane of conical members **38**. As the mingled silverware falls downwardly a continuous sequence of conical members pass under it so that the silverware falls preferably one item in each conical member **38** as it passes under the chute **14**. It is understood that various means may be provided for distributing unsorted silverware sequentially into the machine, such means not being a part of this invention and not being illustrated.

One characteristic of most silverware design which is unique is that of the difference in width of the various items. Typically, the knife is the narrowest silverware utensil. Next in width may come the salad fork, then the teaspoon, fork, then the tablespoon, and finally the soup spoon. Different silverware designs may provide a different sequence of widths but most designs do incorporate varying widths with no two types of utensil in a set having the same width.

As silverware falls from the chute **14** into the first plane of conical member **38** having the smallest diameter opening **42** therein, the smallest width silverware will fall through while all of those items having a width greater than opening **42** will not fall through. For instance, in most designs, the knife being typically of the smallest width will fall through the first plane of conical members **38** and on to the first belt **52**. All other utensils being wider cannot pass through the opening **42** of the first plane of conical members **38** and will not fall through but will be carried as the conical members move around in a circle.

When a conical member **38** having a utensil therein reaches the top of its circular path of travel, any silverware therein will fall out of the base end **40** and downwardly onto the chute **22** located therebelow. Upon encountering chute **22**, the utensil is directed to fall into the large diameter base portion **40** of the next plane of conical members. The next plane of conical members have openings **42** of a size larger and the utensil with the next narrowest width will pass freely through while all those items of greater width will be carried around by the conical members to fall out when the plane of the cones reaches the top. In this way, utensils having the maximum width will transverse through each plane of conical members and, being too large to fall through the openings of any of the conical members in any of the planes, will be discharged finally out the end and on to chute **60**. Thus, the utensils passing on to chute **60** are all those having a width greater than the diameter of openings **42** of any of the conical members in any plane.

To make sure that silverware passes freely downwardly through openings **42** when the conical members are at the bottom of their travel, projections **50** on blocks **48** shake the rods **44** and thereby the conical members. In like manner, the conical members on the upper end of their travel are shaken to make sure that silverware carried to the top fall downwardly onto the chute below to pass into the next plane.

As has previously been indicated, the machine of this invention may be incorporated with silverware washing apparatus and may actually become a part of the washing apparatus. As previously stated, various methods and devices may be incorporated for depositing the silverware into the machine in sequential manner so as to place not more than one item of silverware into each conical member in the first plane as the conical members are rotated. Even if more than one item is deposited into a conical member, the shaking thereof is normally sufficient to cause any of the items of a width less than the diameter of the opening **42** to pass downwardly therethrough and therefore the circumstances wherein more than one utensil falls into a conical member, while not desirable, is not completely detrimental to the functioning of the device.

While the invention has been described with a certain degree of particularity, it is manifest that many changes may be made in details of construction and arrangement of components without departing from the spirit and scope of this disclosure.

What is claimed:

1. A silverware sorting machine for sorting silverware into types according to the width of each type comprising:

a base having an inlet opening to receive mingled silverware therein and a discharge opening to discharge sorted silverware thereout;

a horizontal cylindrical cone supporting frame rotatably supported in said base having a plurality of openings therein arranged in a plurality of spaced vertical planes the openings in each plane being substantially contiguous to each other, the opening of each plane being substantially contiguous to each other;

a multiplicity of truncated hollow conical members each having a large diameter internal base opening converging to a smaller internal diameter opening at the opposite truncated end, the base of each conical member being received by and closing a said cone supporting frame opening, said conical members being thereby supported in a plurality of spaced paralleled planes and extending radially from said cylindrical cone support frame, the smaller opening of each of said conical members of each plane being of equal size and the smaller diameter opening of each plane increasing in internal diameter as each plane is advanced from said base inlet opening;

receiving means beneath each plane of conical members to receive silverware falling therefrom;

means of rotating said cylindrical cone support frame; and

a plurality of vertical spaced apart slide members supported within said cone supporting frame, each of said slide members having an upper and a lower end, the upper end of one of said slide members being positioned below each of said planes of conical members and the lower end thereof terminating above the next adjacent plane of conical members next advanced away from said base inlet opening, whereby silverware passing into said inlet opening falls sequentially into said conical members of the first plane, those pieces of silverware having a width less than the diameter of the truncated end of said conical members of the first plane falling therethrough and into said receiving means beneath such plane, those pieces of silverware having a width greater than the diameter of said conical members of the first plane being carried by the rotation of said cone supporting frames to the top where the silverware falls out of the base end of said cones onto a said slide member whereby the silverware is discharged into conical members of the next adjacent plane, the silverware being thereby advanced from one plane of conical members to another until a plane is reached wherein the diameter of the smaller diameter openings in said cones is greater than the silverware width.

2. A silverware sorting machine according to claim **1** wherein one of said slide members, the same being the furthest displaced from said inlet opening in said base, has the lower end thereof terminating above a final receiving means, whereby such final receiving means receives all silverware having a width greater than the internal diameter of all of the smaller diameter openings of said conical members.

3. A silverware sorting machine according to claim **1** including a perforated water pipe positioned within said cylindrical cone supporting frame and adjacent said slide

members whereby silverware passing through the sorting machine may be washed and rinsed.

4. A silverware sorting machine according to claim 1 including a plurality of tubular members, one of said tubular members affixed to said cylindrical cone supporting frame at and closing each of said openings therein, said tubular member extending outwardly and radially from said cone support in parallel planes, the tubular members being affixed to said cone supporting frame substantially contiguously in each plane, each of said tubular members receiving a said conical member therein.

5. A silverware sorting machine according to claim 4 wherein each of said conical members is slidably received in a said tubular member, the exterior diameter of the base of each of said conical members being substantially equal to the interior diameter of said tubular members; and

means of radially vibrating said conical members at the top of the travel thereof as said cone support frame is rotated to more effectively cause silverware carried by the conical members to fall out through the base opening therein.

6. A silverware sorter according to claim 4 wherein each of said conical members is slidably received in a said tubular member, the exterior diameter of the base of each of said conical members being substantially equal to the interior diameter of said tubular members; and

means of radially vibrating said conical members at the bottom of the travel thereof as said cone support frame is rotated to more effectively cause silverware carried by the conical members to pass through the smaller diameter opening therein.

7. A silverware sorting machine according to claim 4 wherein each of said conical members is slidably received in a said tubular member, the exterior diameter of the base of each of said conical members being substantially equal to the interior diameter of said tubular members, and wherein said conical members of each plane are arranged in paralleled rows, and including

a rod for each row of conical members, each rod of each row being affixed to each of said cones in each row;

wheels at each outer end of each rod; and

spaced apart toothed blocks each having toothed projections extending upwardly therefrom supported to said base, one of said toothed blocks being positioned in the line of travel of said wheels whereby said wheels pass over said toothed blocks as said cone support frame is rotated to simultaneously shake each conical member in a row, each row being shaken at the top of their travel upon each rotation of said cone supporting frame.

8. A silverware sorting machine according to claim 7 including coiled springs resiliently extending between each of said paralleled rods urging said conical members inwardly within said tubular members.

References Cited

UNITED STATES PATENTS

3,247,858	4/1966	Kraeft	134—63 X
3,339,564	9/1967	Kraeft	134—63 X

M. HENSON WOOD, JR., *Primary Examiner.*

R. A. SCHACHER, *Assistant Examiner.*