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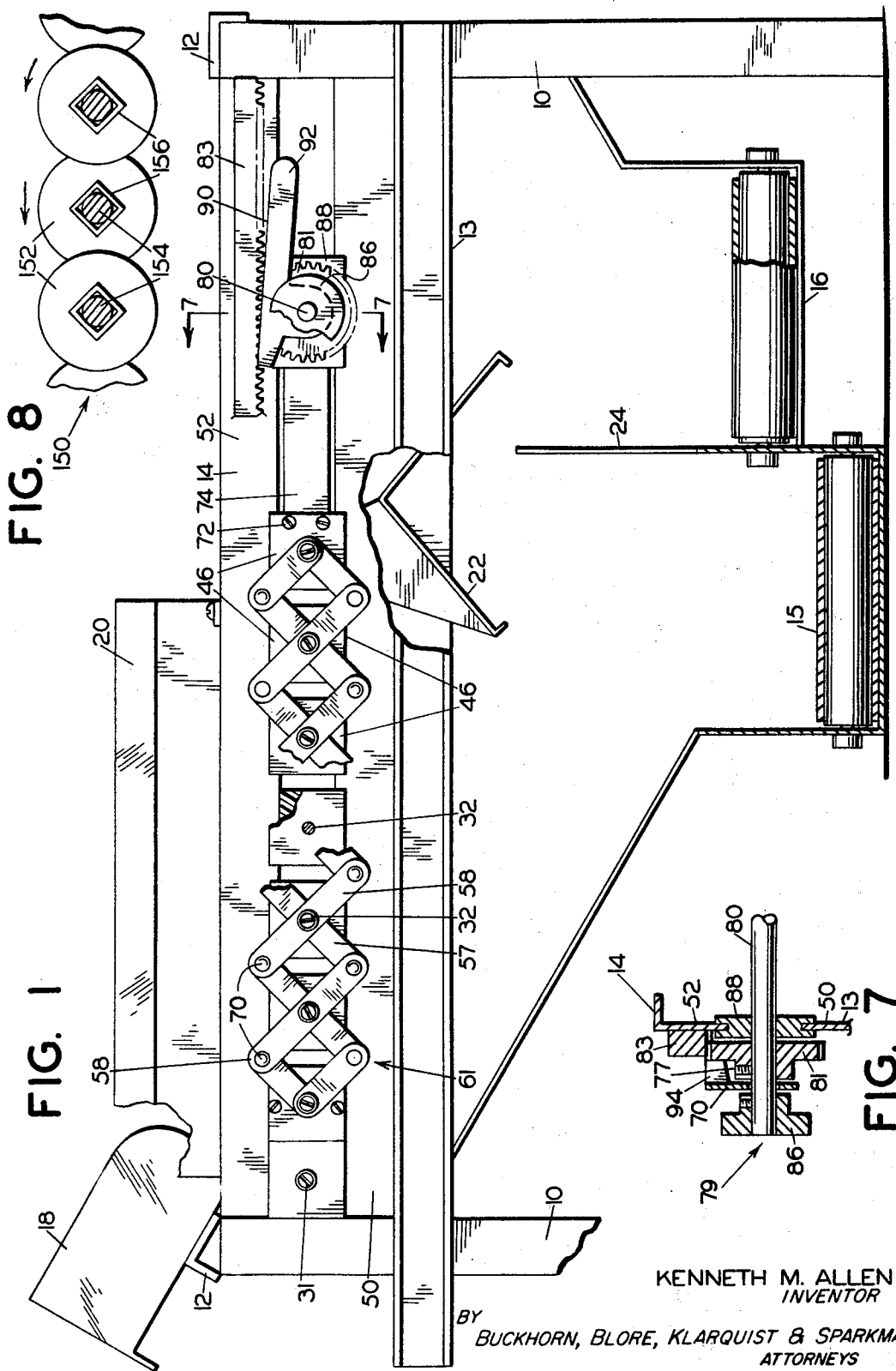
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3,396,843

LAZY TONG ADJUSTABLE SORTING MACHINES

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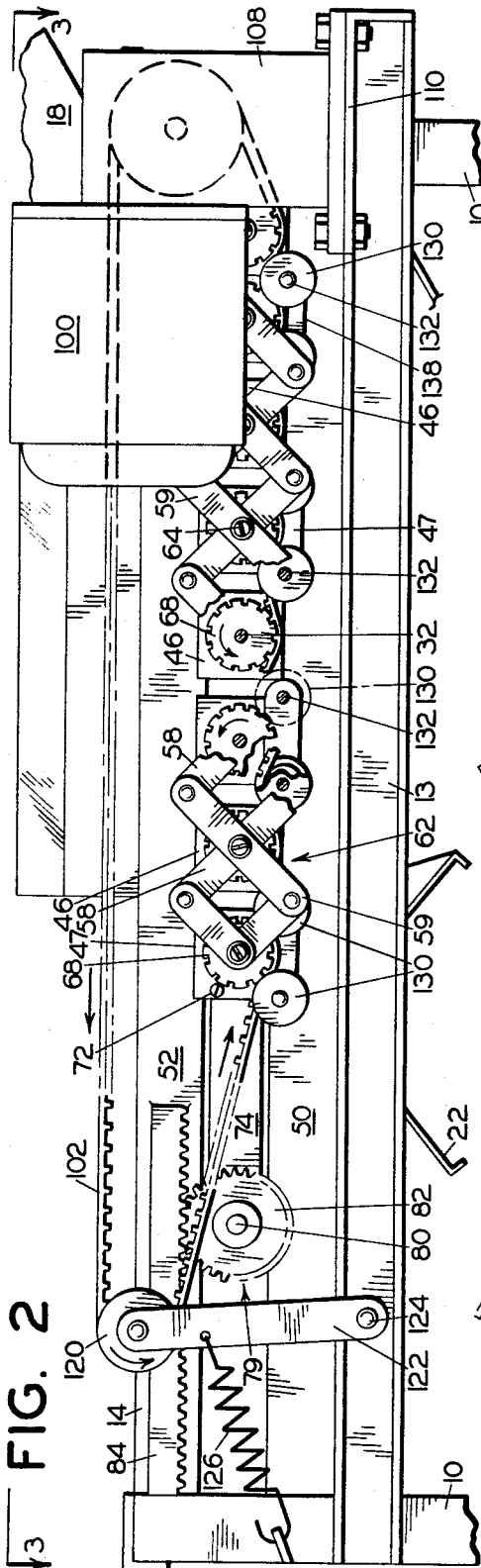
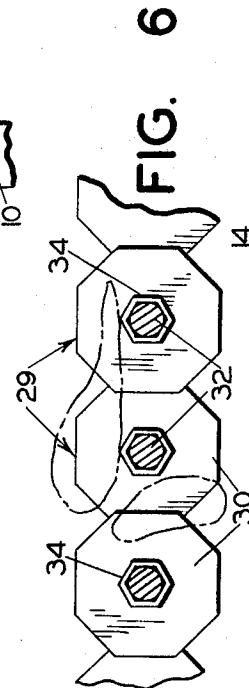
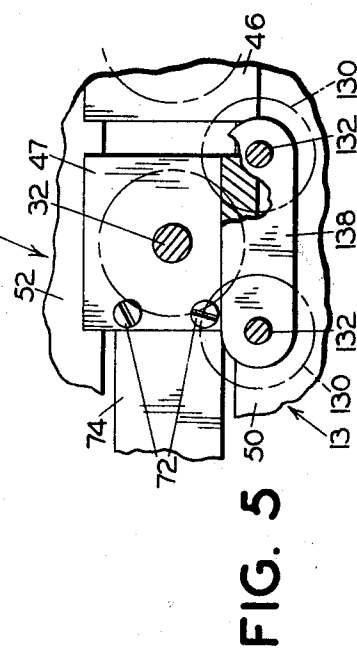
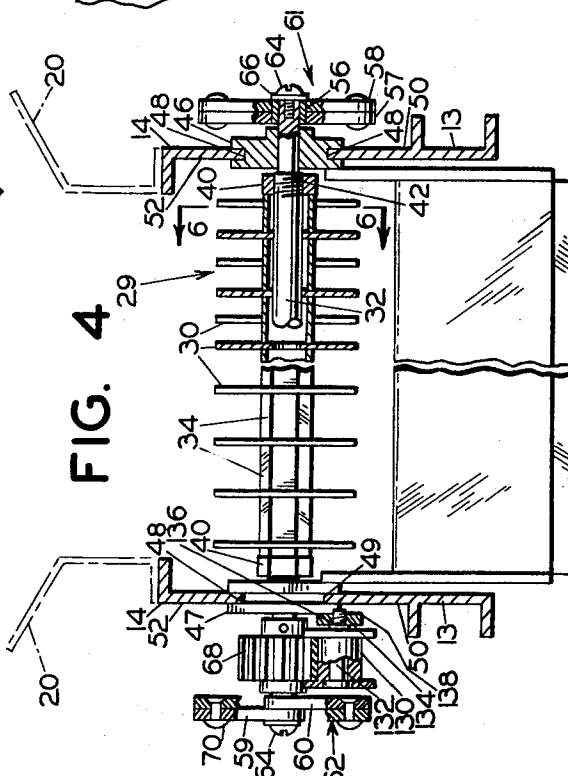
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LAZY TONG ADJUSTABLE SORTING MACHINES

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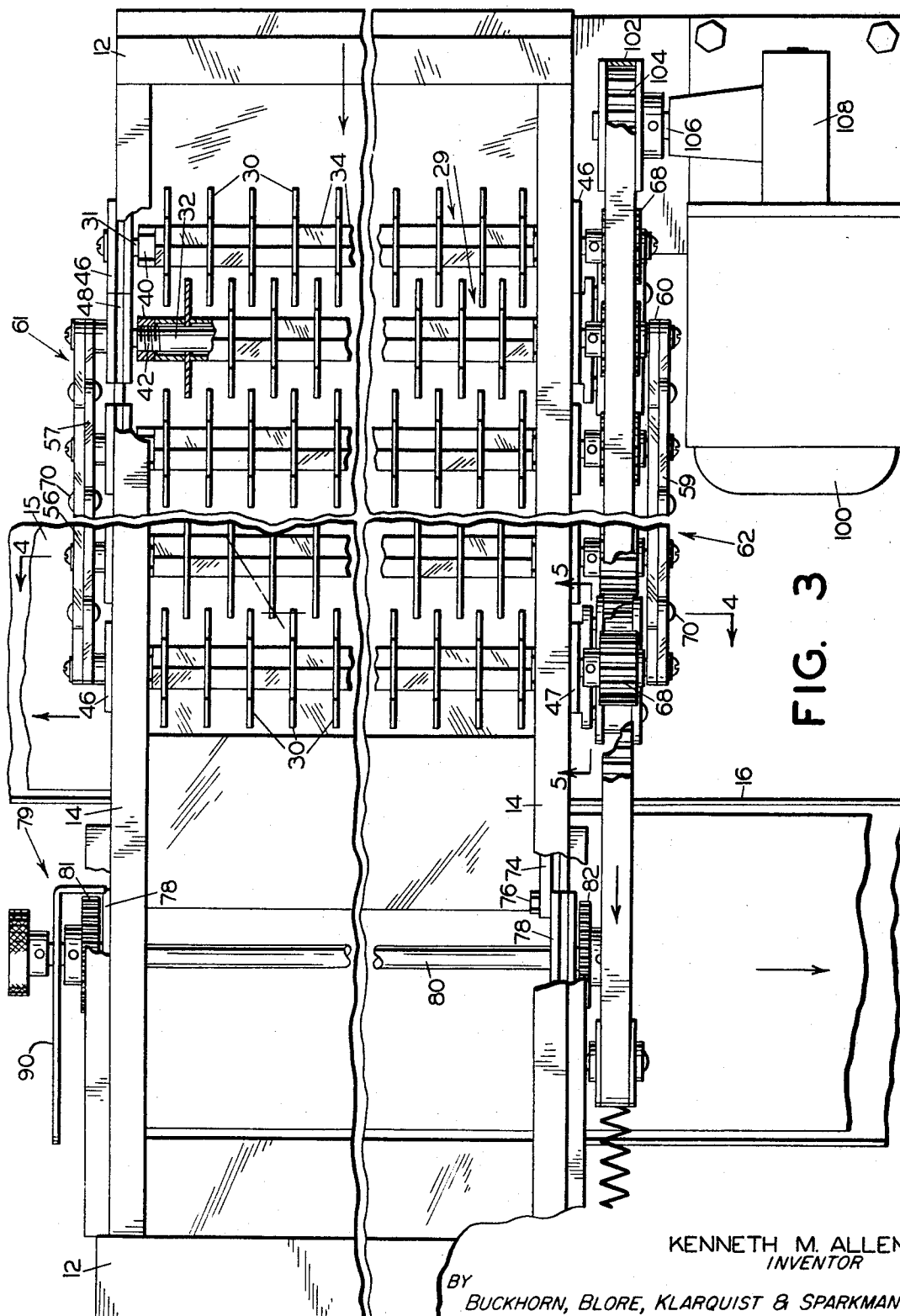
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LAZY TONG ADJUSTABLE SORTING MACHINES

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ABSTRACT OF THE DISCLOSURE

A machine for sorting as to size articles such as potato chips includes a plurality of discs, parallel shafts and spacer sleeves on the shafts frictionally engaging the discs. The shafts are mounted in bearings carried by guide blocks slidable along guideways by a pair of lazy tongs connected to the blocks and are extended or contracted by a pair of pinions on an end shaft secured to the free ends of the lazy tongs when the pinions are rotated along a pair of racks. The racks and pinions keep the movements of the lazy tongs the same to prevent binding. A tensioned cogbelt held in engagement with geared pulleys on the shafts by pairs of rollers on alternate guide blocks is driven to rotate the shafts. In FIGS. 5 and 8, the tubular spacers are angular in transverse cross-section to facilitate feeding articles across the shafts.

Description

This invention relates to improved sorting machines and more particularly to improved machines for sorting food products.

In the filling of small bags of food products such as potato chips, French fries, bacon rind and the like bridging by too wide, too long, too thick or clusters of the products sometimes interferes with filling the bags by bridging the openings to the bags and also by occupying too much space. Also, in packaging corn chips shaped as flat discs, warped chips and clusters prevent compact packaging and are undesirable. Sorters of the type disclosed and claimed in my copending application Ser. No. 308,152, filed Sept. 11, 1963, for "Potato Chip Sorter," separate oversize products according to excessive width, excessive length and excessive thickness to facilitate packaging the smaller containers therefor and to compactly package the food products. However, it would be desirable to provide somewhat simpler and more inexpensive sorters which are equally efficient.

Another object of the invention is to provide new and improved machines for sorting food products.

Another object of the invention is to provide a sorting machine which is simple and inexpensive and can be easily and effectively adjusted.

A further object of the invention is to provide a sorting machine which has a simple drive which is easily adjustable.

The present invention provides a sorting machine including a row of parallel rotating discs adapted to advance oversize articles therealong and permit smaller articles to drop therebetween. The sorting machine includes a plurality of rows of rotating members spaced apart sufficiently that shorter French fries and narrower potato chips will drop therethrough, and longer French fries, wider potato chips and clusters thereof will be advanced therealong. Preferably the rotating members are in the form of discs for separating the articles and the discs are mounted on shafts which together with square spacer sleeves on the shafts space and frictionally drive the discs and advance the articles. The shafts are adjusted by a pair of parallel lazy tongs movable by a pair of pinions keyed together and meshing with a pair of parallel racks. A cog belt meshing with pinions keyed to the shafts serves to rotate the shafts and the discs thereon.

A complete understanding of the invention may be obtained from the following detailed description of sorting machines forming specific embodiments thereof, when read in conjunction with the appended drawings, in which:

FIG. 1 is a fragmentary, side elevation view of a sorting machine forming one embodiment of the invention;

FIG. 2 is a fragmentary, side elevation view of the sorting machine of FIG. 1 with parts thereof broken away for purposes of clarity;

FIG. 3 is a fragmentary, top plan view of the sorting machine of FIG. 1;

FIG. 4 is a fragmentary, vertical sectional view taken substantially along line 4—4 of FIG. 3;

FIG. 5 is an enlarged, vertical sectional view taken substantially along line 5—5 of FIG. 3;

FIG. 6 is a fragmentary, vertical sectional view taken substantially along line 6—6 of FIG. 4;

FIG. 7 is an enlarged vertical sectional view taken substantially along line 7—7 of FIG. 1; and

FIG. 8 is a view similar to FIG. 6 of a sorter forming an alternate embodiment of the invention.

Referring now in detail to FIGS. 1 to 7 of the drawings, the sorting machine shown therein includes posts 10 (FIGS. 1 and 2) supporting cross members 12 and longitudinal members 13 and 14 above conveyors 15 and 16 which serve to advance products sorted by the sorting machine therefrom. An entrance chute 18 and side boards 20 are provided at the entrance end of the sorting machine and a ridged divider plate 22 is positioned above a wall 24 separating the conveyors.

Rotor members 29 comprise discs 30 (FIGS. 3, 4 and 6), which are hexagonal in shape, are mounted in spaced, parallel positions on shafts 31 and 32, with the discs 30 being spaced equidistantly along the shafts by square spacer sleeves 34. The discs 30 on every second shaft 30 and 32 are all radially aligned with the corresponding discs on the others of these shafts, and the discs on the alternate shafts are radially aligned with each other and staggered relative to the discs on the other shafts, and are positioned midway therebetween. Nuts 40 are threaded onto threaded portions 42 of the shafts, and hold the spacer sleeves in frictional contact with the discs to provide a driving force thereto. The discs thus are driven by friction with the spacer sleeves, and the sleeves are driven by friction with the nuts 40. The nuts 40 are adjusted on the shafts to provide the desired frictional pressure between the sleeves and the discs. The diameter of each of the discs is somewhat over twice the diagonal of the spacer sleeves.

The shafts 31 and 32 are journaled in nylon bearings 46 and 47 (FIG. 4) having square exteriors and also having parallel guide grooves 48 therein receiving the edges of the flanges 50 and 52 of the members 13 and 14 and being slidable along the guideway formed by these flanges. The bearings 46 and 47 are composed of nylon or other low friction, plastic material. Reduced end portions of the shafts 32 extend loosely and rotatably through bores 56 in links 57, 58, 59 and 60 of the lazy tongs 61 and 62. Screws 64 and washers 66 retain the links on the shafts. Pinions 68 are pinned to the shafts 31 and 32 between the bearings 46 and 47 and the lazy tongs 62. The ends of the links are secured pivotally together by rivets 70.

The extreme lefthanded bearings 46 and 47, as viewed in FIG. 3, are secured by rivets 72 to bars 74 (FIGS. 1, 2, 3 and 5) secured by capscrews 76 to externally grooved bearings 78 slidable along the guideways formed by the flanges 50 and 52 and forming a portion of an adjusting mechanism 79. A shaft 80 journaled in the bearings 78 has identical pinions 81 and 82 keyed thereto by set screws 77 (FIG. 7), and the pinions 81 and 82 (FIGS. 1 and 2)

mesh with parallel racks 83 and 84 secured to the flanges 52 of the longitudinal members 14. A knob 86 rigidly secured to the shaft 80 may be turned manually to rotate the shaft 80 and the pinions 81 and 82 to move the pinions along the racks 83 and 84 without binding. This moves the bars 74 along the members 13 and 14 to extend or contract the lazy tongs 61 and 62. The shaft 80 is journaled in grooved nylon bearings 88 slidably mounted in the guideway formed by the flanges 50 and 52. A manually operable latch 90 (FIGS. 1 and 7) mounted pivotally on the shaft 80 between the knob 86 and the pinion 81 is urged in a clockwise direction, as viewed in FIG. 1, toward its latching position by a handle 92 to hold a pawl portion 94 (FIG. 7) thereof in latching engagement with the rack 83. The handle 92 may be lifted to move the pawl portion out of engagement with the rack to permit adjustment of the lazy tongs 61 and 62.

An electric motor 100 (FIGS. 2 and 3) drives a cogbelt 102 through a gear 104 keyed to a shaft 106 of a reduction gear 108 driven by the motor. The motor and the reduction gear are mounted on a plate 110 forming a part of the framework of the sorting machine. The cogbelt meshes with the pinions 68 and drives the shafts 31 and 32 and the spacers 34 and discs 30. The discs 30 separate, guide and aid the advance of the food products and the square spacers 34 advance the food products. Smaller food products drop between the spacers into the conveyor 15 while the larger food products are advanced on to the conveyor 16.

The cogbelt 102 is tensioned by an idler gear 120 (FIG. 2) carried by an arm 122 pivotally mounted on one of the members 13 by pin 124 and urged in a tensioning direction by a tension spring 126. The cogbelt is held in meshing engagement with the pinions 68 by grooved pulleys 130 mounted rotatably on headed pins 132 (FIGS. 4 and 5) having reduced threaded end portions 134 screwed into tapped bores 136 in offset plate portions 138 of the bearings 47. The pulleys 130 project upwardly between the pinions 68 and hold the flexible cogbelt in a position trained partially around the pinions 68. The bearings 47 (FIG. 2) which carry the pulleys 130, alternate with the bearings 46, which have no pulleys, the pulleys, being positioned at each end of the bearings 47, serving to hold the belt trained partially around the pinions 68 carried by the bearings 46 as well as partially around the pinions 68 carried by the bearings 47.

Embodiment of FIG. 8

A sorting machine 150 forming an alternate embodiment of the invention is identical to the sorting machine of FIGS. 1 to 7 except that, instead of the hexagonal discs 30, the machine 150 (FIG. 8) has circular discs 152 mounted rotatably on shafts 154. Square tubular spacers 156 are mounted between the discs 152 and frictionally engage the discs 152 to drive them with the shafts 154 as the shafts are rotated. The circular discs have only frictional advancing effect on the food products and serve primarily to separate, guide and orient the food products while the square tubular spacers 156 are the primary means for advancing the food products along the machine, shorter food products dropping between the spacers and the longer food products being advanced the entire length of the sorting machine 150.

The above-described sorting machines serve to effectively separate smaller food products from larger food products, and the rotor members 29 are very easily adjusted to different separations to adjust the size of those of the food products being separated from the remainder thereof. The lazy tongs adjust the rotors without any tendency for the rotors to bind as they are moved along the supporting structure. The machines are simple in construction, while being easily cleaned and maintained.

It is to be understood that the above-described arrangements are simply illustrative of the application of the principles of the invention. Numerous other arrangements may be readily devised by those skilled in the art which

will embody the principles of the invention and fall within the spirit and scope thereof.

What is claimed is:

1. In a sorting machine, a plurality of rotor members, mounting means mounting the rotor members rotatably in parallel, adjustable positions and comprising a pair of parallel guideways and a plurality of pairs of bearings journaling the rotor members and slidable along the guideways, adjusting means including a pair of lazy tongs anchored at one end of each and extending along the guideways, for adjusting the rotor members toward and away from each other, means securing the rotor members rotatably to the lazy tongs at spaced points along the lazy tongs, actuating means connected to the other ends of the lazy tongs for extending and contracting the lazy tongs, a plurality of rotatable geared members carried by the rotor members, an endless toothed member, adjustable means holding the toothed member in driving engagement with the geared members, means for tensioning the toothed member, and means for driving the toothed member to rotate the geared members.
2. The sorting machine of claim 1 wherein the actuating means includes a pair of racks extending parallel to the guideways, a pair of pinions meshing with the racks, a shaft carrying the pinions and keyed thereto, and means for rotating the shaft.
3. The sorting machine of claim 2 including a latching pawl pivotally mounted on the shaft and biased toward locking engagement with one of the racks.
4. The sorting machine of claim 1 wherein the actuating means includes a pair of slide members secured to the ends of the lazy tongs and slidable along the guideways, a pair of racks mounted in parallel positions extending along the guideways, a shaft journaled in the slide members, and a pair of pinions keyed to the shaft and meshing with the racks.
5. In a sorting machine, a plurality of rotor members, mounting means mounting the rotor members rotatably in parallel, adjustable positions, adjusting means for adjusting the rotor members toward and away from each other, a plurality of geared pulleys carried by the rotor members, an endless cogbelt, adjustable means holding the cogbelt in driving engagement with the geared pulleys, means for tensioning the cogbelt, means for driving the cogbelt to rotate the geared pulleys, the mounting means including a pair of parallel guideways and a plurality of pairs of bearings journaling the rotor members and slidable along the guideways, and a plurality of idler pulleys mounted on the bearings in positions guiding the cogbelts partly around the geared pulleys.
6. The sorting machine of claim 5 including means on alternate ones of the bearings mounting the idler pulleys in pairs on said alternate ones of the bearings.
7. In a sorting machine, a plurality of rotor members, mounting means mounting the rotor members rotatably in parallel, adjustable positions, adjusting means for adjusting the rotor members toward and away from each other, a plurality of geared pulleys carried by the rotor members, an endless cogbelt,

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adjustable means holding the cogbelt in driving engagement with the geared pulleys,
means for tensioning the cogbelt,
and means for driving the cogbelt to rotate the geared pulleys,

at least one of the rotor members including a shaft, a plurality of discs mounted rotatably on the shaft, a plurality of tubular spacers angular in transverse cross-section frictionally engaging the discs and positioned on the shaft between the discs, and means pressing the discs and spacers together.

8. The sorting machine of claim 7 wherein the spacers are square in transverse cross-section and the discs have circular peripheries.

9. In a sorting machine,
a plurality of rotor members,
mounting means mounting the rotor members rotatably in parallel, adjustable positions and comprising a pair of parallel guideways and a plurality of pairs of bearings journaling the rotor members and slidable along the guideways,

adjusting means including a pair of lazy tongs anchored at one end of each extending along the guideways, for adjusting the rotor members toward and away from each other,

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means securing the rotor members rotatably to the lazy tongs at spaced points along the lazy tongs,
actuating means connected to the other ends of the lazy tongs for extending and contracting the lazy tongs,

a plurality of rotatable pulley members carried by and drivingly connected to the rotor members,
an endless belt member,

adjustable means holding the belt member in driving engagement with the pulley members,

means for tensioning the belt member,
and means for driving the belt member to rotate the pulley members.

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