

April 11, 1944.

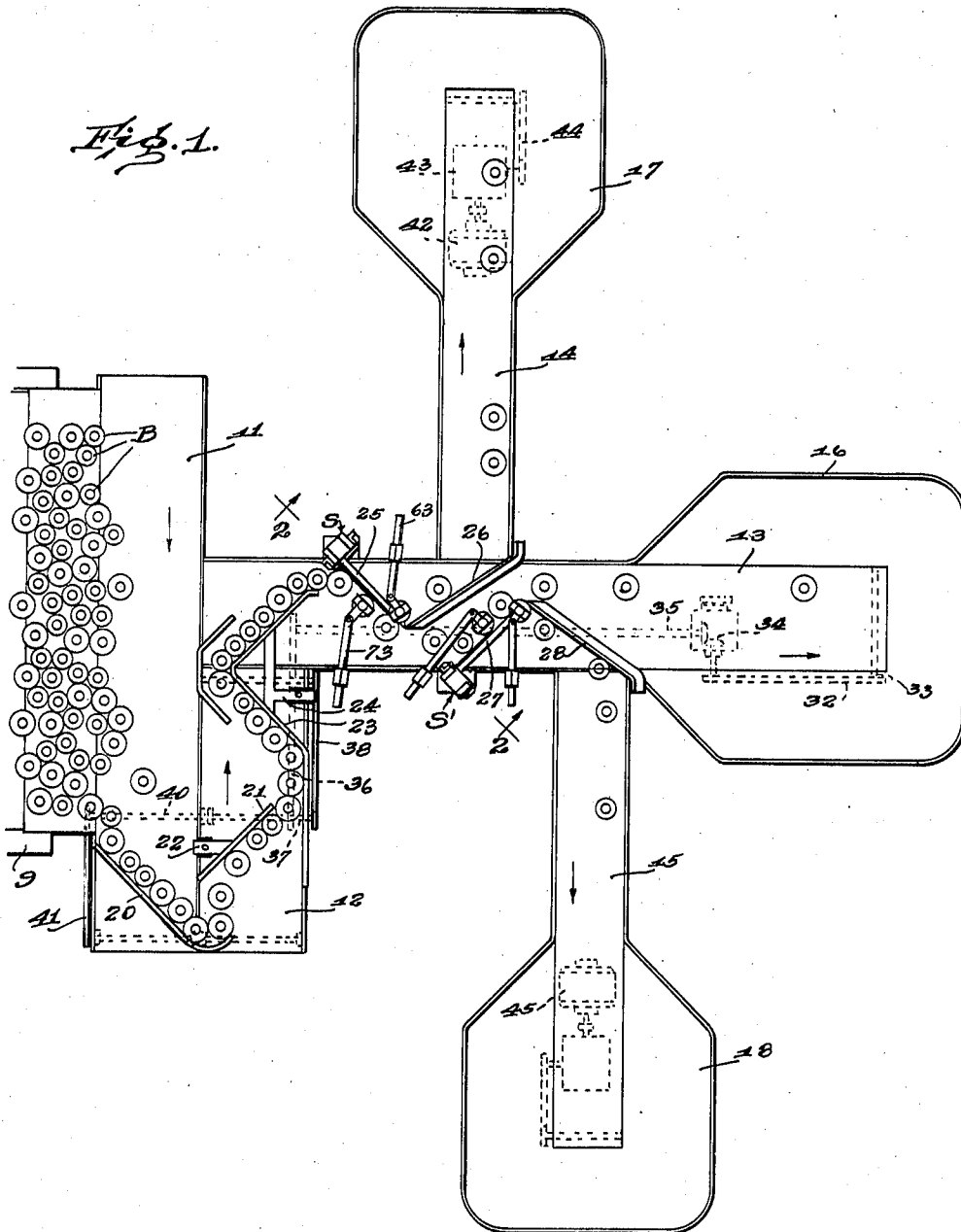
A. S. JACKSON

2,346,583

ARTICLE SORTING APPARATUS

Filed Sept. 11, 1941

3 Sheets-Sheet 1



A. S. Jackson
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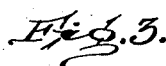
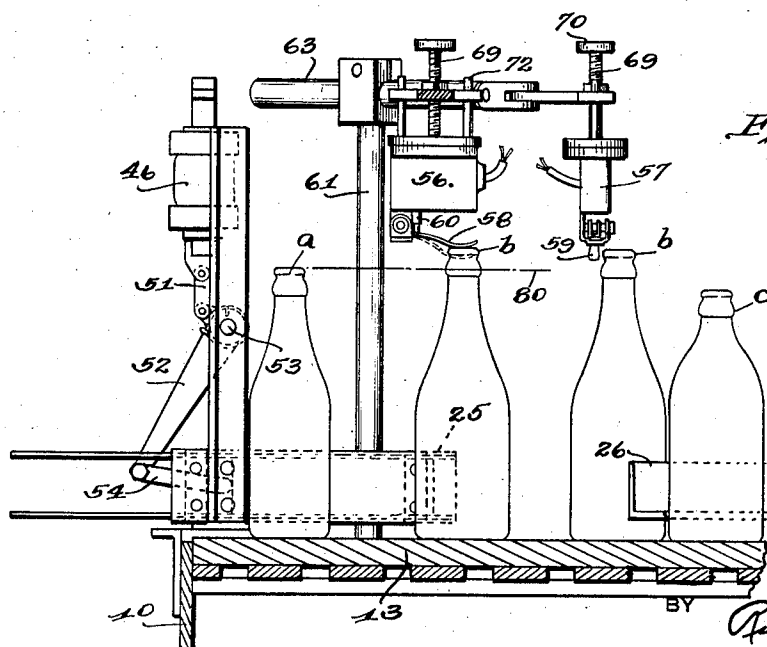
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3 Sheets-Sheet 2



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3 Sheets-Sheet 3

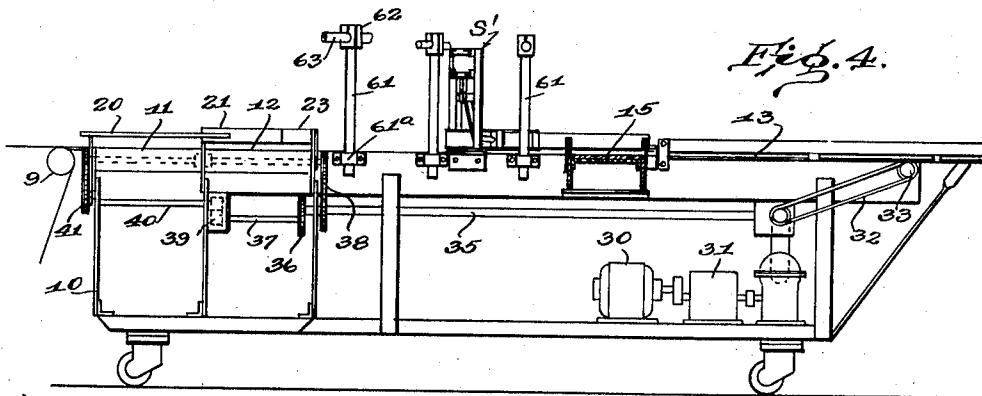
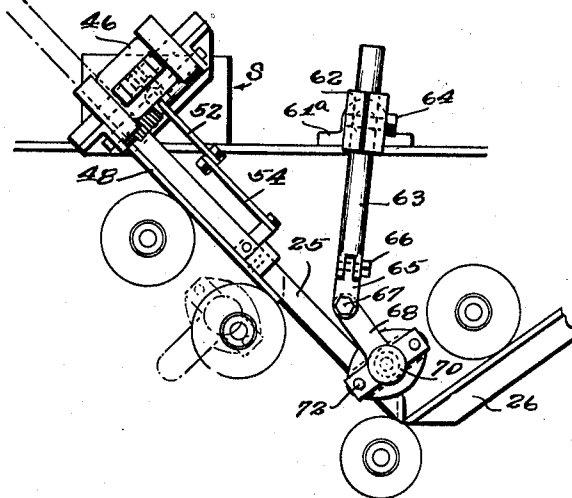
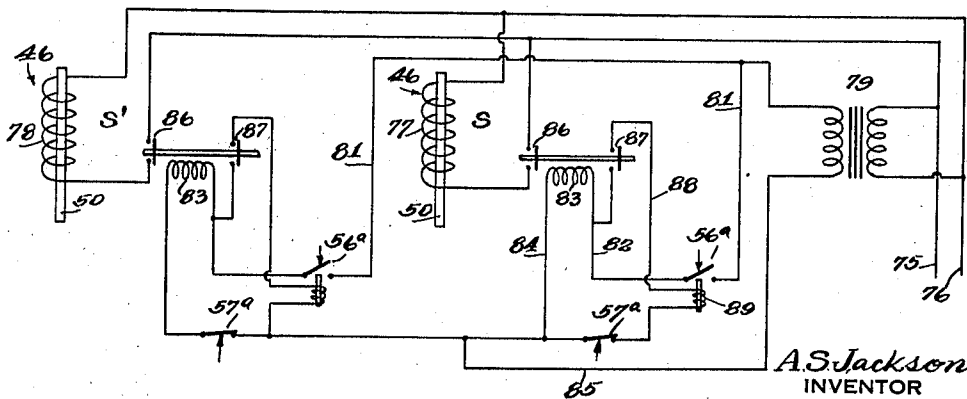


Fig. 6.



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UNITED STATES PATENT OFFICE

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ARTICLE SORTING APPARATUS

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Application September 11, 1941, Serial No. 410,409

8 Claims. (Cl. 209—90)

My invention relates to apparatus for sorting articles of different sizes or shapes. More particularly the invention provides an apparatus for segregating and collecting in groups, articles of particular sizes or shapes from a heterogeneous collection or continuous supply of the articles.

The invention as herein illustrated, is adapted for sorting glass articles such as bottles, jars or the like as they are delivered from an annealing leer. It is common practice to anneal articles of several different sizes or shapes concomitantly in the same leer, so that the leer is continuously discharging a conglomeration of such heterogeneous articles. An object of my invention is to provide apparatus for sorting these articles as they are discharged from the leer and collecting at separate stations all of the articles of each size or shape.

Other objects of the invention will appear hereinafter.

Referring to the accompanying drawings:

Fig. 1 is a diagrammatic plan view of apparatus embodying the present invention.

Fig. 2 is a sectional elevation on a larger scale, the section being taken at the line 2—2 on Fig. 1.

Fig. 3 is a view similar to Fig. 2, but with parts in a different relative position.

Fig. 4 is a part sectional elevation of the apparatus.

Fig. 5 is a fragmentary plan view showing one of the gates and its controlling and operating mechanism.

Fig. 6 is a wiring diagram of the electrical apparatus.

The invention as herein illustrated is designed for receiving bottles, jars or other glass articles from an annealing leer and sorting them according to size or shape.

The apparatus as shown is adjusted for sorting bottles of different lengths and conveying them to separate stations. The particular apparatus shown is also adjustable to enable it to be used for sorting articles with reference to their diameters, shoulder heights or other dimensions. It is to be understood that the invention may be adapted for sorting numerous other kinds of articles, bottles being shown by way of example.

Referring to Fig. 1, bottles B are shown as being discharged from a leer 9 onto a belt conveyor 11 mounted on a framework 10. The conveyor 11 forms one of a group of horizontally disposed, endless conveyors 11, 12, 13, 14, and 15 by which the bottles are transferred from the

leer to tables 16, 17, and 18. The conveyors are driven in the directions indicated by the arrows. The conveyor 12 is preferably driven at a higher speed than the conveyor 11, and the conveyor 13 at a higher speed than the conveyor 12 to assist in arranging the bottles to travel, single file, in a predetermined path, and to maintain a suitable spacing of the bottles during their travel through the selecting zones. The bottles are directed from the conveyor 11 onto the conveyor 12 by a stationary deflector bar 20 and are directed diagonally across the conveyor 12 by a guide bar 21 carried on a bracket 22. A deflector bar 23 carried on a bracket 24 directs the bottles across the conveyors 12 and 13, the bottles traveling in a zig-zag path along the conveyors 12 and 13.

The bottles as they pass beyond the guide bar 23 are moved into contact with a gate 25 forming part of a selector device S. The gate is opened and closed automatically under the control of bottles of a selected height to permit them to pass through the open gate into engagement with a deflector bar 26 by which the selected bottles are directed onto the conveyor 14. The bottles which are not of a length to actuate the selector device S are carried beyond the closed gate and move into engagement with a gate 27 forming part of a selector device S' which may be identical in construction and method of operation with the selector device S. The selector S' is adjusted to select a second group of bottles of a different length from those selected by the device S. When the gate 27 is opened, it permits the selected bottle to be carried by the conveyor 13 into engagement with a deflector bar 28 by which it is directed onto the conveyor 15. The bottles which are carried into contact with the gate 27, but are not of a length to actuate the selector device S', are guided in a path which is beyond the range of the guide bar 28 so that the bottles are carried by the conveyor 13 to the table 16.

Each gate while closed also serves as a deflector or shifting device and extends from one side or edge of the conveyor diagonally forward and inwardly over the conveyor and terminates at a point intermediate the sides of the conveyor. Each gate, except the first, while closed extends laterally beyond the end of the preceding closed gate or in overlapping relation thereto, into the path of the articles released from the said preceding closed gate.

The means for continuously driving the conveyors 11, 12, and 13 comprises an electric motor 30 (Fig. 4) operating through driving mech-

anism including speed reduction gearing within a gear box 31, a driving chain 32, and the driving roll 33 for the conveyor 13. The motor 30 also has driving connections with the conveyor 12 through power transmitting mechanism including gearing 34 (Fig. 1), a shaft 35, a sprocket chain 36, shaft 37 and sprocket chain 38, the latter being trained over the driving roll of the conveyor 12. The shaft 37 operates through a pair of spur gears 39 (Fig. 4) to drive a shaft 40 in the reverse direction, said shaft 40 having driving connection through a sprocket chain 41 with the driving roll of the conveyor 11. The conveyor 14 is driven separately from the other conveyors by an electric motor 42 (Fig. 1) operating through speed reduction gearing in a gear box 43 and a sprocket chain 44 geared to the driving roll of the conveyor 14. The conveyor 15 is also independently driven in like manner by an electric motor 45.

The selector devices S and S' will now be described. Each comprises an electromagnet 46 having a stationary mounting on an upright frame 47 comprising a pair of angle bars mounted on the framework 10. A horizontal guide plate 48 which may be rigidly mounted at the base of the frame 47, is formed with guide-ways for the gate (25 or 27) which is mounted for sliding movement therein from a closed position (Fig. 2) to an open position (Fig. 3). Each electromagnet 46 has a core or armature 50 which is drawn upward within its solenoid when the latter is energized. Operating connections between the gate 25 and its armature 50 include a link 51 connecting the armature with a lug on the hub of an arm 52 mounted to rock on a shaft 53 supported in the frame 47. The arm 52 is connected by a link 54 to the gate 25. When the magnet is energized, it operates through the connections just described to retract the gate to open position. When the magnet is de-energized, a coil spring 55 returns the gate to closed position.

The electrical circuits for the electromagnets 46 are under the control of relays and switches mounted in switch boxes 56 and 57. The switches are actuated respectively by contact fingers 58 and 59 which are carried on the switch boxes and project into the path of the bottles. When a contact finger 58 is moved upwardly by a bottle, it operates through a plunger 60 to close its switch 56^a (Fig. 6). The contact finger 59 when moved upwardly by the bottle, opens its switch 57^a as hereinafter described. The mounting for each switch box includes a vertical supporting rod 61 attached to the framework 10 by means of a clip 61^a (Figs. 2, 4 and 5) which permits vertical and rotative adjustment of the rod. The latter is provided at its upper end with a split bearing block 62 in which is mounted a horizontal arm 63 adjustable both lengthwise in said block and rotatively about its own axis. The arm 63 is clamped in its adjusted position by a clamping bolt 64.

At the forward end of the arm 63 a short link 65 (Fig. 5) is mounted to swing on a pivot bolt 66 which also serves to clamp the link in any position of adjustment. Pivoted to the forward end of the link 65 by means of a clamping bolt 67 is a T-shaped arm 68 which may be adjusted about the axis of the bolt 67. The switch box 57 is adjustably supported on the arm 68 by means of a stem 69 screw-threaded through the arm 68 and swiveled to the box 57. The stem 69 may be rotated by a knob 70 for adjusting the

switch box toward and from the arm 68 and is clamped in adjusted position by clamping nuts 71. The switch box is held against rotative movement by means of a pair of guide pins 72 which are attached to the cover plate of the switch box and are slidable up and down in openings provided in the arm 68. It will be seen that the link 65 and arm 68 provide a universal joint connection between the arm 63 and the switch box, permitting the latter to be adjusted to any angular position. This, with the adjustability of both the arm 63 and supporting rod 61, both rotatively and in the direction of their length, permit the contact finger 59 to be adjusted to any angle and any position within a wide range, so that it may be actuated by the top, side, shoulder or other part of the bottle or other article.

The apparatus as shown is adjusted for selecting bottles from a supply comprising bottles of three different lengths and grouping them according to their length. The bottles *a* of intermediate length are of a height indicated by the broken line 80 (Fig. 3); the bottles *b* and *c* above and below this height and referred to as tall and short bottles respectively. The tall bottles *b* operate the switches for opening and closing the gate 25. The intermediate bottles *a* are of a height to actuate the switches for opening and closing the gate 27. The bottles *c* are too short to operate either set of switches.

The electrical control system, shown diagrammatically in Fig. 6, will now be described. Electric current may be supplied through the mains 75 and 76 of a circuit supplying, for example, an alternating current of 110 volts. The electromagnets 46 comprise solenoids 77 and 78 individual to the selectors S and S' respectively and are energized by current supplied directly from the mains. A step-down transformer 79 supplies current at a comparatively low voltage for actuating the micro-switches and relays. When a tall bottle operates the contact arm 58, it closes a switch 56^a in the switch box 56 for selector S and establishes a circuit which may be traced from one terminal of the secondary winding of the transformer through conductor 81, switch 56^a, conductor 82, relay magnet coil 83 and conductors 84 and 85. The coil 83 being energized, closes a contact 86 and establishes a circuit for the solenoid 77. The latter therefore operates to open the gate 25. The relay coil 83 when energized also closes a contact 87 and establishes a holding circuit for the switch 56^a, which circuit may be traced through conductor 81, switch 56^a, conductor 82, contact 87, conductor 88, holding coil 89, switch 57^a and conductor 85. The solenoid 77 thus remains energized and the gate held open until the bottle operates the contact 59 and opens the switch 57^a (in switch box 57). This breaks the circuit through the holding coil 89, allows the switch 56^a to open, thus breaking the circuit through the coil 83 so that the contacts 86 and 87 are opened and the solenoid 77 deenergized. The circuits which control the selector device S' are identical with those just described in connection with selector S. If there are only two sizes of bottles being delivered for sorting, evidently the second selector device S' may be omitted. If more than three sizes are to be sorted, additional selector devices and conveyors may be used.

Modifications may be resorted to within the spirit and scope of the appended claims.

I claim:

1. Article selecting apparatus comprising a

traveling conveyor, means for positioning articles on the conveyor and causing them to travel with the conveyor in a path adjacent one side thereof, a deflector gate extending from said side diagonally across said path and terminating at a point intermediate the sides of the conveyor and arranged to deflect articles toward the opposite side of the conveyor and release them before they reach said opposite side, a selector device for selecting articles of a predetermined dimension and actuated by said articles, electro-responsive means controlled by said selector device for moving said gate out of the path of a selected article, permitting the passage of said article, and a spring for returning the gate into position to deflect the next succeeding article, said selector device including means actuated by the selected article after it has passed beyond the gate, to release the gate to the operation of said spring.

2. Article selecting and conveying apparatus comprising, in combination, a horizontally traveling conveyor, deflector gates positioned at different points of advancement along the conveyor and arranged in alternation at opposite sides of the conveyor and each extending diagonally over the conveyor from one side thereof to an intermediate point over the conveyor, and arranged to guide articles placed on the conveyor in a zig-zag path, means for holding the gates rigidly in said guiding position, electro-responsive devices individual to said gates and operatively connected thereto for opening the gates, contact devices individual to said electro-responsive devices and controlling their operation, said contact devices being positioned to be selectively operated by articles of different heights whereby the gates are selectively opened for the passage of articles of specified heights and the articles segregated into a plurality of groups in accordance with said heights.

3. Article selecting and conveying apparatus comprising a horizontally disposed endless traveling conveyor, means for directing articles onto the conveyor for travel therewith in a path extending along the conveyor adjacent one side thereof, a deflector gate extending diagonally forward and inwardly over the conveyor with its forward end at a point intermediate the sides of the conveyor, an electro-magnet operatively connected to the gate, a contact finger positioned over the path of the articles and operative by articles of a predetermined height, means actuated by said contact finger for closing a circuit for the electro-magnet and thereby causing the latter to open the gate and permit the passage of the article selected by said contact finger, means for automatically closing the gate after the passage of said article, and a deflector extending over the conveyor in advance of said deflector gate, from a point intermediate the sides of the conveyor, diagonally forward to said first mentioned side and arranged to deflect the selected articles off the conveyor while permitting the articles deflected by said gate to advance with the conveyor and to be carried thereby beyond the deflector.

4. Article selecting and conveying apparatus comprising a horizontally disposed endless traveling conveyor, means for directing articles onto the conveyor for travel therewith in a path extending along the conveyor adjacent one side thereof, a deflector gate extending diagonally forward and inwardly over the conveyor with its forward end at a point intermediate the sides of the conveyor, an electro-magnet, means op-

eratively connecting the electro-magnet to the gate, a contact finger positioned over the path of the articles and operative by articles of a predetermined height, means actuated by said contact finger for closing a circuit for the electro-magnet and thereby causing the latter to open the gate and permit the passage of an article selected by said contact finger, a relay magnet, means actuated by the contact finger for closing a circuit for the relay magnet and causing the latter to establish a holding circuit for said electro-magnet, a second contact finger positioned to be actuated by the selected article after the latter has passed the open gate, means actuated by said second contact finger for opening the relay circuit and de-energizing the electro-magnet, and means for then closing the gate.

5. Article conveying and selecting apparatus comprising a horizontally disposed endless traveling belt conveyor, a stationary horizontal deflector positioned over the conveyor and extending from one edge thereof diagonally forward and inwardly over the conveyor to a point intermediate the sides of the conveyor, a second deflector positioned over the conveyor in advance of said first mentioned deflector and extending from the opposite edge of the conveyor diagonally forward and inward over the conveyor and terminating at a point intermediate the sides of the conveyor with the deflectors in overlapping relation, whereby articles deflected by the first deflector are brought by the conveyor into contact with the second deflector, each said deflector comprising a gate, contact devices individual to said gates and positioned to be operated by articles of predetermined dimensions, automatic means controlled by said contact devices for opening the gates and thereby permitting the passage of the articles therethrough, and discharging devices individual to said gates for discharging the articles passing through the gates.

6. Article selecting and conveying apparatus comprising a horizontally disposed endless traveling belt conveyor, deflector devices spaced at intervals along the conveyor and arranged alternately at opposite sides of the conveyor, each said deflector extending diagonally forward over the conveyor from one side thereof past the forward end of the preceding deflector and with its forward end terminating at a point intermediate the sides of the conveyor, whereby articles carried on the conveyor are directed by each deflector in succession into position to be carried by the belt into engagement with the next succeeding deflector, each said deflector comprising a gate, and contact devices individual to said gates and positioned to be operated respectively by articles of predetermined dimensions, and automatic means controlled by said contact devices for opening the gates.

7. Article selecting and conveying apparatus comprising a horizontally disposed endless traveling belt conveyor, deflector devices spaced at intervals along the conveyor and arranged alternately at opposite sides of the conveyor, each said deflector extending diagonally forward over the conveyor from one side thereof past the forward end of the preceding deflector and with its forward end terminating at a point intermediate the sides of the conveyor, whereby articles carried on the conveyor are directed by each deflector in succession into position to be carried by the belt into engagement with the next succeeding deflector, each said deflector comprising a gate, electro-magnets individual to said gates, means provid-

ing operating connections between the electromagnets and the gates, contact devices positioned to be engaged by articles of predetermined dimensions, and means actuated by the contact devices for effecting the operation of the electromagnets and thereby opening said gates.

8. Article selecting and conveying apparatus comprising a horizontally disposed endless traveling belt conveyor, deflector devices spaced at intervals along the conveyor and arranged alternately at opposite sides of the conveyor, each said deflector extending diagonally forward over the conveyor from one side thereof past the forward end of the preceding deflector and with its forward end terminating at a point intermediate the sides of the conveyor, whereby articles car-

ried on the conveyor are directed by each deflector in succession into position to be carried by the belt into engagement with the next succeeding deflector, each said deflector comprising a gate, contact devices individual to said gates and each positioned over the path of articles approaching its gate and adapted to contact articles of predetermined height, standards on which said contacts are carried, means providing universal joint connections between the contact devices and said standards permitting adjustment of the contacts for selecting articles of different dimensions, and electro-responsive means controlled by said contact devices for opening the gates.

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