Aug. 29, 1961 H. W. NEWBURN 2,998,117

CONTAINER SEGREGATING APPARATUS

Filed March 23, 1956 2 Sheets-Sheet 1

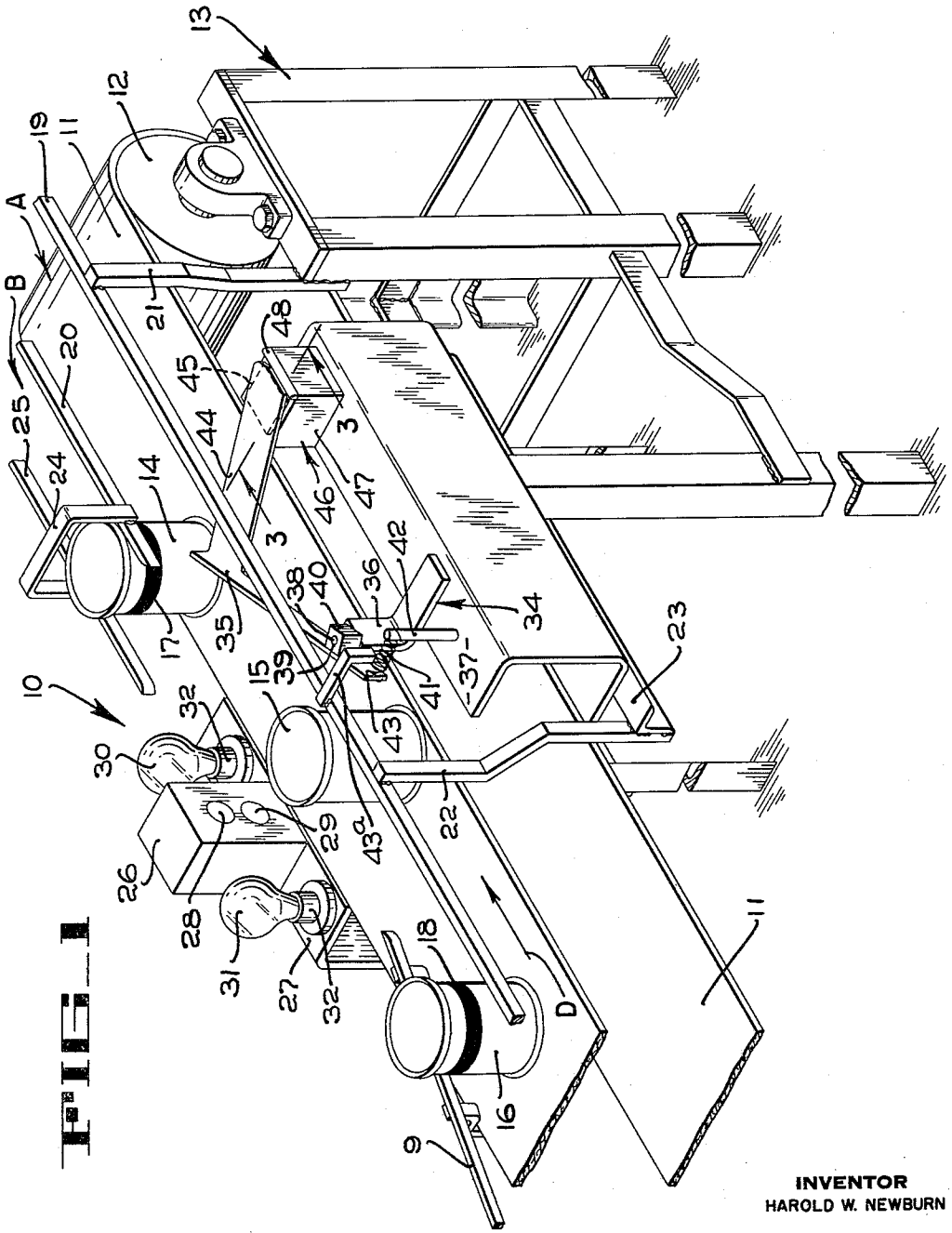


FIG. 1

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FIG_2

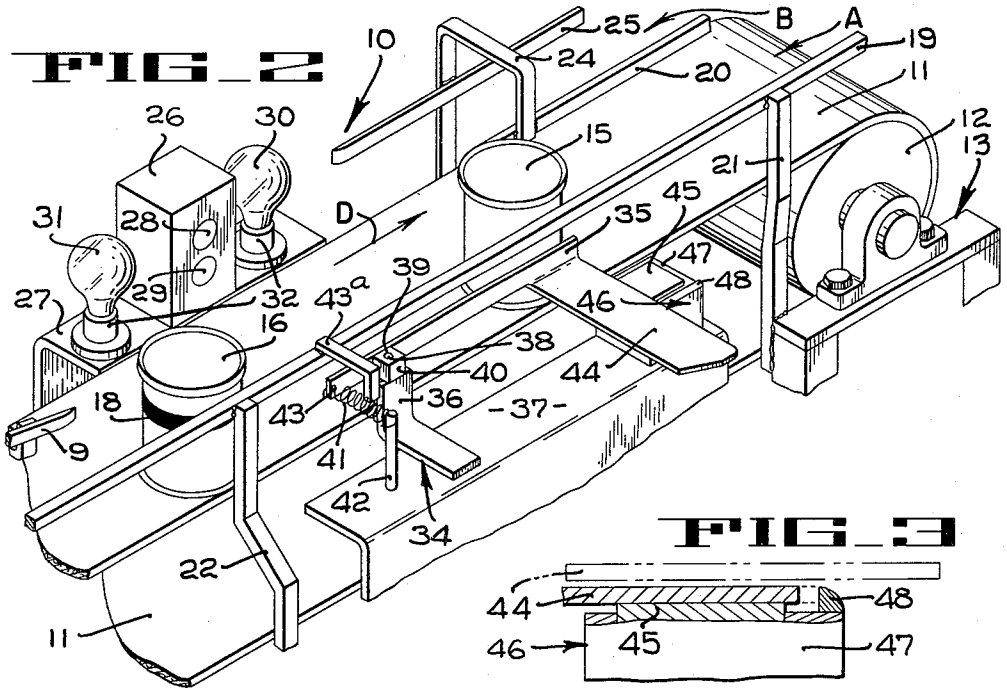
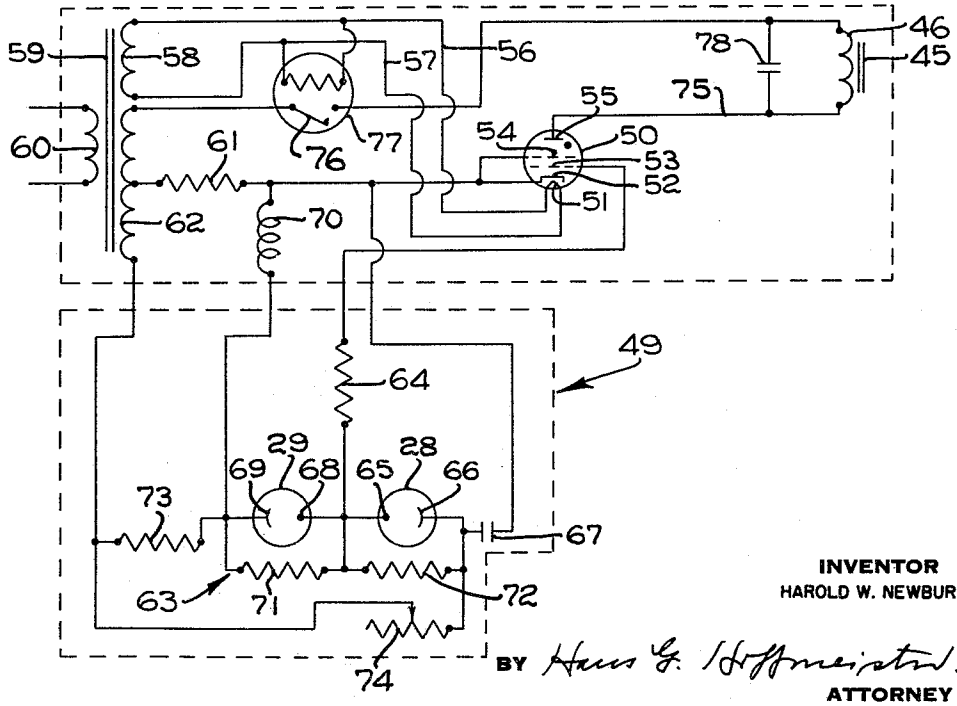


FIG_3

FIG_4



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CONTAINER SEGREGATING APPARATUS

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3 Claims. (Cl. 198—29)

The present invention appertains to a segregating apparatus, and more particularly to an apparatus for segregating containers in accordance with indicia carried thereon.

An object of the present invention is to provide a durable segregating apparatus, which operates at high speeds.

Another object of the present invention is to provide an accurate segregating apparatus of simplified construction.

Another object of the present invention is to provide an improved locking arrangement for a deflecting member of a container segregating apparatus.

Another object of the invention is to provide a simplified apparatus for detecting predetermined indicia on the bodies of containers, such as cans, and segregating such bodies in accordance with such indicia.

Other objects and advantages of the present invention will become apparent from the following description taken in connection with the accompanying drawing, in which:

FIG. 1 is a fragmentary perspective of the segregating apparatus of the present invention showing the container deflecting member in one operating position.

FIG. 2 is a fragmentary perspective of the segregating apparatus of FIG. 1 showing the deflecting member in a different operating position.

FIG. 3 is a fragmentary section taken substantially along line 3—3 of FIG. 1.

FIG. 4 is a schematic circuit diagram for the segregating apparatus of FIG. 1.

In canned food processing plants, different food products and different grades of the same food product are packed in similar size cans. Although each product may be filled and sealed at separate sections in the plant, the various food products in similar size cans become intermingled over a common conveying line during the sterilizing and freezing processes. Prior to labelling, it is necessary to segregate or sort out the different products into separate groups or lines, so that each group or line represents a certain grade or certain product, to facilitate the labelling process.

In order to distinguish cans of similar sizes having different products or grades, each can body is marked at a filling and sealing station with predetermined indicia. One method of marking the can body is to stencil or imprint on the can body a circle or ring stripe, produced by black ink or similar substance, which completely encircles the can body. Can bodies containing different products are marked with ring stripes at different axial heights along the cylindrical can body. Each product or grade will be identifiable by the location of the ring relative to the ends of the can. It is to be understood that the absence of a ring stripe may also be used for coding and, accordingly, the blank surface of the can will be considered as one form of indicium.

Referring now to FIGS. 1 and 2, a can segregating apparatus 10 is herein provided for detecting predetermined indicia on can bodies and sorting the cans into separate lines or groups in accordance with the indicia detected.

The segregating apparatus 10 is positioned at any convenient location along a conventional horizontal conveying member or conveyor belt 11. The conveyor belt 11 is power driven in a well-known manner by suitable means including a roller 12, which is journalled in a suitable support member 13.

The conveyor belt 11 advances can bodies, such as can bodies 14, 15 and 16, to the segregating apparatus 10 in

a single file for sorting, and then carries the can bodies 14, 15 and 16 to another station or a discharge chute, not shown. The can bodies 14, 15 and 16 are placed on the conveyor belt 11 in an upright position so that the cylindrical axes thereof are perpendicular to the surface area of the conveyor belt 11 as the cans travel in the direction shown by the direction arrows D. As the cans approach the segregating apparatus 10, they are channeled into a single file formation by a guide bar 9.

Certain can bodies 14 and 16 carry predetermined indicia thereon, such as ring stripes 17 and 18. The presence of the circumferential stripes 17 and 18 at a predetermined height or location along the surface of the cylindrical can bodies 14 and 16 or the absence of a ring stripe, such as shown by can body 15, is the means by which the different products or grades of products to be segregated are coded.

For guiding the can bodies 14, 15 and 16 in their travel on the conveyor belt 11, suitable guide rails 19, 20 and 25 are provided. The guide rail 19 is supported by suitable support arms 21 and 22, which are mounted to the support 13 and a mounting bracket 23, respectively. The guide rails 20 and 25 are supported by a suitable arched arm 24, which is supported by a mounting bracket, not shown, similar to mounting bracket 23. The guide rails 19 and 20 define therebetween a path of travel for the can bodies, which path for the purpose of convenience, will be referred to as lane A. Another path of travel for can bodies is provided, which other path is defined by the guide rails 20 and 25. For the purpose of convenience, such other path is referred to as lane B.

In order to detect indicia on the can bodies, such as ring stripes 17 and 18, or the lack of stripes, such as shown by can body 15, an indicia detecting device 26 is provided. The indicia detecting device 26 is supported by a suitable mounting plate 27 and comprises suitable photocells 28 and 29, such as conventional cadmium sulfide cells. The coplanar photocells 28 and 29 are simultaneously responsive to variations in light intensity or color and are positioned with respect to one another so that a vertical plane through the photocells is parallel with the axes of the cylindrical can bodies 14, 15 and 16. Accordingly, the photocells 28 and 29 are positioned to respond simultaneously and individually to variations in intensity or color of light reflected from each can body passing in a single file, such as can bodies 14, 15 and 16. Photocell 28 is aligned with the stripes on can bodies to be directed into lane B. Therefore, the height of the photocell 28 above the conveyor belt 11 is equal to the axial height of annular stripes on the upright can bodies to be directed into lane B. Photocell 29 is aligned with and arranged to detect a portion of the can body where no stripe appears. From the discussion to follow it will be noted that many combinations can be provided for the photocells 28 and 29. For example, photocell 29 can be aligned with stripes and photocell 28 can be aligned to the portion of the can body having no stripe thereon. Further, both photocells 28 and 29 can be aligned with stripes of different heights, which will have a similar effect as a can body having no stripes thereon. Further, can bodies having stripes not aligned with either photocell 28 or photocell 29 will have a similar effect as can bodies having either no stripes thereon or having stripes aligned with both photocells 28 and 29.

To enable the photocells 28 and 29 to detect variations in the intensity or color of light caused by the indicia, illumination of the can bodies 14, 15 and 16 is provided by conventional light emitters, such as incandescent lamps 30 and 31. The lamps 30 and 31 are connected to any suitable source of electrical energy in a well-known manner and are seated in sockets 32, which are mounted on the plate 27.

For deflecting can bodies having predetermined stripes thereon into lane B and permitting can bodies to continue in lane A, when such stripes do not appear, a deflecting assembly **34** is provided. In order to guide the can bodies, such as can **14**, into lane B, a leaf spring deflecting member **35** is included in the deflecting assembly **34**. The deflecting member **35** is pivotally supported at one end on a mounting bracket **36**, which is secured to a mounting plate **37**. For pivotally mounting the deflecting member **35**, the bracket **36** has secured thereto a pin **38**, which is received by a suitable aperture **39** in a collar **40**. The collar **40** is fixedly secured to the deflecting member **35** in any suitable manner, such as welding. To return the deflecting member **35** to its normal or idle position, shown in FIG. 1, resilient means is provided, such as spring **41**. The spring **41** is attached at one end to a post **42**, which is mounted into the plate **37**. The other end of spring **41** is anchored in an aperture **43** of the deflecting member **35**. An angle member **43***a*, which is supported by rail **19**, is provided to limit the pivoting movement of the deflecting member **35**.

At its other end the deflecting member **35** is provided with a laterally extending projection or slidable tongue **44**, which is integrally formed therewith. The slidable projection **44** is suitably positioned above a core **45** of a conventional solenoid **46**. When the solenoid **46** is energized, the projection **44** is drawn to the core **45** to hold the deflecting member **35** in position for deflecting can bodies into lane B. For mechanically stopping any substantial outward movement of the deflecting member **35** by a can body, when the tongue **44** is drawn to the core **45**, an upward projection, such as stop flange **48**, is secured to a housing **47** of the solenoid **46**.

Referring now to FIG. 3, the tongue **44**, which is movable in a horizontal plane, is arranged to be normally positioned a suitable distance above the core **45** and also above and inward of the stop flange **48**. When the solenoid **46** is energized, the tongue **44** is drawn to the core **45**. As an advancing can body engages the member **35**, the depressed tongue **44** is moved into an abutting relationship with the stop flange **48** which provides a mechanical stop for the deflecting member **35**. When the solenoid **46** is not energized and a can body engages the deflecting member **35**, the slidable tongue **44** passes over the stop flange **48** permitting such can body to continue its travel in lane A. Under normal or idle conditions, shown in FIG. 1, the deflecting member **35** is inwardly disposed toward the conveyor belt **11** and is pivotal about the bracket **36** in a plane parallel to the surface area of the conveyor **11**. The tongue **44** likewise moves in a plane substantially parallel to the surface area of the conveyor belt **11** and is slidable over the core **45** and the stop flange **48**.

When predetermined stripes are detected on a can body, such as can body **14**, by the photocells **28** and **29**, the solenoid **46** is energized in a manner shown in FIG. 4 and to be described hereinafter. The energization of the solenoid **46** attracts the tongue **44** to the core **45**. As a can body, such as can body **14**, engages the deflecting member **35**, the projection **44** abuts against the stop flange **48** to hold the deflecting member **35** in a locked position. Consequently, the deflecting member **35** guides the can body **14**, which is advanced by the conveyor belt **11**, into lane B as shown in FIG. 1.

When no stripe appears on a can body, such as can body **15**, the solenoid **46** remains deenergized in a manner shown in FIG. 4 and to be described hereinafter. As the can body **15** is advanced by the covneyor belt **11**, it engages the deflecting member **35** causing the member **35** to be pivoted outwardly from the conveyor belt **11** about the pin **38** in a plane parallel to the conveyor belt **11** to permit the can body **15** to continue in lane A, as shown in FIG. 2. As the deflecting member **35** is pivoted by the can body **15**, the projection **44** slides over the solenoid core **45** of the deenergized solenoid **46** and the stop flange **48**. After the can body **15** disengages the deflecting member **35**, the spring **41** returns the deflecting member **35** to its normal or idle position shown in FIG. 1.

Referring now to FIG. 4, an electrical circuit **49** is provided for energizing and deenergizing the solenoid **46** in response to variations of light intensity or color appearing on the can bodies as detected by photocells **28** and **29**. The circuit **49** comprises a suitable gaseous discharge tube **50**, such as a conventional thyratron tube. The gaseous discharge tube **50** performs as a switching device, since the solenoid **46** is energized when tube **50** conducts and is deenergized when tube **50** is non-conducing.

Tube **50** comprises filaments **51**, cathode **52**, grid electrode **53**, screen grid **54** and a plate electrode **55**. The filaments **51** are heated over a path including conductors **56**, **57** and a secondary winding **58** of a conventional step-up transformer **59**. The transformer **59** includes a primary winding **60** connected to a suitable source of electrical energy.

The gaseous discharge tube **50** is biased to cut-off over a path including cathode **52**, cathode resistor **61** and secondary winding **62** of transformer **59**. To overcome the bias potential and thus render the tube **50** conductive, a balanced network **63** interconnects the grid electrode **53** and the cathode **52** through a grid resistor **64**. A suitable current flow from the network **63** produces a potential across the grid resistor **64** and makes the potential on grid **53** more positive, thus rendering the tube **50** conductive.

The balanced network **63** comprises several parallel paths. One parallel path includes anode **65** of photocell **28**, cathode **66** of photocell **28** and condenser **67**. The other parallel path includes anode **68** of photocell **29**, cathode **69** of photocell **29** and inductance coil **70**. The condenser **67** in the path including photocell **28** causes the current to lead the voltage by approximately 90° and the inductance coil **70** in the path including photocell **29** causes the current to lag the voltage by approximately 90°. Accordingly, the current flow in one path is approximately 180° out of phase with respect to the current flow in the other path. When the effective resistances across photocells **28** and **29** are approximately equal, the network **63** is substantially balanced and there is no effective resultant flow of current, since the currents are approximately equal and approximately 180° out of phase. It is of course understood that the effective resistance for the photocells **28** and **29**, respectively, is determined by the current flow therethrough.

When photocells **28** and **29** have substantially different effective resistances, the network **63** becomes unbalanced and there is a phase shift that now provides an effective resultant current flow. Resistances **71** and **72**, which are of equal value, are provided to protect the photocells **28** and **29** and do not affect the balanced network **63**. Resistor **73** is also provided to protect the photocells **28** and **29**. Variable resistor **74** is provided for adjusting the sensitivity of the grid circuit. By utilizing two photocells, such as photocells **28** and **29**, the sensitivity of the circuit **49** to variations in intensity or color of light is improved.

The effective resistances of photocells **28** and **29** vary in accordance with variations in the intensity or color of light. Accordingly, when photocell **28** detects the annular black stripe **17** on can body **14**, the effective resistance thereof increases. Simultaneously, the photocell **29** detects a portion of the can body **14** having no stripe thereon. Consequently, the effective resistance of photocell **28** is greater than the effective resistance of photocell **29**. Therefore, tube **50** is rendered conductive, since the network **63** is substantially unbalanced. When the photocells **28** and **29** do not detect any stripes on the can bodies, the effective resistances thereof remain approximately equal to maintain the network **63** substantially balanced, thus rendering the tube **50** non-conduc-

tive. A similar result is produced when the photocells 28 and 29 detect stripes or fail to detect any stripes.

The plate electrode 55 of the gaseous discharge tube 50 has connected thereto a plate circuit or output circuit 75 comprising solenoid 46, contacts 76 and the secondary winding 62 of the transformer 59. The normally open contacts 76 delay the completion of the plate circuit 75 until the filaments 51 have been sufficiently heated. For this purpose, a time delay device, such as conventional amperite tube 77, is connected in parallel with the secondary winding 58. When the filaments 51 are sufficiently heated, tube 77 closes contacts 76 to complete the plate circuit 75.

The secondary winding 62 supplies alternating current to the plate 55, which is rectified into half waves. The thyratron tube 50 is ready for conduction when a positive potential is applied to the plate 55 thereof and is non-conductive when no positive potential is applied to the plate 55.

Solenoid 46 in the plate circuit of tube 50 is energized when the gaseous discharge tube 50 conducts and is deenergized when the tube 50 is not conducting. Tube 50 conducts when the photocells 28 and 29 unbalance substantially the network 63 in response to different indicia on the can bodies and extinguishes when there is no positive potential on the plate 55 thereof. Filter condenser 78 is provided to reduce alternating current ripples, thereby reducing chattering.

In the operation of the can segregating apparatus 10 (FIG. 1), conveyor belt 11 advances can bodies 14, 15 and 16 in a single file past the indicia detecting device 26. Photocells 28 and 29 of the indicia detecting device 26 are positioned to detect the presence or absence of predetermined stripes on a passing can body. When a predetermined code is detected by the photocells 28 and 29, the network 63 becomes substantially unbalanced causing tube 50 to conduct. The conduction of tube 50 energizes solenoid 46. The energization of solenoid 46 draws the tongue 44 to the core 45 to hold deflecting member 35 in position for locking as seen in solid lines in FIG. 3. As the can body carrying the predetermined code is further advanced by the conveyor belt 11, the can body engages the depressed deflecting member 35 and moves it into locking engagement with the upstanding stop 48. When the deflecting member 35 is in the depressed and locked position, the can is directed into lane B. The deflecting member is maintained in the locked position by the contact of the coded can body and by the abutment of the tongue 44 against the mechanical stop 48. When the potential on the plate 55 of the tube 50 becomes negative from the alternating current supply, tube 50 extinguishes to deenergize solenoid 46. After the can body disengages the deflecting member 35 and the solenoid 46 is deenergized, the resiliency of deflecting member 35 urges the tongue 44 to its normal position.

When a can body carrying no predetermined indicia thereon is advanced by the conveyor belt 11, the effective resistances of the photocells 28 and 29 remain approximately equal. Accordingly, the network 63 remains substantially balanced and the tube 50 is rendered nonconductive. As the can body carrying no predetermined stripe thereon further advances in travel, the can body engages the deflecting member 35 causing the deflecting member to pivot outwardly from the conveyor belt 11. The projection 44 of the deflecting member 35 moves over the core 45 and flange 48 as shown in phantom lines in FIG. 3, since the solenoid 46 is deenergized, and the can body continues in travel in lane A.

It is to be noted that the can segregator 10 of the present invention is adaptable for automatically sorting more than two different grades or products in similar size cans. This is accomplished by providing additional can segregating stations along the conveyor belt 11 similar to the one described herein. For example, a ring stripe may be provided on a can body out of alignment with the photocells. Under such a condition, the can continues to advance in lane A until it reaches the next segregating station. In the succeeding segregating station, the upper or lower photocell at that station is aligned with the stripe on such a can body, thus directing the can body into lane B of the succeeding segregating station. This procedure can be extended to accommodate a large number of different products or grades in similar size cans.

It will be understood that modifications and variations of the embodiment of the invention disclosed herein may be resorted to without departing from the scope of the novel concepts of the invention. The invention is accordingly not to be limited to the specific embodiments shown and described, but only as indicated in the appended claims. The term article as herein used is intended to include, but not to be limited to, cans and containers.

Having thus described my invention, what I claim as new and desire to protect by Letters Patent is:

1. In an article segregating apparatus, a deflecting assembly comprising: a deflecting member mounted for movement between a deflecting position in the path of advancing articles to be segregated and a position withdrawn from said path, resilient means tending to maintain said deflecting member in said deflecting position, a projection extending laterally from said deflecting member opposite the deflecting surface, electro-magnetic means disposed below said projection and arranged to draw said projection downwardly when energized, and a stop flange located to engage the end of said projection and prevent lateral movement when said projection is attracted by said electro-magnetic means but allowing said projection to pass over said stop flange when said electro-magnetic means is not energized and said projection is not in lowered position.

2. In an article segregating apparatus, a deflecting assembly comprising: a deflecting member pivotally mounted for movement between a deflecting position in the path of advancing articles to be segregated and a position withdrawn from said path, resilient means tending to maintain said deflecting member in said deflecting position, a projection extending laterally from said deflecting member in the direction of movement between said positions, electro-magnetic means disposed below said projection when said deflecting member is in a deflecting position, and a stop flange located to engage the extending end of said projection and prevent lateral movement when said deflecting member is in a deflecting position and the electro-magnetic means is energized to draw said projection into engagement, but allowing said projection to pass above said stop flange when said electro-magnetic means are not energized.

3. In an article segregating apparatus, a deflecting assembly comprising: a deflecting member resiliently mounted in a deflecting position in the path of advancing articles to be segregated and capable of withdrawing from said path upon contact by advancing articles, a projection extending laterally from said deflecting member opposite the deflecting surface, said projection being of a paramagnetic material, electro-magnetic means disposed below said projection and arranged to draw said projection downwardly when energized, and a rigid stop flange located to engage the extending end of said projection and prevent lateral movement of said deflecting member outwardly from the path of advancing articles when said projection is attracted by said electro-magnetic means but allowing said projection to pass above said stop flange when said electro-magnetic means are not energized.

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