

Nov. 3, 1953

F. M. JOHNSON ET AL
CAN SORTING MACHINE

2,657,799

Filed June 9, 1949

4 Sheets-Sheet 1

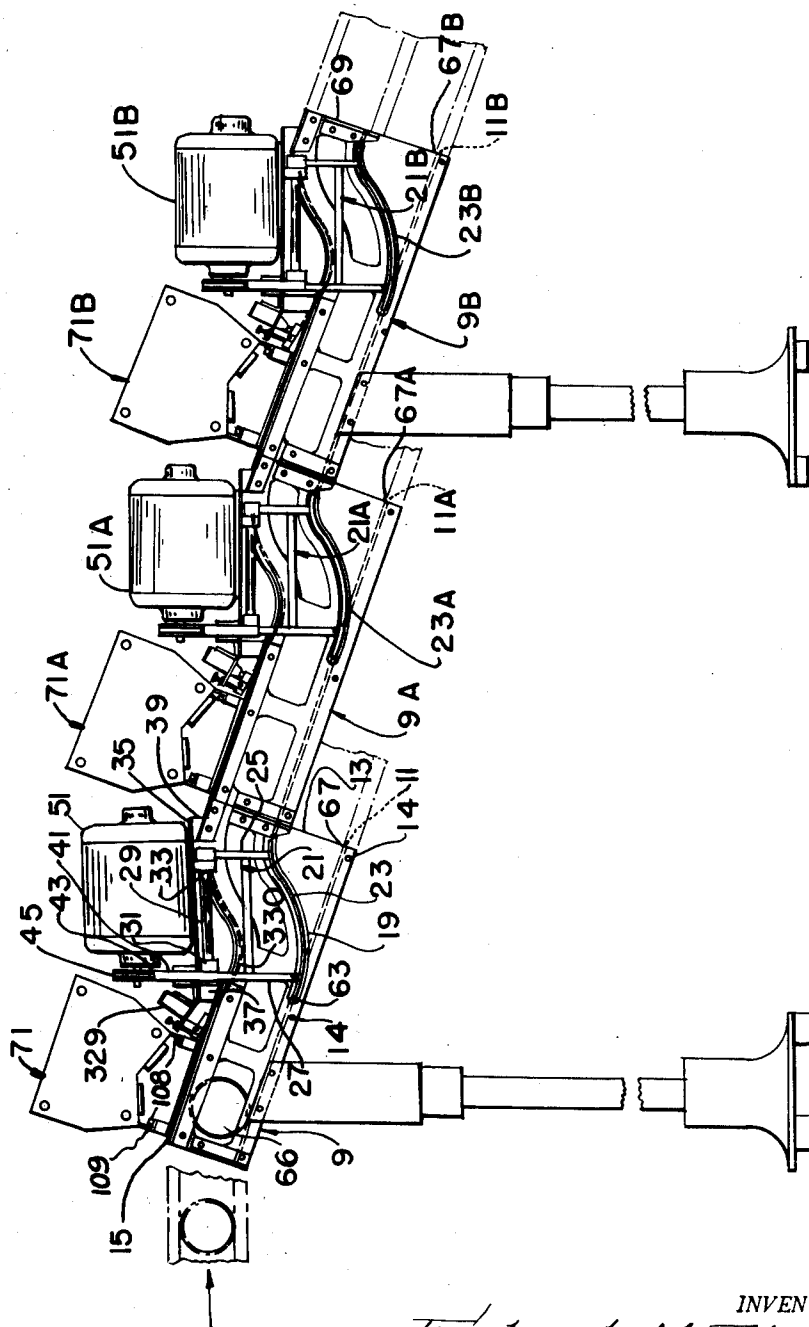


FIG. 1

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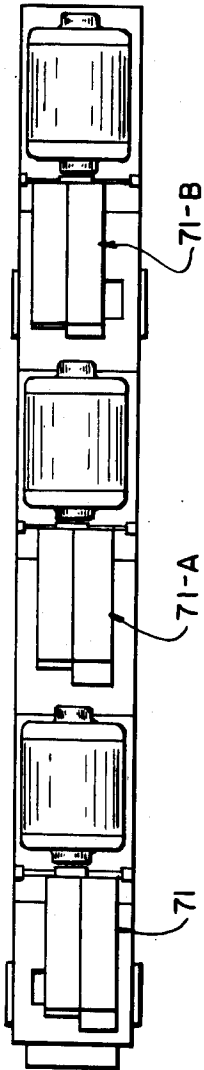


FIG. 5

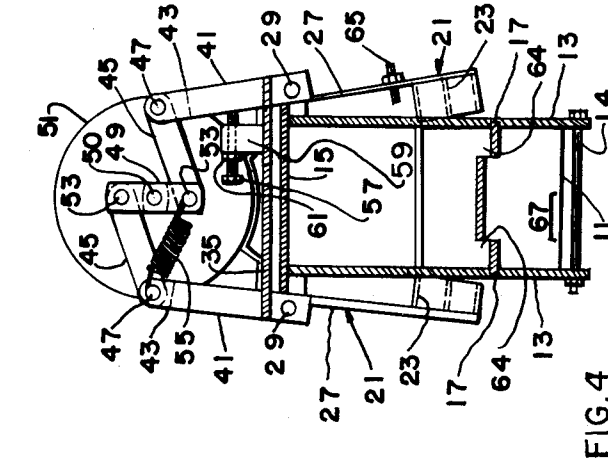


FIG. 4

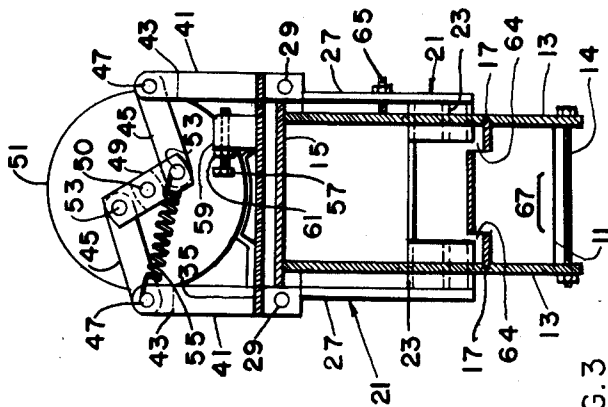


FIG. 3

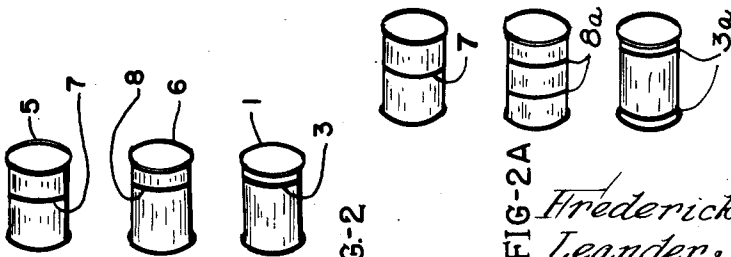


FIG. 2

FIG. 2A

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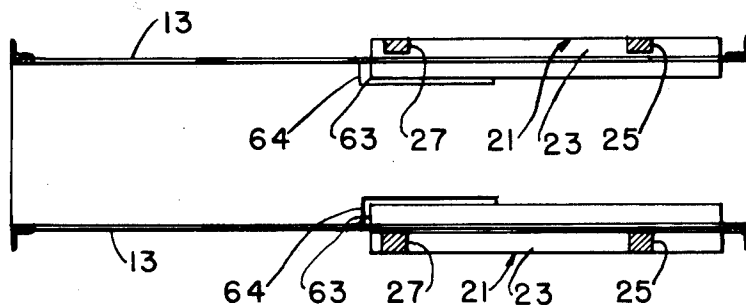


FIG. 7

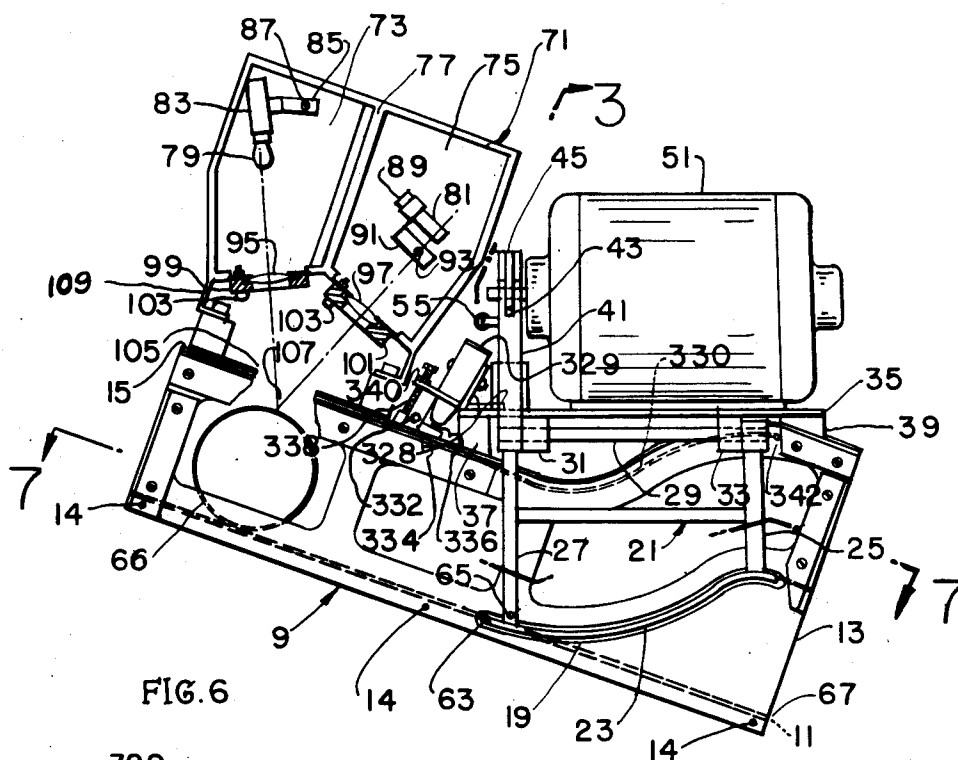


FIG. 6

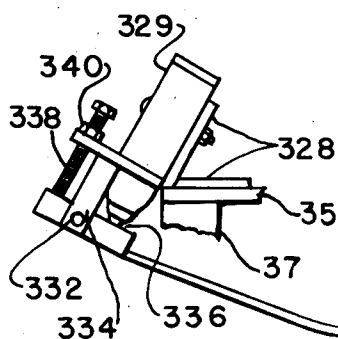


FIG. 8

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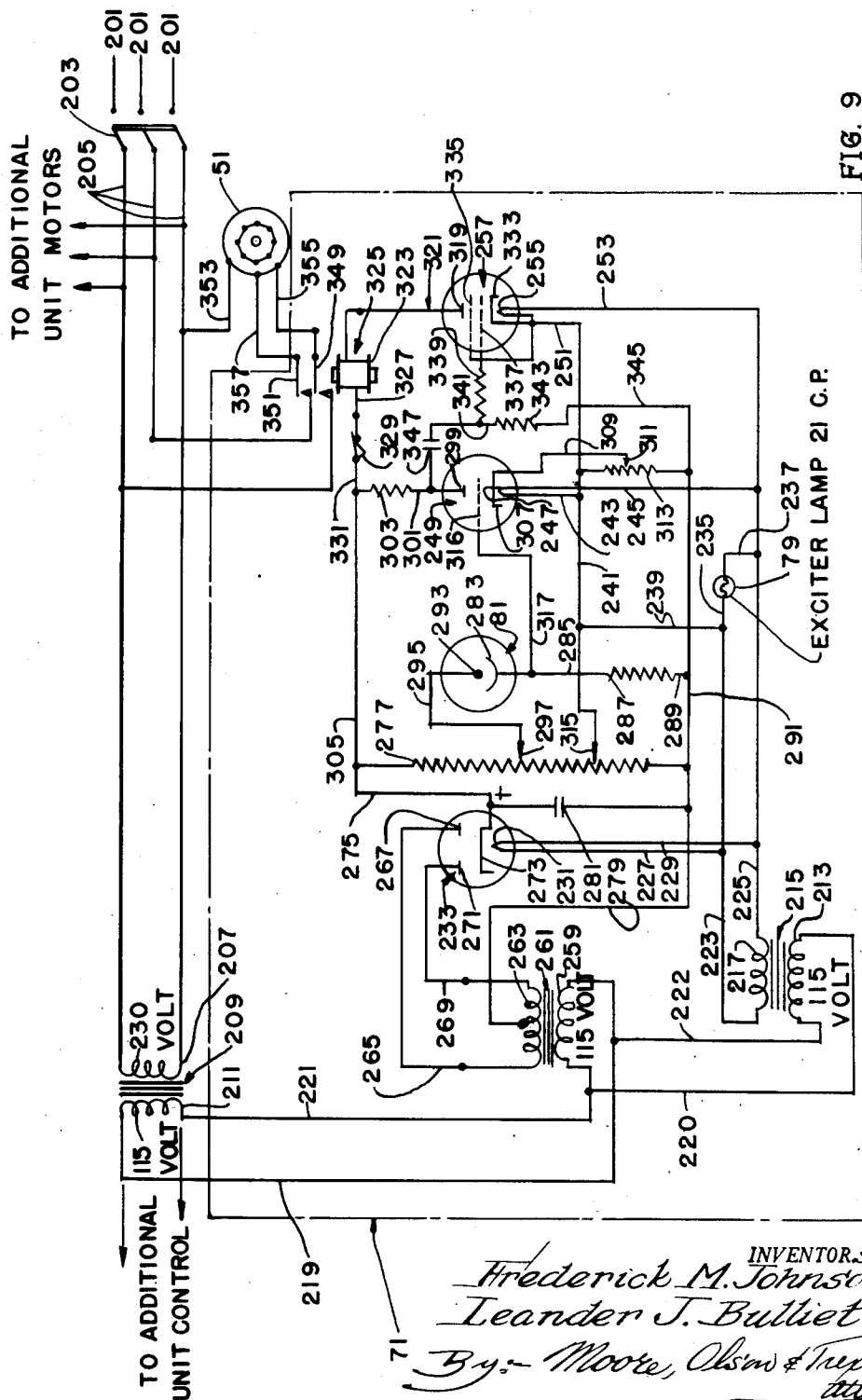
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UNITED STATES PATENT OFFICE

2,657,799

CAN SORTING MACHINE

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6 Claims. (Cl. 209—111)

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This invention relates to container handling equipment, and concerns more particularly a machine for sorting cans or jars in reference to indicia carried thereby.

In canned food preparing plants, certain cooking or sterilizing processes are carried out after the cans are filled and sealed but before identifying labels are applied. In many cases, economical production requires that two or more products, or qualities of the same product, be mingled together in these processes after sealing and before labeling. It then becomes necessary to sort out the several grades, the term "grade" being used generally to designate any characteristic according to which the cans are to be segregated, and direct them to their respective labeling machines.

It has been customary in the canning industry to premark the cans in some suitable manner before filling and to place all products of a certain grade in cans of the same marking, while each other grade goes into cans of a different marking. Then, after cooking or sterilizing, the cans pass before employees who visually identify the grades by the can markings and manually place all of a certain grade on its respective conveyor leading to the proper labeling machine.

The visual and manual sorting of grades requires a large amount of labor and the canning industry has long felt a need for a device to perform this sorting function mechanically.

In accordance with the present invention, an automatically operable sorting machine is provided for effecting a sorting of containers, such as cans or jars, accurately and at high speed, in accordance with indicia carried thereby, and preferably which has been placed thereon in a predetermined position so as to differentiate each grade of cans from other grades provided.

It is an object of the invention to provide an automatically operable machine for effecting the sorting of containers, such as cans, jars, or the like, of improved construction and improved operating characteristics.

More particularly stated, it is an object of the present invention to provide a machine of the character described which is reliable in its operation, and which is operable in a reliable manner at high speed.

A further object of the invention is to provide a sorting machine of the type defined which is operable to effect a separation of the containers in accordance with visual indicia carried thereby, of predetermined character and location.

A still further object of the invention is to

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provide a machine of the character defined, particularly adapted for operation in the sorting of food containers and the like, of cylindrical shape.

Various other objects, advantages and features of the invention will be apparent from the following specification, when taken in connection with the accompanying drawings, wherein certain preferred embodiments of the invention are set forth for purposes of illustration.

In the drawings wherein like reference numerals are used throughout:

Fig. 1 is a side elevation of a sorting machine, constructed in accordance with and embodying the principles of the present invention;

Figs. 2 and 2A are illustrative views, showing the manner in which the containers may be marked for use with the machine illustrated in Fig. 1;

Fig. 3 is a transverse sectional view of a portion of the machine of Fig. 1, taken as indicated by the line 3—3 of Fig. 6;

Fig. 4 is a view similar to Fig. 3, but showing the parts in a different position of operation;

Fig. 5 is a top view of the machine of Fig. 1;

Fig. 6 is an enlarged view of one of the sections of the machine of Fig. 1, Fig. 1 illustrating a three-section machine;

Fig. 7 is a horizontal sectional view of a part of the mechanism of Fig. 6, taken as indicated by the line 7—7 thereof;

Fig. 8 is a detail illustrative view showing the switch arm and associated parts, forming a part of the mechanism of Fig. 6, on a further enlarged scale; and

Fig. 9 is a wiring diagram for the machine, particularly illustrating the wiring connections for one visual sensing head.

Referring more particularly to the drawings, one method of marking the cans is shown in Fig. 2 where 1 designates a can marked for, let us say, grade "A." On this can is stenciled a stripe 3 which may be in black ink and which preferably completely encircles the can near one end. The numeral 5 is a can marked for grade "B." Around this can is the stripe 7 near the middle. The numeral 6 is a third typical can marked with a stripe 8 at a location approximately midway between the locations of stripes 3 and 7. If there are more than three grades to be sorted, their respective cans may be striped at other definite locations relative to the ends of the cans. In accordance with the present invention, these cans may come intermingled from the cooker, and be identified and sorted according to the locations of their stripes.

Referring to the structure of the machine illustrated, as shown in Fig. 1, the machine comprises three sections of duplicate structure, it being understood that as many sections will be provided as there are can grades to be sorted in any particular installation. Referring in detail to the structure of the first section, in Figs. 1, 3 and 4 the numeral 9 designates a chute consisting of a floor plate 11, two wall members 13, and a top plate 15. The top plate is bolted to the wall members. The floor plate is fitted into rabbets 17 in the wall plates 13. The wall plates 13 are held together against the edges of floor 11 by through-bolts 14. Each wall plate 13 has an "S-shaped" aperture 19 cut through it as best shown in the enlarged view, Fig. 6.

On each side of the chute 9 is a pivoted gate 21. A lower flange member 23 of each gate 21 is "S-shaped" to fit loosely into the aperture 19. Each member 23 is supported by a pair of side arms or members 25 and 27 which are fixed to a shaft 29. Each shaft 29 is journaled for rotation in bearing blocks 31 and 33, Fig. 6, which are welded to a motor plate 35. In turn, the motor plate 35 is welded to brackets 37 and 39 which are welded to the chute top plate 15.

The upper end 41 of each gate side arm or member 27 is forked at 43 to receive a link 45. The links 45 are connected to the arms 41 by the pins 47 which are pressed tightly into holes in the arms 41 but are loose in bearing holes through the links 45. A crank arm 49 is keyed to the rotor shaft 50 of a torque motor 51. The crank arm 49 is forked at its ends to receive the links 45 which are connected to the crank arm by pins 53, which are tight in the crank arm and loose in the links.

Rotation of the motor shaft 50 clockwise (as seen in Fig. 3) will pull the arms 41 toward each other. This causes the gates 21 to pivot on the shafts 29, throwing the lower gate members outwardly as shown in Fig. 4.

A tension spring 55 has one end attached to an extension of one of the pins 53 and the other end fixed to an extension of pin 47. Tension of the spring 55 urges the rotor shaft 50 in a clockwise direction and causes the gates 21 to be opened (that is, with members 23 flared apart as shown in Fig. 4). Closing motion of the gates 21 is limited by abutment of one of the arms 41 against a stop screw 57. Stop screw 57 is threaded into a lug 59 which is welded to the motor plate 35. A lock nut 61 is threaded on stop screw 57 and serves to lock it in suitable position for arresting the gates at the desired amount of gate opening.

Rotation of the motor shaft 50 in a counter-clockwise direction causes the gates 21 to "close." When the gates are closed, the members 27 are in a substantially vertical position. Closing of the gates causes the "S-shaped" flange members 23 to project a considerable distance through the walls 13. The approach or lowermost ends 63 of members 23 project into recesses 64, Fig. 7, in floor plate 11, so that the trailing end surfaces of members 23 form substantially a continuation of the top surface of the floor plate 11, when the gates are closed. Closing movement of the gates is limited by an adjustable stop screw 65 which is threaded through the arm 27 and is locked in adjusted position by a lock nut as shown. The end of screw 65 abuts the wall plate 13 when the gates are closed.

As previously set forth, the chute 9 and the accompanying parts previously described may be

duplicated as many times as required, and the identical units placed one after the other in tandem. Thus as stated, Fig. 1 shows three chutes 9, 9A and 9B in tandem. There may be more or less chutes according to the number of grades to be sorted. The suffixes A and B are added to the various numerals of the chutes 9A and 9B to indicate parts in the second and third units which are identical with correspondingly numbered parts in the first unit. For example, torque motors 51A and 51B are identical with torque motor 51, et cetera.

Operation of the structure so far described may now be outlined.

Cans are delivered from the cooking equipment or other source of supply and are passed to the sorting machine on any suitable conveyor. The cans, lying on their sides, enter the chute 9 at the left end as seen in Fig. 1. One such can is shown entering at 66. This can will roll downward and toward the right, by the force of gravity, along the floor plate 11.

If the gates 21 are held open by the spring 55, there will be no effect on the progress of the can by contact with members 23. The can will roll the full length of the floor plate 11 and will emerge from the mouth 67 of the chute 9. If the motor 51 has been energized to close the gates 21, the members 23 will project far enough through the wall plates 13 to engage the end periphery of each end of the can as it progresses down the floor plate. When the can has rolled down the floor plate 11 to contact points 63 of members 23, it rises from the floor plate and follows the track provided by the pair of members 23. The left end of chute 9 is sufficiently high to provide the can with enough momentum to carry it over the rise along the full length of members 23.

When a can leaves the members 23, it enters the chute 9A and begins another descent along the second floor plate 11A. If the gates 21A are open, the can rolls the full length of plate 11A and emerges at the chute mouth 67A. If the gates 21A are closed, the can rolls up over the members 23A and enters the chute 9B. If gates 21B are open, a can entering chute 9B emerges at mouth 67B. If gates 21B are closed, the can rolls up along members 23B and emerges at the mouth 69.

The discharge mouths 67, 67A, 67B and 69 open onto separate suitable conveyors, as indicated in dot and dash lines, which carry the cans to their respective destinations for labeling or other further processing. As will appear below, each grade or kind of product emerges from its particular chute mouth according to the locations of the stripes on the respective cans.

The structure for detecting the presence and location of a stripe on a can and for operating the gates accordingly will now be described.

Mounted on each chute or machine section is a scanning head 71, 71A and 71B. In Fig. 6 the head 71 is shown with its cover removed to reveal the inner construction and contents. A portion of this head is shown in section for clarity in the explanation. The head 71 is divided into two compartments 73 and 75 by an opaque partition 77. In the compartment 73 is an incandescent lamp 79 and in the compartment 75 is a photosensitive electron tube or phototube 81. The lamp 79 is held in a conventional socket 83 supported by a bracket 85 which is fixed to the housing of head 71 by a screw 87. The phototube

81 is held by a socket 89 supported by a bracket 91 fixed to the housing of 71 by a screw 93.

The numerals 95 and 97 indicate convex converging lenses which are supported against apertures in the housing of head 71 by counterbored retaining rings 99 and 101, respectively. The rings 99 and 101 are secured to the housing of 71 by screws 103.

Light from the lamp 79 passes through the lens 95 and through an aperture 105 in the chute top plate 15. The lens 95 is so constituted and positioned that it forms an image 107 of the lamp filament. The location of this image 107 is slightly below the top plate 15. The image location is such that when the axis of rotation of the rolling can 66 is exactly opposite the partition 77, the image 107 will be sharply formed on the cylindrical surface of the can.

The optical axis of lens 97 intersects that of lens 95 at the image location 107. As a bright portion of a can wall moves through the position (as above described) for sharp formation of the image 107 on the can surface, light is reflected from this image through the lens 97. The lens 97 concentrates the light from the image 107 on the cathode of the phototube 81. Light reaches the phototube from the image 107 during only a very brief interval in the rolling motion of the can 66. Of course, when there is no can in the chute, no light is reflected therefrom to the phototube. Also, if the image 107 is formed on the dark marking stripe, such as 3, 7 or 8, Fig. 2, of a can, there will be little or no light reflected to phototube 81.

Referring to Fig. 5, it is seen that the scanning heads 71, 71A and 71B are located in a stepped relation with respect to the width of the machine. That is, head 71 is located nearer the front (lower side in Fig. 5) of the machine than 71A and 71B. Also 71A is nearer the front than is 71B. This stepped relation is such that the light from each head is focused at the designated location for the marking stripe on the cans containing one grade of product. For example, head 71 may be located so that its focus point 107 will fall on the stripe 3 of all cans marked like can 1 in Fig. 2. Head 71A may be placed to focus light on the stripe 7 of cans marked like can 5, et cetera. Preferably the heads are laterally adjustable so as to direct the focus points as desired, by bolts 108, Fig. 1, cooperable with elongated slots in the head support brackets 109.

Each unit of the machine further includes a switch 329, Figs. 1, 3 and 8, screw mounted to a bracket 328 which is welded to the motor plate 35. A curved actuating arm 330 is mounted on and rotatable about the axis of a pivot pin 332. The pin 332 is tight in the arm 330 and is journaled in a bracket 334 welded to the bracket 328. An actuating button 336 of the switch 329 is pressed against the actuating arm 330 by a spring (not shown) inside the switch. The arm 330 is adapted to be actuated upwardly or counter-clockwise about the pivot 332 by the movement of a can along track or flange members 23, and when the arm 330 is pressed upward (Fig. 6), the switch is actuated to open its contacts. Downward motion of the arm 330 is limited by an adjustable stop screw 338 threaded through the bracket 328 and held in adjusted position by a lock nut 340.

As a can rolls up along the members 23, it does not touch the arm 330 until it reaches a downwardly bent portion of the arm near the end at 342.

Fig. 9 is an electrical diagram, the parts for one unit or chute being shown within the dotted outline 71. Conductors 201 are three-phase power supply lines. This supply may be of any convenient characteristics such as 230 volts, 60 cycles. A hand disconnect switch 203 is provided to control the connection between the supply lines 201 and conductors 205 which supply the current to the several units of the machine. The primary winding 207 of a transformer 209 is connected to two of the conductors 205. The purpose of the transformer 209 is to convert the supply voltage of conductors 205 to the usual 115 volts suitable for operation of the electronic circuit components for each of the units, about to be described.

The primary winding 213 of a transformer 215 individual to each head is connected by conductors 219, 221, 220 and 222 to the secondary 211 of transformer 209. The secondary 217 of transformer 215 is connected by conductors 223, 225, 227 and 229 to the filament 231 of an electron tube 233. The filaments of other tubes and lamps are also supplied with power from the secondary 217 as follows: through conductors 223, 225, 235 and 237 to the filament of the lamp 79; through conductors 223, 225, 239, 241, 243 and 245 to the filament 247 of an electron tube 249; and through conductors 223, 225, 239, 241, 251 and 253 to filament 255 of an electron tube 257. All the filaments mentioned are suitable to receive power at the voltage of the transformer secondary 217. As will be understood, the various components within the broken line 71, Fig. 9, are preferably carried within the unit head structure in any convenient manner.

The primary winding 259 of another head transformer 261 is connected through conductors 219 and 221 to the secondary 211 of transformer 209. One end of the secondary winding 263 of transformer 261 is connected by conductor 265 to one anode 267 of the tube 233. The other end of secondary 263 is connected by conductor 269 to the remaining anode 271 of tube 233. The cathode 273 of the tube 233 is connected by conductor 275 to one end of a resistor 277. The other end of resistor 277 is connected by conductor 279 to the mid-tap of the transformer secondary 263.

Those skilled in the art will recognize that the structure described in the preceding paragraph constitutes a conventional full-wave rectifier circuit. The tube 233 may be a high vacuum rectifier tube such as those used in radio receiving equipment. The resistor 277 is the "bleeder" or voltage dividing resistor normally used in such circuits. The end of the resistor 277 which is connected to conductor 275 will be the positive end.

A capacitor 281 is connected in parallel with the resistor 277 to provide a partial filtering action.

The phototube 81 is of the well known photoemissive type. The cathode 283 of this tube is connected by conductor 285 to one end of a resistor 287. The other end of resistor 287 is connected by conductors 289 and 291 to the negative end of the resistor 277. The anode 293 of the phototube 81 is connected by conductor 295 to an adjustable contact 297 on the resistor 277. The contact 297 is set at a point on the resistor 277 to provide a suitable voltage between the anode and cathode of phototube 81.

The electron tube 249 is a high vacuum triode

amplifying tube of the type used in radio receivers. The anode 299 of the tube 249 is connected through conductor 301, a resistor 303 and conductor 305 to the positive end of the resistor 277. The cathode 307 of the tube 249 is connected by conductor 309 to the movable contact 311 which is adjustable along a resistor 313.

The resistor 313 is connected between conductor 291 and conductor 241. Conductor 241 is connected to the contact 315 which is adjustable along the resistor 277 while conductor 291 is connected to the negative end of resistor 277. Thus the voltage across resistor 313 is adjustable in value by setting of the contact 315. The voltage of the cathode 307, relative to the negative end of the resistor 277, is adjustable conjointly by the settings of the contacts 315 and 311. The setting of contact 315 determines a maximum value for the said cathode voltage and the setting of contact 311 determines the actual value between zero and the maximum.

The grid 316 of tube 249 is connected by conductor 317 to conductor 285 which, as previously noted, forms the connection between the cathode of the phototube 81 and the resistor 287.

When there is no current flowing in resistor 287, the grid 316 has the potential of the negative end of resistor 277. Also, as previously described, the cathode 307 has an adjustable voltage somewhat positive with respect to this grid voltage. Stated otherwise, the tube 249 is connected to provide an adjustable negative grid bias.

Because of the unidirectional conducting characteristic of the phototube 81, any current that does flow in resistor 287 will be in the direction to cause the grid 316 to have a potential positive with respect to conductor 291. This potential is opposed to the bias voltage described. This condition affects the amount of bias needed when there is more or less ambient light on tube 81.

Tube 257 is of the gaseous discharge type commonly referred to as a thyratron tube. The anode 319 of tube 257 is connected by conductor 321 to one end of the coil 323 of a relay 325. The other end of the coil 323 is connected by conductor 327 to one terminal of the switch 329, previously described. The other terminal of switch 329 is connected by conductor 331 and conductor 305 to the positive end of resistor 277. The cathode 333 of tube 257 is connected by conductors 251 and 241 to the adjustable contact 315 of resistor 277. The screen grid 335 of tube 257 is connected to the cathode 333. The control grid 337 of tube 257 is connected through a resistor 339, conductor 341, a resistor 343, conductor 345 and conductor 291 to the negative end of resistor 277. A capacitor 347 is connected between conductors 341 and 301.

The potential on the cathode 333 is positive with respect to the negative end of resistor 277 by an amount determined by the setting of contact 315. When there is no current flowing in resistors 339 and 343, the control grid 337 has the potential of the negative end of resistor 277. Thus, the control grid of tube 257 is negatively biased relative to the cathode and the amount of bias is adjustable by moving contact 315.

It may be noted that adjustment of contact 315 will affect the voltage between the anode and cathode of tube 257. Also adjustment of contacts 315 and 311 will affect the anode-to-cathode potential of tube 249. However, the ranges of these adjustments are relatively small and the anode-cathode potential of these tubes is not critical so that the adjustments previously de-

scribed for grid bias potentials will not adversely affect the anode-cathode potential values.

Operation and adjustment of the photoelectric circuit may now be described.

With only the normal room light reaching the phototube 81, the bias setting contacts 315 and 311 are adjusted. Contact 315 is set first to provide a negative grid bias which will prevent anode conduction of the tube 257. Then the contact 311 is adjusted to provide a suitable low value of anode current in tube 249.

If now there is a momentary flash of light on the cathode of phototube 81, induced by the passage of a can, there will be a momentary increase of current through resistor 287. This current surge will cause a temporary increase in the positive potential of the grid 316 with respect to the conductor 291. As previously pointed out, the potential drop across resistor 287 is opposed to the preset grid bias provided for the tube 249. Consequently, the light flash causes a momentary decrease in the negative potential of the grid 316 with respect to the cathode 307 (the grid potential may actually become slightly positive) and there will result a momentary increase in the anode current flowing through the resistor 303.

Before occurrence of the above mentioned light flash, there is no current flowing through capacitor 347 or resistor 343, and so the negative grid bias of tube 257 is as previously described. At this time, however, there is a charge on the capacitor 347 due to the potential difference between the conductor 301 and conductor 291. The charge on the capacitor is polarized positive on the side connected to conductor 301.

When the light flash occurs, the resulting increase of current in resistor 303 causes the conductor 301 to assume a potential less positive with respect to conductor 291. This reduction of potential causes the capacitor 347 to discharge partially. The discharging current flows through the resistor 343 in such a direction as to make the conductor 341 more negative with respect to the conductor 291. That is, the increase of current in resistor 303 causes an increase in the negative grid bias on tube 257. No conduction in the anode circuit of tube 257 results from this action.

As the flash of light is terminated, the momentary increase of current in resistor 303 ceases and the conductor 301 assumes its original potential. The capacitor becomes recharged to its original potential by a momentary current flowing through the resistor 343. This charging current is in such direction as to cause the conductor 341 to become positive with respect to conductor 291. This last described potential across resistor 343 is opposed to the preset grid bias for tube 257. The result is that the control grid 337 now assumes a potential less negative (or perhaps positive) with respect to the cathode 333. The change in grid-to-cathode potential is sufficient to permit the anode circuit of the tube 257 to become conducting.

The anode circuit of tube 257 is supplied with D. C. potential so that the anode circuit will continue to conduct current even though the grid 337 assumes its original potential as soon as the capacitor 347 is charged back to its original potential. Anode conduction in tube 257 may be stopped by opening the switch 329. This switch opening may be only momentary. Reclosing of this switch will not start conduction again because the grid of tube 257 is in condition to prevent conduction at all times except at the instant of a light flash.

If the anode current in tube 249 changes slowly due to line voltage variations, et cetera, the capacitor 347 will change its charge slowly with very little resulting current through resistor 343. Such slow changes do not cause anode conduction in tube 257. Thus the device 347 is a blocking capacitor which allows only sharp impulses in the system to start conduction of tube 257.

The current flowing in the anode circuit of tube 257 flows through the winding 323 of the relay 325. This causes the relay to close its contacts 349 and 351.

Recapitulating, a quick flash of light on and off the cathode of phototube 81 will cause the relay 325 to close and hold closed its contacts 349 and 351. Slow changes in ambient light incident on the phototube 81 will not cause operation of the relay 325 because of the blocking action of capacitor 347.

The torque motor 51 is preferably wound for three-phase current supply. As is familiar to those skilled in the art, a torque motor has the characteristic of producing its highest torque when the rotor shaft is held stationary. Such motors are intended for actuation of mechanisms which stall the motor at the end of the actuation.

The stator windings of motor 51 have one terminal connected by conductor 353 to one of the conductors 205. The other two motor terminals are connected by conductors 355 and 357 to the contacts 349 and 351, respectively, of the relay 325. The remaining sides of the contacts 349 and 351 are connected to the remaining conductors 205.

When the contacts 349 and 351 are closed by energization of the coil 323 of relay 325, current is conducted to the motor 51 which then exerts a torque.

As seen in Fig. 4, and as previously described, when the motor 51 is not energized the spring 55 holds the arm 41 against the stop screw 57 and the gates 21 stand open. When power is applied to the windings of motor 51, the rotor shaft 50 turns counterclockwise (Fig. 3). This acts through crank arm 49 and links 45 to force the arms 41 outward, closing the gates 21. Closing motion is stopped by abutment of stop screw 65 against the wall member 13. Continued energization of the motor 51 keeps the gates closed. When the motor is electrically disconnected, the spring 55 again opens the gates 21.

We may now review the general operation of the can sorting device.

Let it be assumed that a can 66 has been introduced into the left end, Fig. 1, of the chute 9 and has rolled down to approximately the position it occupies in Fig. 6. As the can rolls through this position, light is momentarily reflected to the cathode of phototube 81 if the can wall is bright at the point 107 where light is focused from the lamp 79. This flash of light results in the operation of relay 325 which causes the motor 51 to be energized. Motor 51 closes the gates 21. When the can has rolled to the point 63, it rolls up on the flange members 23 of gates 21 and enters the chute 9A, Fig. 1. As the can leaves the right end of members 23, it raises the lever 330 causing the contacts of switch 329 to open and deenergize the relay 325. This deenergizes the motor 51 and the gates 21 open ready for another can.

If when the can reached the focus point 107, there was a dark stripe on the portion of the can on which the light fell, there would be no flash of light to the phototube. In such case the gates

21 would not close and the can would roll out the mouth 67.

Any can which rolls up over the gate flanges when the gates are closed enters chute 9A, and the operations there are the same as for chute 9. According to location of the dark stripes, the can may emerge at mouth 67A or it may go on to chute 9B where a further selection is made.

As previously described, there may be as many sections or chutes as required by the number of grades to be distinguished.

In the last section, such as 9B, the upper or closed gate mouth 69 may be used for a definite grade or it may be used as a rejection exit for cans which have failed to receive a stripe through some error in marking. Unmarked cans will emerge at the exit mentioned because such a can is bright all over and will cause all the gates to close in sequence as it goes through.

In the marking of the cans, as previously described in reference to Fig. 2, it is necessary that the end-for-end orientation of the cans be preserved so that the marking stripes will be properly presented. In Fig. 2A an arrangement is illustrated wherein duplicate marking stripes 3a and 8a are provided at each end of the can, in the positions of the stripes 3 and 8 previously described. In such instance it is clear that the end-for-end orientation of the cans need not be preserved, and the cans may be twisted or stored in any desired manner prior to transmission to the can sorting machine.

It is obvious that various changes may be made in the specific embodiments of the invention set forth for purposes of illustration, without departing from the spirit thereof. The invention is accordingly not to be limited to the specific embodiments shown and described, but only as indicated in the following claims.

The invention is hereby claimed as follows:

1. A sorting machine for cans or the like having visual indicia thereon, and comprising a plurality of conveyor sections each including a downwardly inclined conveyor trackway along which the cans or the like to be sorted are rolled in sequence and a divergent conveyor trackway inclined upwardly from the conveyor trackway for communication with the next succeeding conveyor section, a light sensing device located adjacent each conveyor section and each sensing device being disposed with respect to its conveyor section in a position laterally different from that of the sensing device for an adjacent conveyor section and predetermined in accordance with the applied indicia on the cans or the like being passed, and a gate device for each conveyor section operable in response to its sensing device to be positioned to afford communication between the inclined conveyor trackway and the divergent conveyor trackway to permit articles with predetermined indicia thereon to pass through the communicant conveyor trackway and the divergent conveyor trackway.

2. A sorting machine as claimed in claim 1, wherein a switch mechanism is disposed within the divergent conveyor trackway to release the gate device upon the passage of a can or the like therethrough for affording through communication along the conveyor trackway.

3. A sorting machine as claimed in claim 1, wherein the gate device includes complemental gate members shiftable into and out of the path of movement of a can or the like along the conveyor trackway.

4. A sorting machine as claimed in claim 1,

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wherein the divergent conveyor trackway is substantially S-shaped and wherein the gate device includes complementary S-shaped gate members forming a trackway for the divergent conveyor trackway and shiftable into and out of the path of movement of a can or the like along the conveyor trackway.

5. A sorting machine as claimed in claim 1, wherein the sensing device includes a photo cell and a relay responsive to the rate of energy change of the photo cell within a given energy range.

6. A sorting machine as claimed in claim 1, wherein the light sensing device includes a photo cell, an amplifier responsive to the action of the photo cell, a relay controlled by the amplifier, and a rotary armature torque motor controlled by the relay.

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