

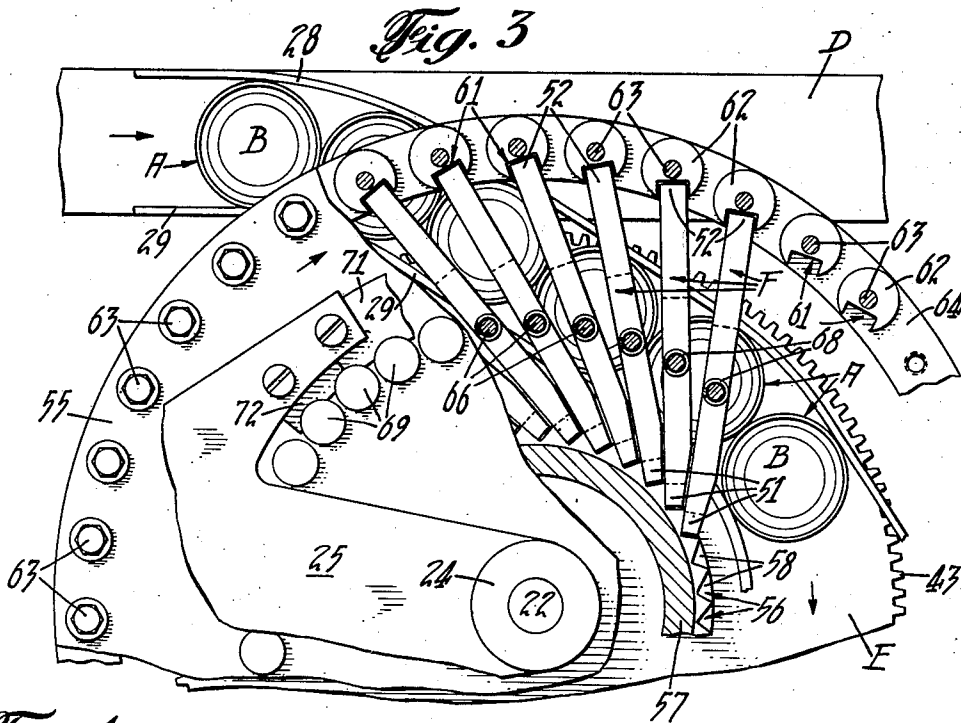
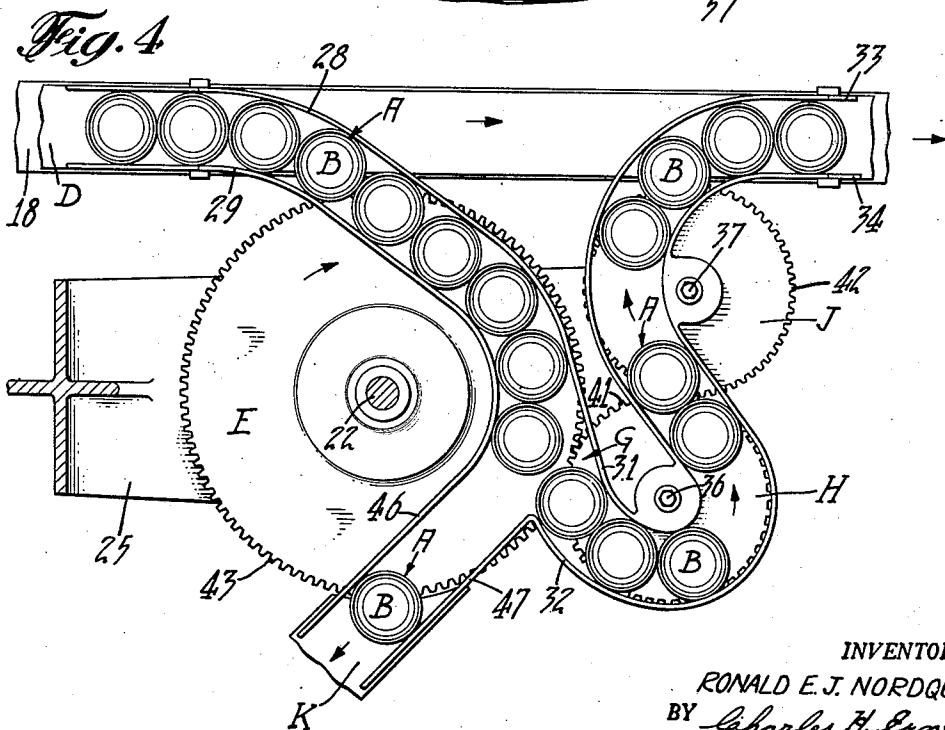
June 30, 1953

R. E. J. NORDQUIST
ARTICLE SORTING MACHINE

2,643,766

Filed June 29, 1950

4 Sheets-Sheet 3



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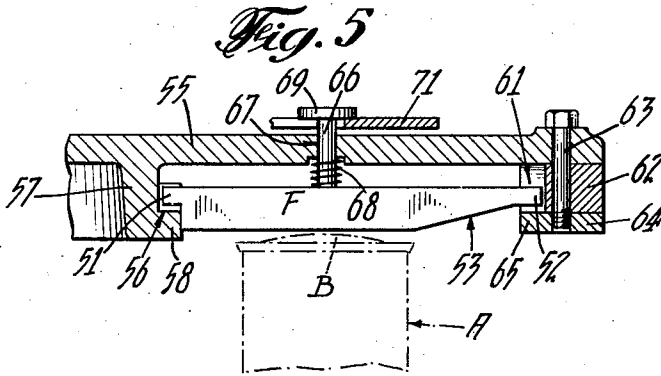
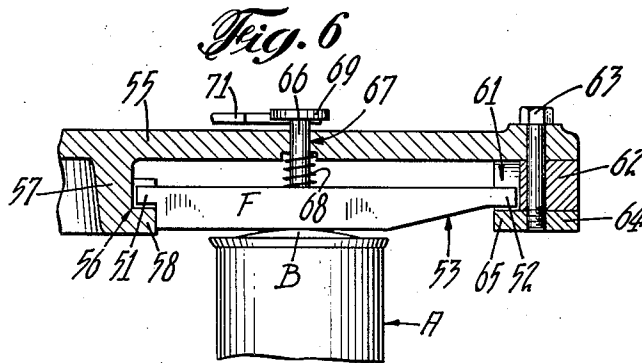
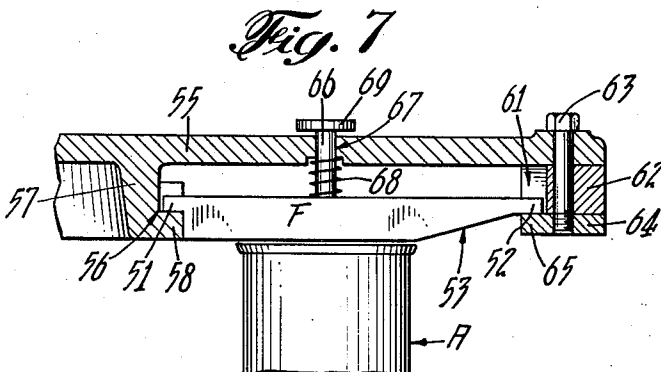
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ARTICLE SORTING MACHINE

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The present invention relates to article sorting machines and has particular reference to devices for sorting by centrifugal action articles of abnormal dimensions from those of normal dimensions.

Articles such as containers or cans are sorted in various ways in accordance with different characteristics of the containers or their contents. In the canning industry the packing of certain liquids such as, for example, beer in sheet metal cans presents a difficult problem of segregating containers in which the end members of the containers are abnormally bulged outwardly as a result of the internal pressures created by pasteurizing the contents of the containers after the containers have been sealed. The instant invention contemplates the provision of a machine for rapidly and economically sorting, for example, the normal or unbulged beer containers from the abnormal or bulged containers by centrifugal action.

An object of the instant invention is the provision of an article sorting machine wherein centrifugal force is utilized to segregate containers having abnormal dimensions from containers having normal dimensions.

Another object is the provision of such a sorting machine wherein the abnormal containers may be rapidly and economically sorted from the normal containers while passing the containers through the machine in a substantially continuous procession.

Another object is the provision of such a sorting machine which is simple in construction and which may be readily fitted into an automatic line of machinery for processing containers.

Numerous other objects and advantages of the invention will be apparent as it is better understood from the following description, which, taken in connection with the accompanying drawings, discloses a preferred embodiment thereof.

Referring to the drawings:

Figure 1 is a top plan view of a sorting machine embodying the instant invention, with parts broken away;

Fig. 2 is a sectional view taken substantially along the broken line 2—2 in Fig. 1, with parts broken away;

Fig. 3 is an enlarged fragmentary plan view of certain parts of the machine, with these parts broken back to illustrate underlying detail parts;

Fig. 4 is a reduced scale top plan view taken

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substantially along horizontal planes indicated by the broken line 4—4 in Fig. 2, with parts broken away;

Fig. 5 is an enlarged sectional view taken substantially along the line 5—5 in Fig. 1 with parts broken away and showing a pressure element used in the machine; and

Figs. 6 and 7 are views similar to Fig. 5 showing the pressure element in an advanced position and in relation to an abnormal container and a normal container.

As a preferred or exemplary embodiment of the invention the drawings illustrate a machine for sorting filled and sealed sheet metal cans A having normally substantially flat tops and bottoms or end members B and in which the end members may be abnormally bulged due to excess pressure in the cans.

The cans A, preferably in an upright position and moving in a substantially continuous procession in timed or untimed order, are received from any suitable source of supply, such as a pasteurizer or other machine and are advanced by a connecting conveyor D (Fig. 1) along a straight line path of travel. As the cans advance with the conveyor they are diverted to a horizontal rotatable sorting table or support member E (Fig. 4) which is rotated in a clockwise direction at sufficient speed to throw the cans outwardly by centrifugal force. During a portion of their travel with the sorting table E the cans are guided to temporarily retain them on the table.

The procession of cans A entering upon the sorting table E, may contain a certain percentage of abnormal cans having their end members bulged above the top of the can to an unacceptable degree and normal cans on which the end members are normal or slightly bulged to a permissible or acceptable degree. The purpose of the machine is to separate these cans to prevent the abnormal cans from being shipped to market. For this purpose the procession of cans on the sorting table E passes under a plurality of pressure bars F (Fig. 3) which are located at such an elevation as to just clear the tops of normal cans on the sorting table as shown in Fig. 7 but to engage against the bulged tops of the abnormal cans as shown in Fig. 6 and hold these abnormal cans firmly against the table. The pressure bars F move with the table.

With the abnormal cans A held clamped to the sorting table E by the pressure bars F and the normal cans A unclamped or free, the procession of cans advanced toward a normal can outlet G

(Fig. 4). At this outlet the unclamped normal cans on the table are thrown by centrifugal force from the table and onto a rotating transfer wheel H which carries them to a rotating discharge wheel J which preferably returns them to the conveyor D for discharge to any suitable place of deposit. The clamped abnormal cans are carried past the normal can outlet G by reason of their being clamped between the table and the pressure bars F and are advanced toward an abnormal can chute K. At this chute the abnormal cans are diverted into the chute which guides them to a suitable place of deposit separate from the normal cans. This completes the segregation of the abnormal bulged end cans from the normal cans.

Referring now in more detail to the drawings it will be observed that the conveyor D preferably comprises an endless belt disposed in a horizontal position and operates over a pair of spaced pulleys 12, 13 mounted on shafts 14, 15 journaled in bearing blocks 16, 17. The shaft 15 preferably is a driving shaft which is continuously rotated in any suitable manner to effect continuous operation of the conveyor. The cans A are disposed on the upper run of the belt. Between the pulleys 12, 13 the upper run of the conveyor D extends across and is supported on a horizontal table 18.

The rotatable sorting table or support member E (Figs. 2, 3 and 4) is disposed adjacent the conveyor D and is mounted on a vertical drive shaft 22 journaled in a pair of vertically spaced bearings 23, 24 formed in a frame 25 carried on a pedestal 26. The shaft 22 is driven continuously in any suitable manner, preferably through a gear 27 which is mounted on the shaft.

Division or diverting of the cans from the conveyor D to the table E preferably is effected by a pair of spaced and parallel guide rails 28, 29 which extend along the outer edges of the belt conveyor D. As best shown in Fig. 4 these guide rails 28, 29 adjacent the sorting table E, extend at an angle away from the conveyor and project over the table in vertically spaced relation thereto. For a short distance over the table the guide rails 28, 29 curve around the table drive shaft 22 in spaced concentricity therewith and terminate adjacent the normal can outlet G (Fig. 4). These guide rails guide the cans while on the conveyor and the sorting table and during transfer of the cans from the conveyor to the sorting table.

Normal cans A which pass through the outlet G and are received on the transfer wheel H and the discharge wheel J for return to the conveyor D as explained hereinbefore, are guided by a pair of spaced and parallel curved guide rails 31, 32 which extend over the wheels H and J and merge into a pair of spaced and parallel discharge guide rails 33, 34 disposed on adjacent sides of the conveyor D.

The transfer wheel H and the discharge wheel J are mounted on idler shafts 36, 37 carried in bosses 38, 39 (Fig. 2) formed in the frame 25. These two wheels H and J are rotated by and in synchronism with the sorting table E, through gear teeth 41, 42, 43 formed on the peripheries of the wheel H, the wheel J and the table E respectively. This synchronism facilitates transfer of the normal cans A from the sorting table to the transfer and discharge wheels and eventually to the conveyor D.

The abnormal can discharge chute K is disposed beyond the transfer wheel H, toward the left as viewed in Fig. 4. The abnormal cans are diverted into this chute by a pair of spaced and

parallel straight guide rails 46, 47 which extend at an angle across the sorting table E. The guide rail 46 preferably is a continuation of the inner guide rail 29, while the guide rail 47 connects with the curved guide rail 32 at the normal can outlet G.

The pressure members or bars F hereinbefore referred to preferably are straight rectangular shaped bars (see Figs. 3 and 5) having their inner ends formed with an inwardly projecting tongue 51. The outer ends of the bars are formed with a similarly projecting tongue 52. These tongues are disposed at the tops of the bars. The lower faces of the bars are straight for the major portion of their length and at their outer ends merge into inclined faces 53 which extend up to and merge into the outer tongues 52.

There are a plurality of the pressure bars F arranged in a closely spaced horizontal fan shaped relation in nonradial position relative to the sorting table drive shaft 22 and in vertically spaced relation to the sorting table E. These pressure bars F are carried in a horizontal, rotatable carrier member or disc 55 (Figs. 1, 2 and 3) mounted above the sorting table E in spaced relation thereto, and secured to the table driving shaft 22 for rotation with the shaft and the table.

The inner tongues 51 of the pressure bars F are disposed in V-shaped notches 56 (see also Fig. 6) formed in the outer periphery of a flange 57 which depends from the bottom face of the carrier member 55. The notches 56 are cut only part way through the flange leaving stops or supporting lugs 58 at the bottom of the notches for vertically supporting the tongues 51 and the inner ends of the pressure bars from which they project. The inner ends of the bars F are slightly tapered as shown in Fig. 3 to permit close but loose fitting of the bars together so that by virtue of their close relation they retain each other in their respective notches against lateral displacement therefrom.

The tongues 52 at the outer ends of the pressure bars F are disposed in and are vertically movable in square cut notches or recesses 61 (Figs. 3 and 5) cut in spaced retaining blocks 62 arranged in a circle adjacent the outer periphery of the carrier member 55. The blocks 62 are held in place against the bottom face of the carrier member by bolts 63 which extend through the carrier member and the blocks and are threadedly secured in a retaining ring 64 disposed under the blocks. The ring extends below the blocks and projects beyond the notches 61 in the blocks and thus forms a stop or supporting ledge 65 at the bottom of the notches for vertically supporting the tongues 52 and the outer ends of the pressure bars F from which they project.

Intermediate the ends of the pressure bars F the bars are fitted with vertically disposed lifter pins 66 which extend up through holes or openings 67 formed in the carrier member 55. Compression springs 68, surrounding the pins 66 and interposed between the carrier member 55 and the tops of the pressure bars F hold the pressure bars in a normally depressed position with their tongues 51, 52 seated against the stops 58, 65 on the flange 57 and retaining ring 64 as best shown in Fig. 7. Above the carrier member 55, the pins 66 are formed with lifting heads 69 which during a portion of the cycle of rotation of the carrier member, as will be hereinafter explained, are engageable with a stationary lifting cam 71 (Figs. 1, 3 and 5). The cam 71 is a curved flat bar cam disposed adjacent and overlapping the path

of travel of the lifting heads 69, at a location near the entry of the cans A onto the sorting table E from the conveyor D. The cam is secured to the frame 25 above the carrier member 55. The leading end of the cam is tapered as at 72 (Figs. 1 and 3) to permit the lifting heads 69 to ride up onto the cam as will now be explained.

Hence, as a pressure bar F of the rotating carrier member 55 approaches the procession of cans A being diverted from the conveyor D to the sorting table E, the head 69 of the lifting pin 56 attached to the pressure bar, rides up onto the cam 71 and this lifts the pressure bar above the incoming cans as best shown in Fig. 5. The cam 71 is sufficiently long to accommodate a number of the heads 69 and thus holds several pressure bars F in this elevated position above the incoming cans (Fig. 1).

When an elevated pressure bar F is fully over the procession of incoming cans received on the sorting table E, it rides off the cam 71 and is depressed by its compression spring 68 toward the procession of cans. The pressure bars are spaced sufficiently close to each other to insure that at least one bar and sometimes two bars will cover each can in the procession.

If the can directly under the released pressure bar is a normal can as shown in Fig. 7, the spring 68 will depress the bar its full extent and press its tongues 51, 52 against the stop members 58, 65, without any clamping effect upon the can, since the stops 58, 65 hold the bar in an elevated position just clear of the top of the can. The can is thus free to be thrown by centrifugal force, from the sorting table E when the can reaches the normal can outlet G as explained above.

If, however, the can directly under the released pressure bar F is an abnormal can as shown in Fig. 6, the bar acting under the pressure of its spring 68 will engage the bulged end of the can and thus the tongues 51, 52 of the pressure bar will be held away from their stops 58, 65. Thus the pressure of the spring 68 is exerted through the bar, onto the abnormal can and hence clamps the can against the sorting table E so that it cannot be thrown off by centrifugal force. It is in this manner that the abnormal cans are held on the table for deflection into the abnormal can chute K so that they may be readily segregated from the normal cans as hereinbefore explained.

It is thought that the invention and many of its attendant advantages will be understood from the foregoing description, and it will be apparent that various changes may be made in the form, construction and arrangement of the parts without departing from the spirit and scope of the invention or sacrificing all of its material advantages, the form hereinbefore described being merely a preferred embodiment thereof.

I claim:

1. In a machine for sorting articles of abnormal dimensions from those of normal dimensions, the combination of a rotatable support member for receiving articles to be sorted, means for rotating said support member at a speed sufficient to remove said articles by centrifugal force, pressure means movably mounted adjacent the path of travel of articles on said support member, said pressure means being so positioned as to engage only articles of abnormal dimensions, means for engaging said pressure means with articles of abnormal dimensions only for holding said abnormal articles against removal by centrifugal force to sort such articles from normally dimen-

sioned articles, and means for holding said pressure means out of engagement with said normally dimensioned articles on said support member to permit the normal articles to be removed by said centrifugal force.

2. In a machine for sorting articles of abnormal dimensions from those of normal dimensions, the combination of a rotatable support member for receiving articles to be sorted, means for rotating said support member at a speed sufficient to remove said articles by centrifugal force, pressure means movably disposed adjacent the path of travel of articles on said support member, said pressure means being so positioned as to engage only articles of abnormal dimensions, means for moving said pressure means into engagement with articles of abnormal dimensions only on said support member for holding said abnormal articles against removal therefrom by said centrifugal force to separate such articles from normally dimensioned articles, means for holding said pressure means out of engagement with said normally dimensioned articles to permit the latter to be removed by said centrifugal force, and means for engaging and removing said held abnormally dimensioned articles from said support member to segregate them from said centrifugally removed normal articles.

3. In a machine for sorting articles of abnormal dimensions from those of normal dimensions, the combination of a rotatable support table for receiving the articles to be sorted, means for rotating said table, movable pressure means disposed adjacent said table and positioned so as to engage only articles of abnormal dimensions on said support, said pressure means having means for moving the same into engagement with articles of abnormal dimensions only for holding said abnormally dimensioned articles against removal from said table, and means for engaging said pressure means to prevent movement thereof into holding engagement with containers of normal dimensions on said table to permit such normal containers to be removed therefrom.

4. In a machine for sorting articles of abnormal dimensions from those of normal dimensions, the combination of a rotatable support table for receiving articles to be sorted, means for rotating said table at a speed sufficient to remove said articles by centrifugal force, movable pressure means yieldably mounted adjacent the path of travel of articles on said table, said pressure means being so positioned as to engage only articles of abnormal dimensions, means for temporarily holding said pressure means in an inoperative position, means for moving said pressure means into engagement only with articles of abnormal dimensions after release of said pressure means by said holding means for clamping said articles against removal by said centrifugal force to separate such abnormal articles from normally dimensioned articles, and means for preventing engagement of said pressure means with said normally dimensioned articles on said table to permit the normal articles to be removed therefrom by said centrifugal force.

5. In a machine for sorting abnormal containers having bulged ends from normal containers without bulged ends, the combination of a rotatable sorting table for receiving the containers in an upright position, means for rotating said table at a speed sufficient to remove said containers by centrifugal force, a pressure bar disposed above and movable with said table in spaced relation thereto, spring means for urg-

ing said bar into contact with the bulged ends of abnormal containers only for holding said abnormal containers against removal by said centrifugal force to permit such containers to be separated from the normal containers removed from the table by said centrifugal force, and stop means disposed adjacent and movable with said pressure bar for preventing the bar from being moved by said spring means into engagement with a normal container on said table having no bulged end.

6. In a machine for sorting abnormal containers having bulged ends from normal containers without bulged ends, the combination of a rotatable table for receiving the containers in an upright position, means for rotating said table at a speed sufficient to remove said containers by centrifugal force, a plurality of pressure bars disposed above said table in spaced relation thereto and movable with said table, means for supporting said pressure bars at a level above normal containers but below the bulged ends of abnormal containers on said table, means for lifting said pressure bars to permit reception of said containers on said table and for releasing said pressure bars over said received containers for engagement against the bulged ends of abnormal containers to hold such containers against removal by said centrifugal force to sort such containers from the normal containers removed by said centrifugal force.

7. In a machine for sorting abnormal containers having bulged ends from normal containers without bulged ends, the combination of a rotatable table for receiving the containers in an upright position, means for rotating said table at a speed sufficient to remove said containers by centrifugal force, a rotatable carrier member disposed above said table in spaced relation thereto and movable in time with said table, a plurality of pressure bars movably supported in said carrier member at a level above normal containers but below the bulged ends of abnormal containers on said table, pressure means movable with said carrier member and exerting a pressure against said pressure bars individually and in a direction toward said table, stationary cam means disposed adjacent said carrier member, and actuating means connected with said pressure bars and operable by said cam means for lifting said pressure bars to permit reception of

said containers on said table and for releasing said pressure bars over said received containers for engagement against the bulged ends of abnormal containers to hold such containers against removal by said centrifugal force to sort such containers from the normal containers removed by said centrifugal force.

8. In a machine for sorting abnormal containers having bulged ends from normal containers free from bulged ends, the combination of a rotatable table for receiving the containers in upright position, means for rotating said table at a speed sufficient to remove said containers therefrom by centrifugal force, guide means disposed adjacent said table for directing the path of travel of containers received on the table, said guide means including a normal container outlet for receiving normal containers discharged from said table by centrifugal force, said guide means also including an abnormal container outlet and container diverting means leading thereto, a yieldably mounted pressure bar movable with and disposed above said table in spaced relation thereto, said pressure bar having spring means for normally urging the same into engagement with the bulged ends of abnormal containers for holding the latter against removal from said table by said centrifugal force and for subsequent diversion by said diverting means into said abnormal container outlet, and means for holding said pressure bar against movement by said spring means into engagement with normal containers on said table, whereby to separate the abnormal bulged containers on said table from the normal non-bulged containers being removed therefrom by said centrifugal force.

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