Dec. 10, 1957 J. ALBERTOLI 2,815,845

UNSCRAMBLER FOR EMPTY CANS

Filed March 9, 1953 2 Sheets-Sheet 1

Fig. 1

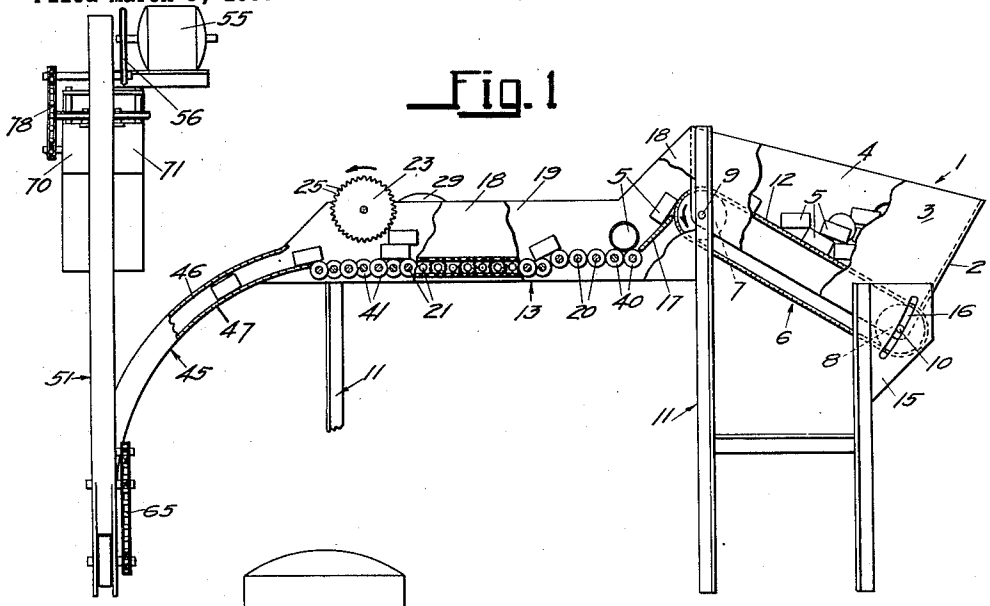
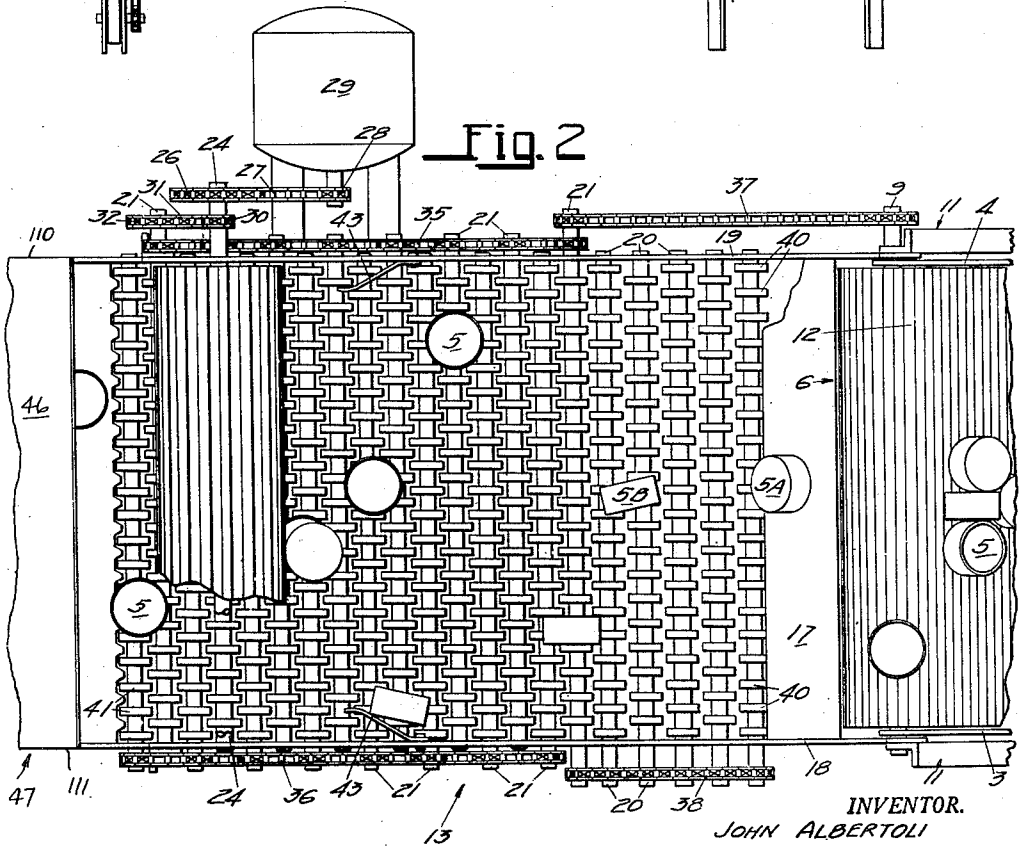



Fig. 2




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Fig. 3

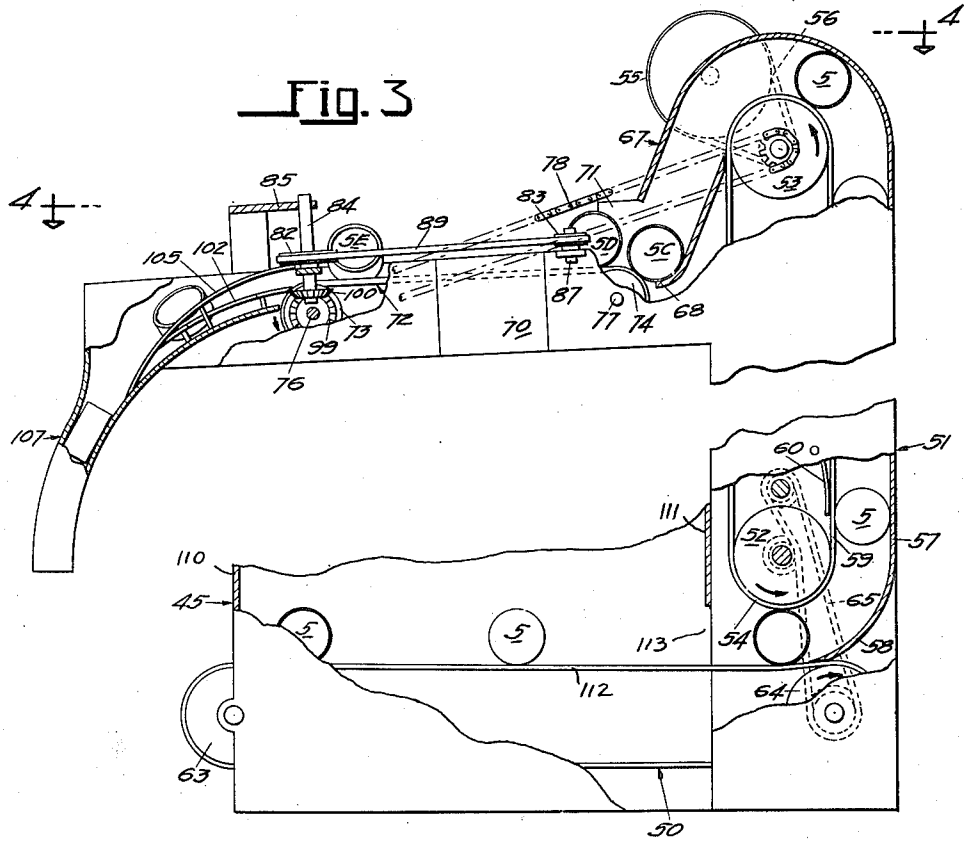



Fig. 4

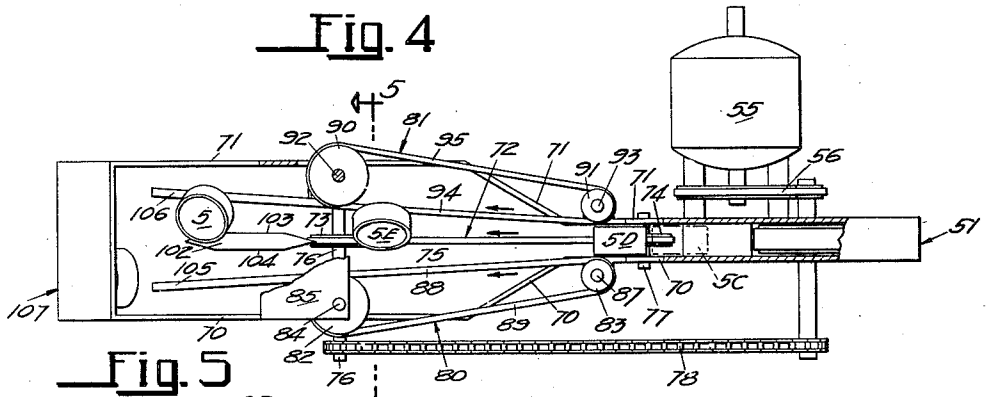
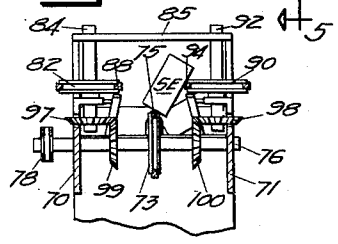



Fig. 5




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# UNSCRAMBLER FOR EMPTY CANS

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Application March 9, 1953, Serial No. 341,309

3 Claims. (Cl. 198—33)

This invention relates to a method and apparatus for unscrambling empty cans. More particularly, the invention relates to a method and apparatus for rearranging cans from a conglomeration or haphazard pile into orderly rows with all cans disposed in the same predetermined fashion.

In most canning plants, it is generally required to feed empty cans in single file with their open ends directed upwardly toward an automatic filling device. Such empty cans are generally supplied to the canner from a manufacturer and may be shipped to the packer either in a neat package containing cans in orderly rows or in a reusable container in a hapharzardly arranged pile. In the first case, the step of manually transferring the cans from the package to a conveyor belt leading to the filling device is simplified because the cans are arranged in an orderly manner. In the second case, the manual transfer of the haphazardly arranged cans from the container is a slower process.

Inasmuch as it is more expensive for the packer to obtain the cans arranged in rows in a package, it is desirable that means be provided for automatically arranging the cans as desired from a haphazard pile. The main object of the present invention is the provision of a novel method and apparatus for so arranging empty cans.

Another object is the provision of an empty can unscrambler which is relatively inexpensive to build and use, but which provides 100% unscrambling of cans from a haphazard pile.

Yet another object is the provision of a novel method and apparatus for turning empty cans to positions with their open ends directed upwardly for feeding to the filling machine.

Another object of the invention is the provision of a method and apparatus for orienting relatively flat cans having a depth less than their diameters.

Other objects and advantages will be seen in the following specification and in the drawings wherein:

Fig. 1 is a side elevational view of the first portion of the unscrambler apparatus showing the second portion of the apparatus in end elevation.

Fig. 2 is a greatly enlarged top plan view of a portion of the apparatus of Fig. 1.

Fig. 3 is a side elevational view partly broken away in height of the apparatus for carrying out the second portion of the unscrambling process.

Fig. 4 is a top plan view of the apparatus of Fig. 3.

Fig. 5 is a cross sectional view of the can turning apparatus as taken along lines 5—5 of Fig. 4.

In detail, the invention comprises a receiving bin generally designated 1 which is adapted to receive a pile of haphazardly arranged cans from the container in which they are shipped to the packer.

Bin 1 comprises a rear wall 2, a pair of opposed side walls 3, 4 and is open at its forward end to permit discharge of the cans 5 from said bin.

The bottom of bin 1 is formed by the upper run of a



conveyor belt generally designated 6 which is provided with a forward pulley 7 and a rear pulley 8. These pulleys are secured to shafts 9, 10 respectively which, in turn, are rotatably mounted in a frame member generally designated 11. The forward ends of sidewalls 3, 4 are rotatable on shaft 9 so that the bin 1 may be swung relative thereto in a manner to be described.

The can supporting belting 12 of conveyor 6 is preferably provided with a roughened surface to enhance the friction between said belt and the cans 5.

Upon rotation of the forward pulley 7 in a counterclockwise direction as indicated (Fig. 1), the cans 5 will be fed outwardly of bin 1 through its forward end. In this connection, the runs of belt 12 are preferably arranged so that they slant upwardly in a forward direction. This arrangement tends to cause the cans to be discharged one at a time although such a result is not insured.

Secured to opposite sides of the rear end of frame 11 are plates 15 provided with arcuate slots 16 in which the ends of the rear shaft 10 are received. In this manner, the angle of conveyor 6 may be adjusted as desired. By swinging the conveyor 6 toward a horizontal position the rate of discharge of cans 5 from bin 1 may be speeded up and by swinging conveyor 6 further away from horizontal such discharge rate may be reduced.

Upon discharge from bin 1, the cans 5 slide or roll down a downwardly slanting plate 17 which extends between and is secured at its opposite ends to a pair of opposed sidewalls 18, 19, the latter being suitably supported off the floor by frame 11. The cans now proceed to a conveyor generally designated 13 which will now be described.

Forwardly of plate 17 and extending between sidewalls 18, 19 is a row of horizontally spaced parallel elongated rotatable members or shafts 20. Five of such shafts 20 are indicated in Figs. 1, 2 although the number is not critical. Forwardly of shafts 20 is a row of shafts 21 similar to shafts 20 but spaced closer together. Sixteen of such shafts 21 are indicated though, again, the number is not important.

Shafts 20, 21 are rotatably supported at their opposite ends in sidewalls 18, 19 respectively with shafts 20 preferably spaced slightly upwardly from shafts 21.

Rotatably supported above the forward end of the row of shafts 21 is a relatively large roller 23 which is carried on a shaft 24 rotatably supported at its ends in sidewalls 18, 19. Roller 23 is provided with a relatively soft periphery of rubber or the like and is preferably formed with axially extending grooves 25.

Shaft 24, at one end, carries a sprocket wheel 26 which is driven through a chain 27 from a sprocket 28 on the output shaft of a motor 29.

Also secured to shaft 24 is a sprocket wheel 30 which drives a chain 31 connecting sprocket 30 with a sprocket 32 on one of the shafts 21. Alternate shafts of the row of shafts 21 are driven by a chain 35 from shaft 21 (Fig. 2) and on the side of the apparatus adjacent sidewall 19. At the side of the apparatus adjacent side 18, the remaining shafts 21 are driven through a chain. This arrangement is convenient because the shafts 21 are relatively close together.

The rear shaft 21 serves to drive, by means of chain 37, shaft 9 of the forward pulley 7 in bin 1 (Fig. 2) and also drives, by means of chain 38, the more widely spaced apart shafts 20.

The shafts 20 are provided at spaced points along their lengths with a plurality of circular disc-like elements 40 which may be conventional washers of suitable size.

Similarly shafts 21 are provided with elements 41 spaced apart along the length of said shafts. Elements

40, 41 are securely fastened to their corresponding shafts.

The spacing between shafts 20 and the diameter of elements 40 is preferably such that elements 40 of adjacent shafts 20 are in substantially tangential relationship although relatively spaced apart horizontally. The spacing of elements 40 is also such that the elements of adjacent shafts are in staggered relationship (Fig. 2).

The elements 41 of shafts 21 are in the same staggered relationship as elements 40 and, inasmuch as shafts 21 are closer together, the elements 41 are in lapping relationship (Fig. 2).

The spacing of elements 40, 41 is preferably slightly less than the depth of the cans 5 so that it is possible for a can to become balanced on its cylindrical sides on a pair of adjacent elements 40 or 41, but it is impossible for a can to become wedged between a pair of elements or to fall through between such elements.

In the following description, the apparatus will be described in connection with relatively flat cans, that is, cans having a depth less than their diameter, inasmuch as this type is the most difficult to unscramble. In this connection, the conveyor which comprises shafts 20, 21 and elements 40, 41 is especially for use in partially unscrambling flat cans.

A can such as can 5A (Fig. 2) sliding down plate 17 on its bottom or its top will stay in this same general position upon engaging elements 40. Said elements will move the can 5A forwardly without the same turning because such can is in a stable condition.

However, a can such as 5B (Fig. 2) which rests on elements 40 with its axis horizontal is unstable and will tend to fall flat with its axis vertical.

Inasmuch as the elements 40 of adjacent shafts 20 are in staggered relationship, a can cannot proceed forwardly without becoming unbalanced. This is for the reason that if a can is supported on its circular sidewalls on a pair of elements 40 of one shaft 20 it becomes supported on only one element 40 when it is moved to the next adjacent row of elements in a forwardly direction. The continuous rotation of elements 40 thus causes agitation of the cans in addition to moving them forwardly.

A further tendency to unbalance the upright cans exists because of the drop which the cans experience when they move from elements 40 on shafts 20 to elements 41 on shafts 21 (Fig. 1). By driving the shafts 21 at a faster speed than shafts 20, any tendency for cans to bunch together may also be overcome.

When the cans are supported on elements 41, further agitation of the cans takes place so that it is practically impossible for a can to remain upright with its axis horizontal after having passed over a few shafts 21.

In the event that a can tends to hug sidewalls 19 or sidewall 20, I provide an elongated deflector 43 on each sidewall which extends inwardly toward the center of the conveyor so that each upright can is bound to become unstable and fall to a flat position.

In the event that two superposed cans reach the roller 23 the latter knocks off the upper one so the cans discharged by the forward shaft 21 are all lying flat. It should also be noted that a vertically disposed can cannot pass beyond roller 23 because the latter is spaced above the elements 41 a distance less than the diameter of a can.

The cans from conveyor 13 are received in a chute 45 extending between sidewalls 19, 20 and which chute turns the cans through 90 degrees so that the same are all disposed with their axes horizontal. The sidewalls 46, 47 of chute 45 are spaced apart a distance slightly more than the depth of a can so that the cans are restrained at all times. At the bottom of chute 45 is a conveyor 50 (Fig. 3) on which the cans 5 are received and supported for movement toward a conventional can elevator generally designated 51.

This elevator 51 comprises a lower pulley 52, an upper pulley 53 and a flat belt 54 reeved over said pulleys. The upper pulley 53 is driven from a motor 55 (Fig. 4) by a belt 56.

Alongside the upwardly moving run 59 of belt 54 is a sidewall 57 of the elevator and said sidewall is curved at its lower end as indicated at 58 in Fig. 3 so that the cans coming from conveyor 50 are frictionally held between belt 59 and said sidewall for rolling movement upwardly over the top of pulley 53. One or more leaf springs 60 are supported in elevator 51 so as to urge run 59 toward sidewall 57 thus insuring continuous engagement with the upwardly moving cans. The structure of the elevator 57 is conventional and it will be understood that any means for moving the cans from conveyor 13 to the apparatus about to be described may be employed.

Conveyor 50, in the apparatus illustrated, may be conveniently mounted on a pair of pulleys 63, 64 with the latter driven by a belt 65 (Fig. 3) from the lower pulley 52 of elevator 51 to pulley 64.

At its upper end, the elevator structure is formed with a downwardly slanting chute 67 which is provided with a lip 68 along its lower side onto which the cans are adapted to drop.

In continuation of the sidewalls of elevator 51 are a pair of elongated horizontally extending sidewalls 70, 71 between which is positioned a central conveyor 72. This conveyor 72 comprises a pair of horizontally spaced pulleys 73, 74 and a V-belt having an upper run 75 on which the cans are adapted to be supported. Pulleys 73, 74 are supported for rotation in shafts 76, 77 respectively and shaft 76 may be conveniently driven by chain 78 from the shaft of elevator pulley 53.

On opposite sides respectively of conveyor 72 are a pair of side conveyors generally designated 80, 81.

Conveyor 80 comprises a pair of horizontally spaced horizontally disposed pulleys 82, 83. Pulley 82 is secured to a vertical shaft 84 which is mounted at its upper end in a hood portion 85 extending between and above sidewalls 70, 71, the latter being more widely spaced apart at this point (Fig. 4).

Pulley 83 is mounted on a relatively short shaft 87 supported on a suitable clip secured to sidewall 70. Around pulleys 82, 83 is reeved a V-belt having an inner run 88 and an outer run 89 (Fig. 4).

In a similar manner, conveyor 81 comprises a forward pulley 90 and a rear pulley 91 supported on vertical shafts 92, 93 and a V-belt having inner and outer runs 94, 95 respectively.

As best seen in Fig. 5, vertical shafts 84, 92 of forward pulleys 82, 90 are provided with bevel gears 97, 98 which are in mesh with a pair of bevel gears 99, 100 respectively mounted on shaft 76.

When shaft 76 is driven by chain 78, it will be apparent that the upper run 75 of the central conveyor 72 will move in a direction away from the elevator 51 as will the inner runs 88, 94 of conveyors 80, 81.

At a point adjacent the rear pulley 74 of the central conveyor 72 the sidewalls 70, 71 are spaced apart a distance slightly greater than the depth of the cans so that a can 5C (Figs. 3, 4) when moved upwardly onto central conveyor 72 under the urging of the next can will attain a position 5D at which it is substantially balanced on the upper run 75 of a central conveyor 72 with the latter supporting the can at a point substantially centrally between its ends.

As the can 5D proceeds forward, that is to the left in Fig. 4, it is laterally supported at its ends between the inner runs 88, 94 of the side conveyors 80, 81. In other words as the can 5D starts moving along the length of the upper run 75 of conveyor 72, it is balanced on the latter.

At this point, it should be stressed that the previously described conveyor 13 merely arranges the cans in a flat position and some cans have their bottoms directed down-

wardly and some have their bottoms directed upwardly. Thus when the cans are supported on conveyor **72**, some cans are positioned with their bottoms adjacent side conveyor **81** and some with their bottoms adjacent side conveyor **80**.

As best seen in Fig. 4, conveyors **80, 81** are disposed so that the inner runs **88, 94** respectively extend divergently away from the rear pulleys **83, 91** so that the lateral support initially offered the cans by said inner runs is gradually removed as the cans proceed along the upper run **75** of conveyor **72**. The latter preferably moves relatively fast so that the cans tend to remain balanced because of their speed. However, as the lateral support is removed by the diverging runs **88, 94, the** cans will topple toward the bottom end since such end is the heavier. Thus in Fig. 4, can **5E** has toppled so that its bottom rests on run **94** of conveyor **81**.

As best seen in Fig. 5, the central axis of can **5E** will become more and more inclined to the horizontal as it proceeds because of the constantly diverging side run **94**.

At the forward end of central conveyor **72** and in continuation of its upper run **75** is a stationary plate **102** having a pair of opposite side edges **103, 104**. Also, in continuation of the inner runs **88, 94** are a pair of elongated rods **105, 106** respectively.

By this structure, the cylindrical sides of the cans are supported on plate **102** as the cans are discharged from central conveyor **72** and the bottoms of the cans are supported on rods **105** or **106** depending on which side conveyor is adjacent the bottom initially.

Plate **102** need not be very long and preferably slants downwardly in a forward direction (Fig. 3) and merges with a discharge chute generally designated **107**.

Inasmuch as rods **105, 106** gradually diverge in a forward direction, the cans may be brought to a substantially flat position before discharge into chute **107**. The subsequent disposition of the cans is unimportant insofar as this invention is concerned because they may be handled by conventional machinery. However, all cans are disposed with their axes parallel and with their open ends directed in the same direction.

The apparatus of the present invention has been run at very high speeds and provides 100% unscrambling.

It should be noted that the apparatus of Figs. 3, 4 will work even more efficiently with relatively deep cans because the movement tending to topple the same from conveyor **72** is directly proportional to the length of can. However, if the depth of the cans is greater than their diameters the apparatus of Figs. 1, 2 cannot be used, but in such a case the step of turning the cans on their sides is less difficult.

As was pointed out hereinbefore, any suitable means may be employed for transferring the cans from the apparatus of Fig. 2 to the apparatus of Fig. 4. In this connection the conventional elevator **51** may be dispensed with depending upon the elevations at which the different operations take place.

However, in this same connection, the chute **45** is extremely valuable in the transferring of the cans. As best seen in Fig. 1, the amount of space occupied by said chute is relatively small and the operation of the device is extremely efficient. Not only does chute **45** insure the turning of all cans through 90 degrees to simplify further handling, but the same operates with the same high efficiency regardless of the rate at which the cans **5** are being handled.

Referring again to Fig. 3, it will be seen that the cans **5** may be stacked one on top of the other in chute **45** without affecting the single file feed of such cans to the elevator **51** or to whatever other additional transfer means is employed. It may be repeated at this point that the cans are restrained by sidewalls **46, 47** which are spaced apart a distance slightly greater than the depth of the cans. In addition, endwalls **110, 111** (Fig. 3) effectively bear against the ends of the stack, thus completely restraining the pile of similarly oriented cans which might occupy said chutes.



As best seen in Fig. 3, the endwall **111** terminates short of the upper run **112** of the conveyor **50** a distance slightly greater than the diameter of a can so as to provide a discharge opening **113** which insures single file discharge of the cans.

The detailed explanation and description of the invention herein given is not to be taken as restrictive of the same as it is obvious the minor changes in design may be resorted to without departing from the spirit of the invention as defined in the appended claims.

I claim:

1. In apparatus for unscrambling empty cylindrical cans having a bottom at one end and open at the opposite end, a central conveyor adapted to support said cans at points centrally between their ends for movement along a generally horizontally extending path of travel, a pair of side conveyors alongside said central conveyor and providing a pair of opposed runs spaced upwardly from said central conveyor and on opposite sides thereof, means for driving said central conveyor and said side conveyors with their adjacent runs traveling in the same direction, means for feeding said cans in single file to said central conveyor at a point along the length of the latter with the axes of said cans horizontal and with said central conveyor engaging said cans at points centrally between their ends only, said opposed runs being horizontally spaced apart at said point a distance slightly greater than the depth of said cans for laterally supporting said cans at the ends thereof, said opposed runs extending divergently away from said point in said direction whereby each can on said central conveyor will topple toward the one of said runs that is adjacent its bottom end.

2. In apparatus for unscrambling empty cylindrical cans having a bottom at one end and open at the opposite end, a central conveyor adapted to support said cans at points centrally between their ends for movement along a generally horizontally extending path of travel, a pair of side conveyors alongside said central conveyor and providing a pair of opposed runs spaced upwardly from said central conveyor and on opposite sides thereof, means for driving said central conveyor and said side conveyors with their adjacent runs traveling in the same direction, means for feeding said cans in single file to said central conveyor at a point along the length of the latter with the axes of said cans horizontal and with said central conveyor engaging said cans at points centrally between their ends only, said opposed runs being horizontally spaced apart at said point a distance slightly greater than the depth of said cans for laterally supporting said cans at the ends thereof, said opposed runs extending divergently away from said point in said direction whereby each can on said central conveyor will topple toward the one of said runs that is adjacent its bottom end, a pair of elongated guide elements in substantial alignment with said runs respectively and slanting downwardly toward said central conveyor for engaging the bottoms of the cans so toppled for gradually turning said cans to positions with their axes substantially vertical.

3. An empty can sorting device comprising a central conveyor adapted to support cans on their peripheries at points centrally between their ends for movement along a generally horizontal extending path of travel in one direction, a pair of side conveyors alongside said central conveyor and providing a pair of opposed runs respectively on opposite sides of said central conveyor, means for driving said central and side conveyors at substantially the same speed in said direction, means for feeding cans to a point between said side conveyors with the peripheries of said cans supported on said central belt, said side conveyors being horizontally spaced apart a distance greater than the depth of such cans whereby

said cans topple towards one of said side conveyors or the other depending on which end of the cans is provided with a bottom, and whereby said cans are carried along in said direction by said central belt and one of said side belts.

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