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CAN ARRANGING MACHINE

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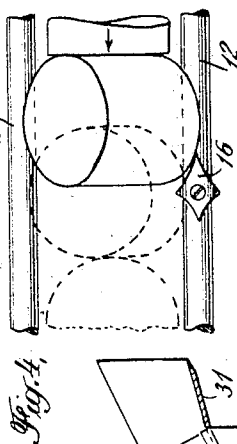
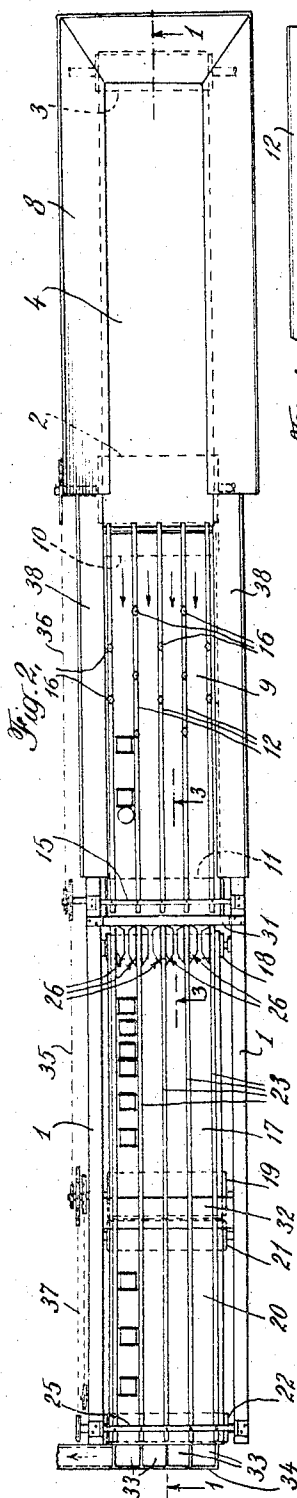
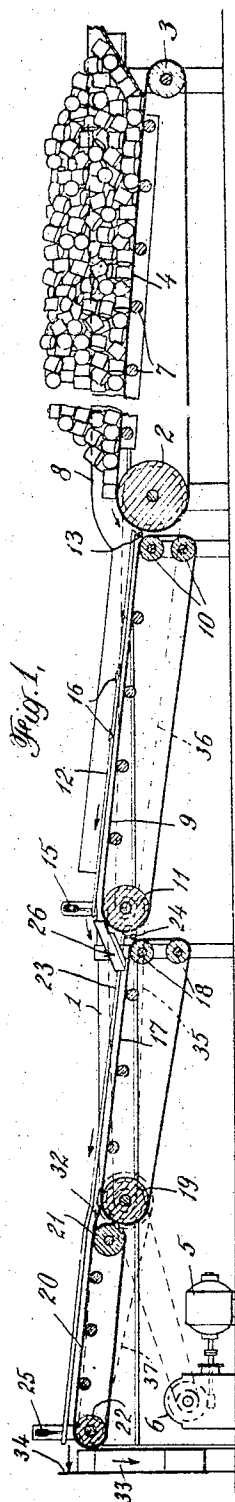


Fig. 4,

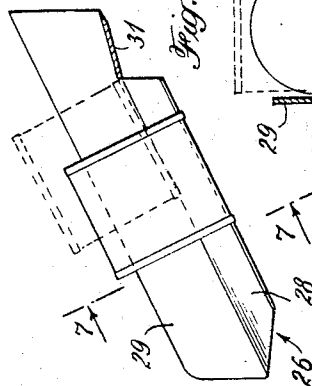


Fig. 6,

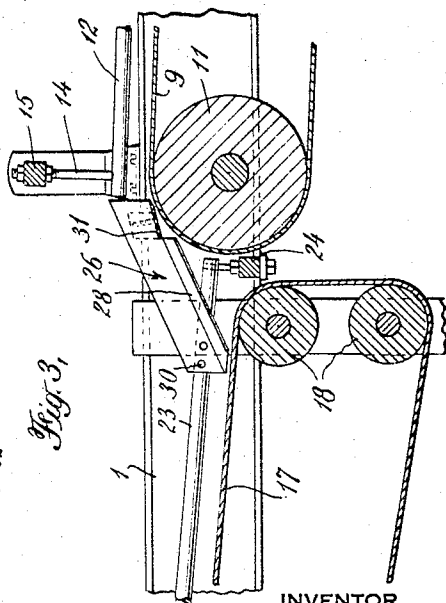


Fig. 3,

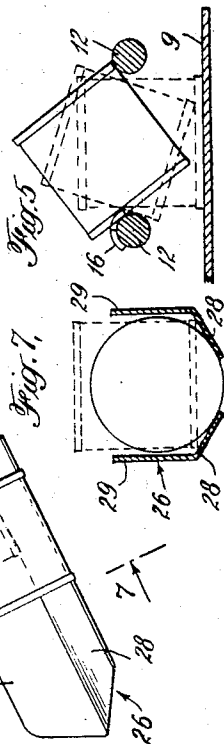


Fig. 5,

Fig. 7,

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CAN-ARRANGING MACHINE

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8 Claims. (Cl. 198—33)

This invention relates to article-handling machinery and particularly to a machine adapted to arrange tin cans received in bulk from a steam cooker or other source of supply in orderly alignment and deliver such cans in spaced relation and in the same relative positions to a labelling machine, packing machine or other point of delivery.

In putting up vegetables and other food stuffs in cans, it is the common practice to handle such cans during the cooking operation in large metal baskets holding one hundred or more cans. After the desired period of cooking, the metal basket containing the hot cans is transported by an overhead conveyor to the labelling or packing department and the cans discharged on a suitable table or hopper in a pile from which they must be taken by hand and delivered in proper position and spaced relation to the feed conveyors which carry them to the labelling machine or other destination.

The object of the present invention is to provide a machine which will receive the cans in bulk from the metal baskets to which they are delivered from the cooker and sort them out without hand labor of any kind and deliver them to the labelling machine in the desired order.

In sorting out the cans they have to be arranged in a plurality of rows with the cans in each row lying on their sides in end to end spaced relation. These rows of cans are then brought together into a single line by converging chutes which allow the cans to roll forward on their sides at right angles to their previous direction of motion.

When handling tall cans, that is, cans in which the longitudinal dimension is substantially greater than the diameter, not much difficulty is encountered in causing the cans standing on end to turn on their sides in end to end relationship after, or as, they are arranged in rows. However, with short cans where the height of the can is not much greater than the diameter, or is less than the diameter, it becomes something of a problem to turn such cans on their sides.

The particular object of the present invention is to provide a machine of the sort previously referred to which is especially adapted for handling short cans. It will be understood, however, that the present machine may if desired also be used for arranging tall cans.

We have illustrated the preferred embodiment of our invention as now employed in commercial practice, in the accompanying drawing.

In the drawing:

Fig. 1 represents a longitudinal vertical section

of the machine taken on a plane indicated by line 1—1 of Fig. 2, a load of cans having been placed upon the receiving end of the machine;

Fig. 2 represents a plan view of the machine;

Fig. 3 represents a fragmentary longitudinal section drawn to an enlarged scale and taken on a plane indicated by line 3—3 of Fig. 2;

Figs. 4 and 5 represent enlarged fragmentary views to illustrate the operation of part of the apparatus;

Fig. 6 represents a sectional view, drawn to a still further enlarged scale, of the chute illustrated in Fig. 3 with a can thereon; and

Fig. 7 is a transverse section taken on line 7—7 of Fig. 6.

Referring now to the accompanying drawing:

The frame 1 of the machine comprises suitable longitudinal steel members riveted or welded together in any approved manner. The can-receiving end is preferably lower than the delivery end. Supported at the can-receiving end of the machine on suitable rolls 2 and 3 is a wide conveyor-belt 4 which is continuously driven through connections to be later described from a suitable driving motor 4 and a reducing gear 6 located at the opposite end of the machine.

The upper reach of conveyor-belt 4 is supported upon a series of transverse rolls 7 spaced sufficiently close together to enable the belt to support, without undue sagging, a charge of cans received from one of the metal baskets previously referred to, which has just come from the cooker.

Supported on the frame of the machine above the belt 4 is a flat hopper 8 formed of appropriate side plates and a single end plate as shown in Fig. 2, the inner edges of these plates overlying the belt 4 so that cans supported by the hopper will be allowed to gradually descend onto the conveyor as the cans at the center of the mass or stack are carried forward.

Immediately in advance of the pulley 2 is a second conveyor belt 9 of the same width as belt 4, but with its end adjacent the belt 4 at a somewhat lower level than the belt 4. Belt 9 is supported on double pulleys 10 mounted in the frame 1 of the machine closely adjacent to pulley 2 and by a third pulley 11 by which the belt is continuously driven from motor 5 by connections to be later described.

Overlying the upper reach of belt 9 are a plurality of straight, stationary horizontal rods or bars 12 extending longitudinally of the machine and at an elevation above the surface of the belt somewhat less than the diameter of the cans. The bars are supported at their ends adjacent the

belt 4 by a cross-member 13 between the pulleys 2 and 10 and at a height somewhat below the upper surface of the belt 4. The bars extend to the opposite end of belt 9 where they are supported directly over pulley 11 by short rods 14 which are suspended from crossbar 15 held by brackets, secured to the frame 1 of the machine.

The bars 12 are spaced apart a distance somewhat greater than the diameter of the cans. For small cans, for which this machine is primarily intended, the distance between the adjacent surfaces of adjacent rods is in the neighborhood of $1\frac{1}{4}$ times the diameter of the cans, and possibly somewhat less. Some of the cans discharged onto the bars 12 will enter between the bars and come into contact with the surface of belt 9, either standing on end or lying on the side. Although cans which are not much taller than their diameter cannot span the distance between the rods so as to be supported at each end in the horizontal position thereby, a large number of the cans discharged onto the bars will be supported at an angular position somewhat as shown in Fig. 5 wholly by the bars and carried along by engagement with the cans lying on the belt.

Buttons or lugs 16 of the shape shown more specifically in Figs. 4 and 5 are attached to the bars 12 at intervals and in staggered relation as shown, said buttons serving, as will be later described, to engage the cans not resting squarely on the belt as described, and deflect such cans into position to drop between the bars onto the belt.

In advance of conveyor-belt 9 is a third conveyor-belt 17 of the same width as the previous belts and supported at its receiving end on a pair of double pulleys 18 at an elevation somewhat lower than the upper face of belt 9. At its opposite end it is supported by pulley 19 by which the belt is continuously driven from motor 5. A fourth conveyor-belt 20 is arranged in advance of belt 17 and carried by pulleys 21 and 22 which are also mounted in the frame 1 of the machine, pulley 22 serving to drive belt 20 continuously through connections later to be described from motor 5.

A second series of spaced, stationary bars 23 extends longitudinally above both of belts 17 and 20. They are supported at their front end by cross-member 24 close to and below the upper surface of pulley 11, and at their opposite ends they are suspended from a cross-member mounted in a manner similar to cross-member 15. These bars are, at their forward ends, in alignment with bars 12, and they are arranged substantially parallel although they may, if desired, be brought somewhat closer together toward their left hand ends. They are mounted at about the same height above the belts as are bars 12.

In order to convey the cans from belt 9 to belt 17 there are provided a plurality of short and rather steeply inclined chutes. These chutes receive the cans from between the bars 12 and deliver them between the bars 23. These chutes each have bottoms which support in unstable equilibrium, any cans received thereon standing on end so that such cans immediately fall onto their sides with their ends extending longitudinally of the machine, and slide onto belt 17 in this position. For this purpose the outer side portions 28 of the chutes are inclined toward one another as shown in Fig. 7, and to maintain the cans with their ends directed longitudinally of the machine as they fall on their sides, the chutes are provided with vertical side walls 29 which

extend upwardly for a substantial distance in proportion to the diameter of the cans. These chutes may each conveniently be made of a pair of complementary steel angle members and they may be supported at their lower ends by riveting or welding to the rods 23 as indicated at 30. At their upper ends they are supported by a thin cross-member and scuff plate 31 which extends between the side frames 1 of the machine and is positioned close to the surface of belt 9 as it passes over pulley 11 so as to remove the cans from the belt as they reach the end of the belt.

The receiving end of belt 20 is preferably positioned at an elevation slightly above the delivery end of belt 17, and an inclined scuff plate is provided for conveying the cans between these two belts.

The cans are delivered from the end of belt 20 lying on their sides between the guide-bars or rods with their ends directed longitudinally of the machine and received by a plurality of delivery chutes 33 which are arranged to permit the cans to roll on their sides, under the influence of gravity, in a direction at right angles to the travel of the conveyor-belts of the machine. The cans are delivered by belt 20 at a velocity which is sufficient to carry the cans across the space between the end of belt 20 and the vertical plate 34 forming the outer wall of chutes 33. The flat ends of the cans striking against this plate repositions at right angles to the plate any cans which may be delivered by the belt with their axes slightly askew, thus causing the cans to descend along chutes 33 rolling on their sides rather than sliding endwise.

The chutes are of sheet metal and of a width just enough greater than the length of the cans to permit the cans to roll freely through them. The several chutes 33 converge into a single chute at one side of the machine thereby delivering the cans in a single line rolling on their sides.

They may be conveyed by gravity or otherwise to the labelling machine or packing machine.

The conveyor belts 4, 9, 17 and 20 are not driven at the same speed. The belt 4 is driven at a comparatively slow speed, say fifteen feet per minute. The belt 9 is driven at a much higher speed, that is, in the neighborhood of sixty to sixty-five feet per minute. The belt 17 is driven at about twice the speed of belt 9, while the belt 20 is driven from one and a half to two times the speed of belt 17. The belts are all driven from the motor 5 through suitable sprocket chains or otherwise. As shown, the shaft of the pulley 19 is directly driven from the motor through the reducing gear. From this shaft the shaft of the pulley 11 of belt 9 is driven through sprocket chain 35 and sprocket wheels of different sizes to reduce the speed of belt 9 to the desired extent. In like manner the pulley 2 of the receiving belt 4 is driven through chain 36 and sprocket wheels of appropriate size to further reduce the speed of belt 4 as desired. Also the pulley 22 of the belt 20 is driven through chain 37 from a large sprocket wheel on the shaft of pulley 19 to thereby drive belt 20 at a speed greater than belt 17.

In the operation of the machine, a load of cans is dumped from a metal basket onto the belt 4 and the adjacent plates of the hopper 8. As shown in Fig. 1, such a batch of cans has been delivered, and the machine has not yet operated for a sufficient length of time for any of these cans to be transferred to belt 9. The slowly moving belt 4 moves the cans away as they are discharged from the basket with the cans in vari-

ous positions, some lying on their sides, some on end and others resting partly or wholly on the cans beneath.

The inclined sides of the hopper on the forward movement of the cans, cause the cans to gradually converge toward the middle of the machine as they reach the pulleys 2. As the cans pass over the pulleys 2 some of those which are resting on end will be turned down on their sides by the curvature of pulleys 2 if there is sufficient space for them to fall. With short cans, however, not so many of them will be turned on their sides by this means as with tall cans, and a greater number of cans will reach the end of belt 9 still standing on their ends.

The bars 12 being spaced so that their adjacent edges are spaced apart just a little more than the diameter of the cans, a considerable number of the cans passing over pulleys 2 will be supported partially or wholly upon the bars 12 somewhat after the manner illustrated in Figs. 4 and 5. Such cans will be pushed along the bars 12 by other cans behind them which are resting on the belt between the bars. Ordinarily such cans will have slipped down from the full line position shown in Figs. 4 and 5 through the tilted position shown in dotted lines into the upright position shown in dotted lines, that is, resting on one end on the belt, before they reach the first button 16. But whether or not the can has reached the upright position by the time it engages the button, the button will cause the can to turn after the manner just described, into the upright or vertical position standing on its end.

As shown, the buttons are substantially kite-shaped with the longer point projecting toward the oncoming cans and hence with its inclined edge in position to engage the bottom edge of the can advancing along the bars. This inclined face of the button pushes the end of the can inwardly, that is, toward the opposite rod on which the can is resting, and as the rods are sufficiently elevated above the belt for the can not to engage the belt until clear of the bar, the can offers but little resistance to this movement.

The center of gravity of the can is lowered by the action of the buttons as will be obvious from the succeeding positions of the can illustrated in Fig. 5. There is therefore only the slight friction of the can against the bars and the button to be overcome in this shifting of the cans into upright position.

The buttons are staggered on the bars 12 as previously mentioned. As shown, for example, the second and fourth rods of the five shown in the drawing have their first buttons pushed toward the pulley 2, and the first, third and fifth bars have their first buttons spaced beyond the first mentioned buttons so that no can can be engaged by more than one button at the same time. Usually the cans will be all arranged between the bars 12, either lying on their sides or standing on end, by the time the second row of buttons is passed. However, in case the cans may be unusually piled up on the bars so that they have not been reduced to a single layer by the time the second row of buttons is reached, an additional row of buttons may be provided, as indicated in the drawing. To take care of this contingency also and prevent the fringes of the mass of cans delivered by the belt 4 to the belt 9 from falling off from this belt, the narrow side plates 38 are provided, extending along the sides of belt 9. As stated above, the belt 9 moves at a speed several times that of belt 4 so that although the cans may

be piled up on each other to a considerable extent when discharged onto the bars 12, the rapid movement of the belt 9 will thin them out into substantially a single layer with some standing on end and some lying on their sides, as exemplified by the three cans shown in Fig. 2 on belt 9, by the time the end of belt 9 is reached.

As the cans reach pulley 11 they pass onto the scuff plate 31 and thence down the chutes 26. As the cans enter these chutes, those on their sides merely slide down the chutes onto belt 17 and still remain on their sides. The cans which are standing on end, however, as they enter the chutes are supported only at two diametrically opposite points by the sloping side portions 28 of these chutes. They are hence in unstable equilibrium and as the center of gravity of the cans is in front of these points of support, the cans pitch forward onto their sides and slide down the chute, remaining in this position as they are discharged onto belt 17. This turning movement of the cans is aided by the fact that, as the cans enter the chutes, they are moving at a substantial velocity, and the friction of the stationary chutes with the bottoms of the cans tends to cause the bottoms of the cans to be slowed up slightly, thereby causing the upper portions of the cans to pitch forward.

The cans, therefore, on belt 17 are maintained in a plurality of rows by means of the bars 23 and are all turned on their sides somewhat as illustrated by the few typical cans shown in Fig. 2. As the belt 17 moves more rapidly than belt 9, it tends to separate the cans more widely in spaced end to end relation. Nevertheless if two cans are lying on their sides in substantially end to end contact as they enter the chutes 26, the rapidity with which they descend these chutes is so great that they will not be spaced apart to any great extent after they both reach belt 17. Also, if two cans when they enter chute 26 are substantially in contact with one another and the one in front is on its side while the one in the rear is standing on end, they will be found substantially in end to end contact when they both reach the belt 17.

Accordingly, in order to insure that the cans are all spaced a substantial distance apart before they are delivered to chutes 33, although this spacing may not be uniform, the fourth belt 20 is provided which is operated at a speed substantially greater than the speed of belt 17. As the cans reach scuff plate 32 they are slowed down by friction and may be pushed across this plate by the cans in the rear which are lying on belt 17. There is thus provided an appreciable time element between successive deliveries of cans from the edge of the scuff plate 32 to belt 20 and during this time interval, the can in front is carried forward rapidly by belt 20 so that the following can is spaced an appreciable distance behind. When delivered to the delivery chutes 33 in such substantially spaced relation, there is ample time for each can to shoot across the space between the end of the belt and plate 34, be straightened up perpendicularly to this plate and fall bodily sideways down the chute out of the path of the succeeding can. If, however, two cans are delivered in end to end contact to the chutes 33, one or both of the cans almost certainly will be turned at right angles as it falls down the chute and will thus slide lengthwise instead of rolling.

Our improved machine is designed primarily to handle cans delivered thereto from the metal baskets now almost universally employed for

holding cans during the cooking operation in commercial canning establishments. It will of course be understood, however, that the machine will operate equally well on cans in whatever manner they may be delivered to the belt 4 and hopper 8. It will also be understood that the invention is not limited to the details of construction herein shown and described, but that the same may be widely varied within the spirit of the invention and the scope of the appended claims.

The word "can" as used in the appended claims is not to be construed as a limitation, but is intended to include articles of such shape and dimensions as to be handled by the machine described and claimed.

This application is in part a continuation of copending application, Serial No. 534,226 filed May 1, 1931 by Wallace D. Kimball, Cornelius Braren and John H. Mosley, and assigned to the same assignee as the present application.

We claim:

1. In a machine of the class described, a conveyor, means associated therewith for arranging cans conveyed by said conveyor in one or more rows with some of the cans standing on end, and means for turning said cans on their sides comprising a second conveyor having its receiving end below the discharge end of said first mentioned conveyor, and an inclined chute aligned with each of said rows for transferring the cans from one conveyor to the other, said chute having a bottom the outside portions of which are inclined toward one another whereby cans standing on end are caused to turn on their sides.

2. In a can-arranging machine, a succession of conveyor belts for moving the cans having means associated therewith for arranging the cans thereon in rows, and means between two of said belts for turning on their sides those cans which stand on end comprising inclined chutes having bottoms the outer portions of which are inclined toward one another.

3. In a can-arranging machine, a succession of conveyor belts for moving the cans having means associated therewith for arranging the cans thereon in one or more rows, means between two of said belts for turning on their sides those cans which stand on end comprising an inclined chute aligned with each of said rows, said chute having bottoms the outer portions of which are inclined toward one another, and a scuff plate for removing the cans from one of said belts and delivering them to said chute.

4. In a can-arranging machine, a succession of conveyor belts for moving the cans having means associated therewith for arranging the cans thereon in one or more rows, and means between two of said belts for turning on their sides

those cans which stand on end comprising an inclined chute aligned with each of said rows, said chute having a bottom the outer portions of which are inclined toward one another, said chute also having substantially vertical side walls for confining the sides of the can in turning on its side so as to prevent the can from turning crosswise.

5. In a machine of the class described, a conveyor for cans having means associated therewith for arranging the cans thereon in one or more rows, means for turning on their sides those cans which leave said belt standing on end comprising a second belt having its receiving end at a lower elevation than the delivery end of the first mentioned belt, and an inclined chute aligned with each row of cans delivered by said first mentioned belt, said chute having its bottom formed to support the cans in unstable equilibrium, and a third belt arranged to receive said cans from said second belt and space them apart from one another.

6. In a machine of the class described, a conveyor belt adapted to receive cans in haphazard arrangement, said belt having a plurality of spaced substantially parallel rods overlying the same and forming guideways extending longitudinally of said belt for arranging said cans in rows, deflectors on said rods whereby cans lying wholly or partly on said rods are deflected into positions to lie wholly between adjacent rods, means for turning on their sides cans which stand on their ends comprising a second conveyor belt having its receiving end below the discharge end of said first mentioned belt, and a plurality of inclined chutes for transferring the cans from one conveyor to the other, said chutes having bottoms the outside portions of which are inclined toward one another whereby cans standing on end are supported in unstable equilibrium and caused to turn on their side.

7. In a can-arranging machine a succession of conveyor belts for moving the cans having means associated therewith for arranging the cans thereon in one or more rows, and means between two of said belts for turning on their sides those cans which stand on end including an inclined chute aligned with each of said rows comprising a pair of spaced oppositely positioned angle bars each having in cross section a vertical portion and a bottom portion at an obtuse angle thereto.

8. In a can-arranging machine a succession of conveyor belts for moving the cans having means associated therewith for arranging the cans thereon in rows, and means between two of said belts for turning on their sides those cans which stand on end comprising an inclined chute having a bottom formed to support the cans in unstable equilibrium.

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