Jan. 8, 1946. N. S. SELLS 2,392,509

CAN ALIGNER

Filed Feb. 13, 1943 3 Sheets-Sheet 1

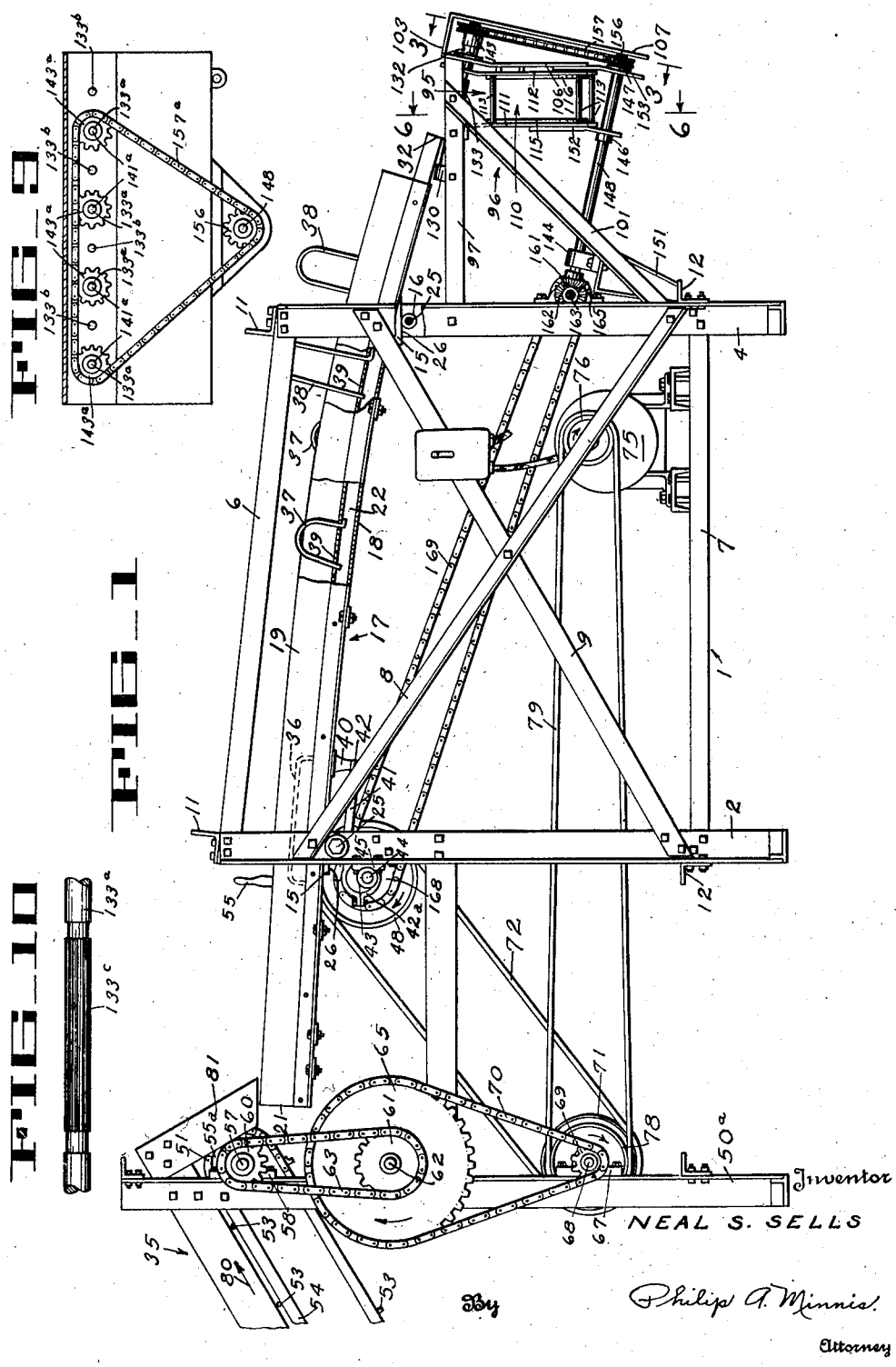


FIG. 1

FIG. 10

FIG. 9

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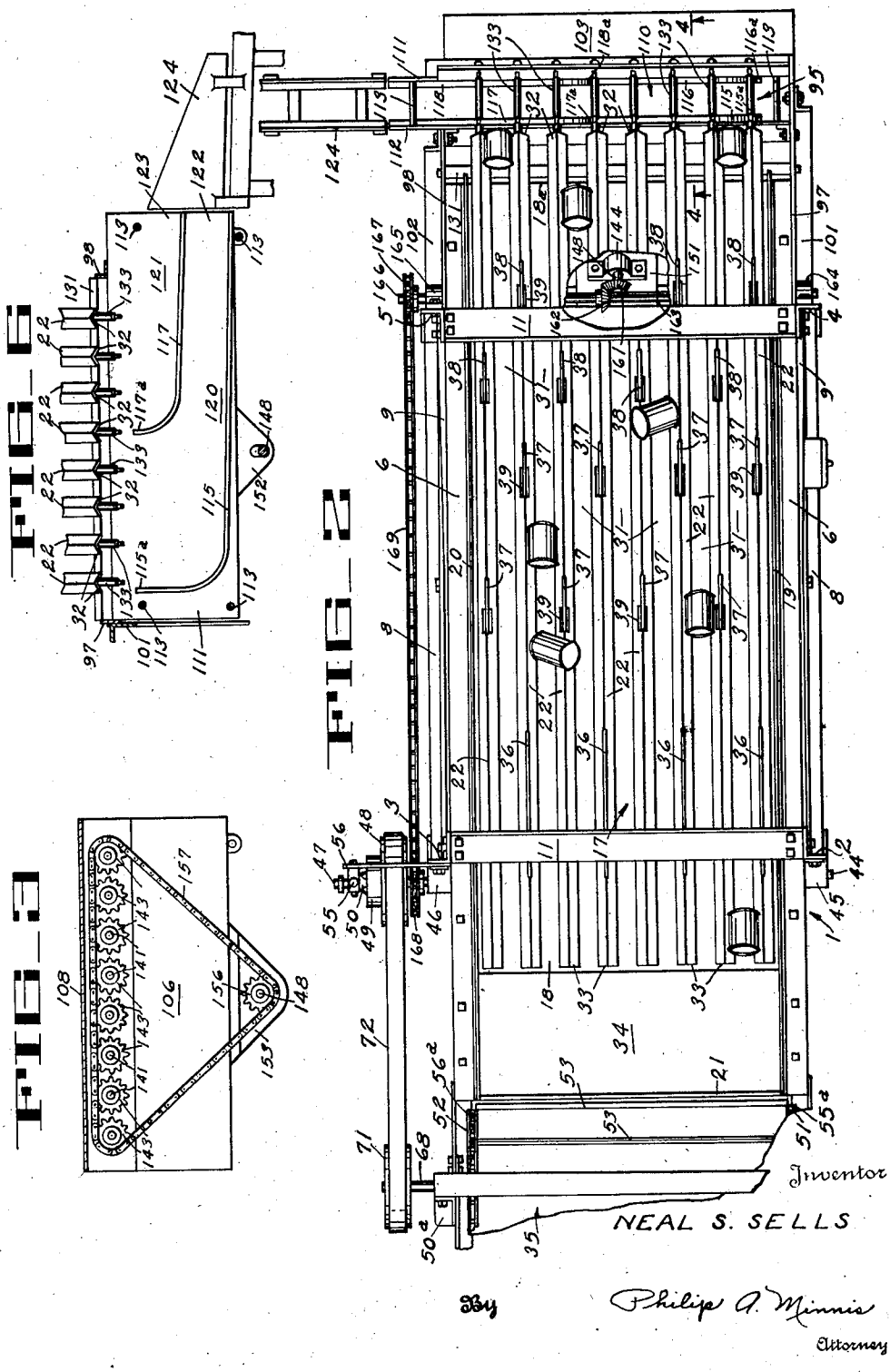
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CAN ALIGNER

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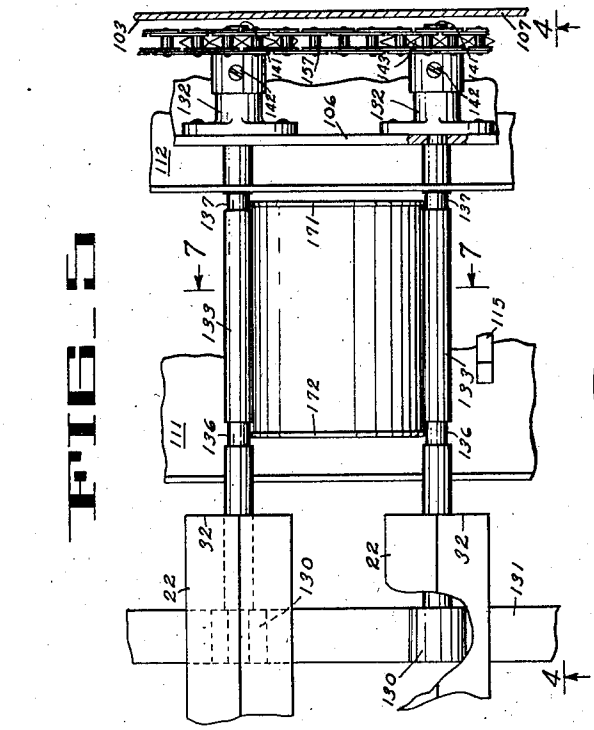


FIG. 5

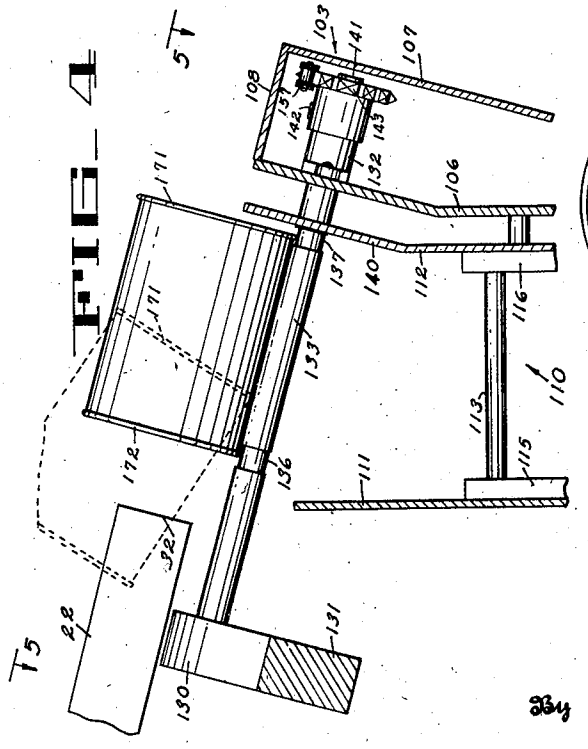


FIG. 4

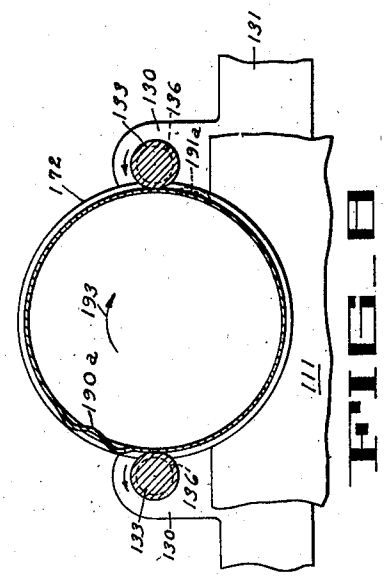


FIG. 8

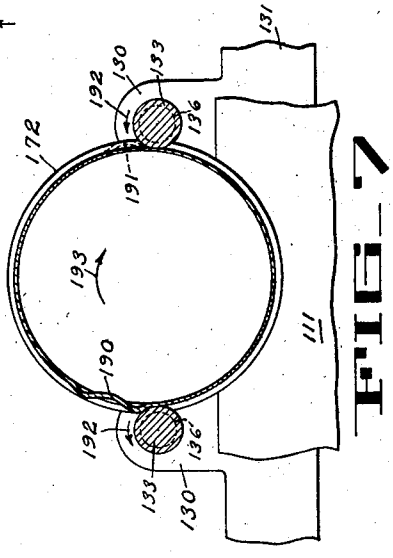


FIG. 7

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Patented Jan. 8, 1946 2,392,509

UNITED STATES PATENT OFFICE

2,392,509

CAN ALIGNER

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Application February 13, 1943, Serial No. 475,778

4 Claims. (Cl. 198—30)

The present invention relates to a can aligning machine for aligning "sanitary" cans in a desired order.

One object of the present invention is to provide a can aligning machine which handles perfect as well as dented cans.

Another object is to provide a can aligning machine for aligning cans in a desired order and for arranging the aligned cans in a single file in rolling procession irrespective of any dents in the cans.

Other and further objects and advantages of the present invention will become apparent from the following description and drawings in which:

Fig. 1 is a side view of the can aligner of the present invention, certain parts being broken away while others are shown in section.

Fig. 2 is a plan view of Fig. 1, certain portions being broken away.

Fig. 3 is a section taken along lines 3—3 of Fig. 1, certain parts being omitted.

Fig. 4 is an enlarged section of Fig. 2 taken along lines 4—4 thereof, certain parts being broken away.

Fig. 5 is a plan view of Fig. 4 taken along lines 5—5 thereof, certain parts being broken away.

Fig. 6 is a section of Fig. 1 taken along lines 6—6 thereof, certain parts being omitted.

Fig. 7 is an enlarged section of a portion of Fig. 5 taken along lines 7—7 thereof, certain parts being omitted and illustrating a dented can positioned on the can supporting rods.

Fig. 8 is a view similar to Fig. 7 illustrating the can in another position.

Fig. 9 is a view similar to Fig. 3 showing a modified structure of the present invention.

Fig. 10 is a detail view of a portion of one of the can supporting rods employed in the modified structure shown in Fig. 9.

In the drawings, see Figs. 1 and 2, 1 designates the frame structure of the machine which comprises front legs 2 and 3 and rear legs 4 and 5. Interposed between the front and rear legs at each side of the frame structure 1 are upper and lower longitudinal frame members 6 and 7 respectively and diagonally extending brace members 8 and 9. The frame structure 1 includes further upper and lower transverse frame members 11 and 12 for connecting the legs on opposite sides of the machine so as to form a rigid frame structure.

Reciprocably mounted within the frame structure 1 by means of bearing blocks 15 and supporting rollers 16, only one of which has been shown in Fig. 1, is a can table 17 comprising a bottom 18, side walls 19 and 20, a front wall 21 and a plurality of longitudinally extending angle irons or guide rails 22. The front portion of the bottom 18 of the table 17 is flat while the middle and rear portions thereof are curved in a downward direction in such a manner that the downward inclination of the bottom of the can table progressively increases toward the rear end of the same.

The bearing blocks 15, above referred to, are secured to the bottom 18 of the can table adjacent each leg 2, 3, 4 and 5 while the supporting rollers 16, are rotatably mounted on the inner sides of the legs 2 to 5 by means of stud bolts 25. Each of the bearing blocks 15 is provided with a horizontal surface 26 which engages the roller 16 cooperating therewith so as to permit back and forth movement of the table 17 in a horizontal plane.

The angle irons or guide rails 22 are welded or otherwise secured to the bottom 18 of the can table and are arranged in spaced relation with respect to each other and extend longitudinally of the machine so as to form in conjunction with the bottom 18 a plurality of can receiving troughs or guide channels 31. These guide rails 22 are curved in the same manner as the bottom 18 of the can table 17. The channels 31 are of such width and depth as to receive and support the cans lengthwise therein without wedging the cans between the inclined side walls of the guide rails 22. The rear ends 32 of the guide rails 22 extend a short distance beyond the rear end of the table 17 (see Figs. 1 and 2) while the front ends of the guide rails terminate a considerable distance from the front end of the can table 17.

Secured to the bottom 18 of the can table 17 intermediate the front wall 21 and the front ends 33 of the guide rails 22 is a flat wooden floor 34. If desired an apron of flexible material, not shown, such as rubber belting or the like, secured in an inclined position between the upper edge of the front wall 21 and the center of the wooden floor 34, may be provided for cushioning the impact of cans discharged upon the can table 17 by an elevator 35.

Secured to the apex portion of every other guide rail 22 in the vicinity of the front ends 33 thereof are stationary can aligning wires or rods 36 of inverted U shaped configuration, while secured to the apex portion of each guide rail 22 in the vicinity of the middle and rear end of the can table 17 are inverted U shaped can aligning fingers or springs 37 and 38, respectively. These can aligning springs are arranged in staggered rela-

tion in a manner as shown in Fig. 2. The rear end of each can aligning spring 37 or 38 (see Fig. 1) is fixed to the apex portion of its supporting guide rail 22 while the front end of each spring 37 or 38 extends into a slot 39 in the guide rail adjacent the same. The slots 39 are of sufficient length to permit a limited amount of free movement of the front ends of the springs with respect to the guide rails 22.

Secured to the bottom 18 of the can table 17 is a downwardly extending bearing bracket 40 to which a pitman 41 is pivotally secured as shown at 42 in Fig. 1. The pitman 41 is provided with a bearing portion 42^a within which a disk 43, eccentrically mounted on a shaft 44 for rotation therewith, is rotatably received so that upon rotation of the shaft 44 and the disc 43, the can table 17 is reciprocated in a horizontal plane longitudinally with respect to the frame 1.

The shaft 44 is rotatably mounted within bearings 45 and 46 secured to the legs 2 and 3, respectively, of the frame structure 1 of the machine. Rotatably mounted upon the free end 47 of the shaft 44, which extends beyond the bearing 46 exterior of the frame structure 1, is a belt pulley 48. The belt pulley 48 is provided with a female clutch member 49 cooperating with a male clutch member 50 slidably mounted upon the shaft portion 47 and keyed thereto for rotation therewith. A clutch shift lever 55 pivotally mounted on a bracket 56 secured to the leg 3 is provided for shifting the male clutch member 50 into and out of engagement with the female clutch member 49 to thereby establish a driving relation between the belt pulley 48 and shaft 44.

Positioned at the front end of the machine is an elevator structure of conventional construction which comprises a frame 50^a and endless conveyer chains 51 and 52 (see Figs. 1 and 2) provided with transverse bars 53 adapted to travel along a feed table 54. The endless chains 51 and 52 are trained around opposite pairs of sprocket wheels at the forward and rear end of the elevator structure 35 in well known manner, only the sprocket wheels 55^a and 56^a at the rear end of the elevator structure being shown in Figs. 1 and 2. The sprocket wheels 55^a and 56^a are keyed to a shaft 57 rotatably mounted on the frame structure 50^a of the elevator 35 by means of bearings 58, only one of which has been shown in Fig. 1, in any convenient manner.

Also keyed to the shaft 57 is a sprocket wheel 60 and trained around the same and a sprocket wheel 61, keyed to a shaft 62, is a sprocket chain 63 (see Fig. 1). The shaft 62 is rotatably mounted within bearings in any convenient manner on the frame structure of the elevator 35 and carries a sprocket wheel 65 keyed thereto for rotation therewith. Rotatably mounted within bearings 67, only one of which has been shown in Fig. 1 is a transverse shaft 68 to which a sprocket wheel 69 is keyed for rotation therewith. Trained around the sprocket wheel 69 and the sprocket wheel 65 previously referred to is a sprocket chain 70.

Keyed to the shaft 68 is a belt pulley 71 (see Figs. 1 and 2) and trained around the same and the belt pulley 48 previously referred to is a drive belt 72.

Mounted upon the lower frame members 7 of the frame structure 1, is an electric motor 75 provided with a drive pulley 76. Trained around the drive pulley 76 and a belt pulley 78 keyed to the shaft 68 is a drive belt 79.

From the above it will be seen that upon operation of the electric motor 75, shafts 68, 62, and 57 are rotated causing a corresponding rotation of the sprocket wheels 55 and 56 effecting travel of the elevator chains 51 and 52 and the transverse bars 53 thereof in the direction indicated by the arrow 80 in Fig. 1 so as to elevate cans from a source of supply and discharge the same at the rear end of the elevator 35 into a discharge chute 81 carried thereby and upon the front end of the can table 17.

Simultaneously with the operation of the elevator 35, shaft 44 is rotated by means of belt pulley 71, 48 and drive belt 72 effecting reciprocation of the can table 17 by means of the eccentric disc 43 and pitman 41 previously referred to. During operation of the elevator 35 and can table 17 in the manner described, the cans deposited upon the front end of the can table travel from the front end to the rear end thereof past the can aligning rods 36 and can aligning springs 37 and 38. While the cans travel past the can aligning rods 36 and the can aligning springs 37 and 38, they are aligned with their axes parallel to the channels or troughs 31 and deposited lengthwise therein. It should be noted, however, that due to the continuously increasing slope of the can table 17, the cans travel along the same at a continuously accelerating speed so that successive cans in each guide channel 31 are widely separated from each other when they reach the rear end of the can table 17.

Positioned at the rear end of the can table 17 is a can discharge and diverting unit 95 for receiving the aligned cans from the can table and for discharging them in a rolling procession from the machine.

This can diverting unit comprises a frame structure 96 including horizontal frame members 97 and 98 secured with their front ends to the rear legs 4 and 5 respectively of the frame structure 1. Braces 101 and 102 secured to the frame members 97 and 98, respectively, near their rear ends and the lower ends of the legs 4 and 5 are employed to give the frame structure 96 sufficient rigidity. Secured to the rear ends of the frame members 97 and 98 and extending transversely across the rear end of the machine is a sprocket wheel casing 103 having a front wall 106, a rear wall 107 and a top wall 108. The sides and the bottom of said casing are open (see Fig. 1).

Carried by the frame structure 96 and secured to the front wall 106 of the casing 103 is a can discharge chute 110 comprising opposing sidewalls 111 and 112 held in spaced relation with respect to each other by means of spacing rods 113. Mounted on the inner sides of the walls 111 and 112 in inclined position are opposing guide rails 115, 116, 117 and 118. The guide rails 117 and 118 are positioned above the guide rails 115 and 116 (see Fig. 6) and are shorter than the same. One of the ends $115a$, $116a$, $117a$ and $118a$ of the guide rails 115 to 118 is bent upwardly (see Figs. 2 and 6). The spacing between the side walls 111 and 112 is slightly larger than the length of the sanitary cans to be handled by the machine, while the spacing between the guide rails 115 and 116 and the guide rails 117 and 118 is less than the length of the cans so that two can chutes 120 and 121 are formed with the can chute 121 positioned above the chute 120 (see Fig. 6). The can chutes 120 and 121 are open at their ends 122 and 123 respectively and discharge the cans into a can chute 124 (see Figs. 2 and 6).

Rotatably mounted within bearings 130 of a

bearing bracket 131 (see Figs. 4, 5, 7 and 8) mounted between the frame members 97 and 98 and extending transversely of the machine slightly below the rear ends 32 of the guide rails 22, and bearings 132 secured to the front wall 106 of the casing 103, are can aligning and discharging rods 133. One discharge rod 133 is provided for each guide rail 22 and is arranged in alignment therewith directly below the same (see Figs. 2 and 4 to 8). Each can discharge rod is provided with annular grooves 136 and 137. The rods are spaced from each other a distance slightly greater than the diameter of the body portion of the cans, but less than the flange diameter of the cans so that the cans deposited upon the rods lengthwise therebetween are supported on their flanges between adjacent rods. The grooves 136 and 137 are of such depth that when the cans are in such position that the flanges thereof are in registration with the grooves, the cans are no longer supported by the rods 133 and drop downwardly therebetween into the can chutes 120 or 121. To effect a proper discharge of the cans from the rods 133 into the chutes 120 and 121, the grooves 136 and 137 are in correct alignment therewith and the rear wall 112 is rearwardly inclined as shown at 140 in Fig. 4 in such a manner as to properly guide the cans into the can discharge chute 110 (see Fig. 4).

The rear ends 141 of the can aligning rods 133 extend through the bearings 132 into the casing 103 (see Figs. 4 and 5) and fixed to the rear end 141 of each can aligning rod by means of a set screw 142 is a sprocket wheel 143. Rotatably mounted within bearings 144, 146 and 147 (see Fig. 1) is a shaft 148. The bearing 144 is carried by a bearing bracket 151 secured to the lower transverse frame member 12 at the rear end of the machine (see Fig. 1) while the bearings 146 and 147 are secured to or form integral parts of supporting plates 152 and 153 attached to the side walls 111 and 106 of the discharge chute 110 and casing 103, respectively.

Keyed to the rear end of the shaft 148 adjacent the rear wall 107 of the casing 103 is a sprocket wheel 156 and trained around the same and the sprocket wheels 143 of the can aligning rods 133 is a sprocket chain 157 (see Fig. 3).

Keyed to the front end of the shaft 148 is a bevel gear 161 which intermeshes with a bevel gear 162 keyed to a transverse shaft 163 rotatably mounted within bearings 164 and 165. The end 166 of shaft 163 carries a sprocket wheel 167 keyed thereto and trained around the same and a sprocket wheel 168 keyed to shaft 44 is a sprocket chain 169.

From the above, it will be seen that upon rotation of the shaft 44, shafts 163 and 148 are rotated causing a corresponding rotation of the can discharge rods 133 in a common direction.

Operation

Upon operation of the motor 75, the elevator 35 is actuated so as to feed cans from a source of supply to the machine and to deposit the cans upon the front end of the can table 17. The clutch lever 55 is shifted so as to engage the male clutch member 50 with the female clutch member 49 to effect reciprocation of the can table 17 and to rotate the can discharge rods 133 in a common direction.

By reason of the reciprocating movement of the can table 17, and the rearward declination of the same, the cans deposited in promiscuous positions upon the front end of the can table 17 by the elevator 35 are advanced from the front of the table toward the rear end thereof past the can aligning wires 36 and can aligning fingers 37 and 38. Some of the cans will enter the troughs 31 in properly aligned position, i. e., with the axes parallel to the same while others will lie across the troughs 31. Some of these cans are aligned and deposited into the troughs when they engage the aligning wires 36. Any cans still remaining in unaligned position engage the spring fingers 37 and/or 38 and are bounced backward by the same until they drop into the channels with their axes parallel to the same. In this manner all of the cans advanced over the can table 17 are aligned with their axes parallel to the guide channels 31 and are deposited lengthwise therein.

After the cans have passed the can aligning fingers 38 and while the same are now in properly aligned position within the guide channels 31 and continue their travel endwise in spaced relation with respect to each other toward the rear end of the can table 17, they advance past the rear end 18*a* of the can table bottom 18 and are thereupon solely supported between adjacent guide rails 22 and finally slide from the same and are deposited lengthwise between adjacent can supporting rods 133.

The rear ends 32 of the guide rails 22 extend over the can aligning rods 133 in such a manner that they do not obstruct the grooves 136 and 137 thereof during reciprocation of the can table 17. The rear ends of the guide rails 22 are further so positioned with respect to the grooves 136 that the leading end of each can sliding along the ends 32 of the guide rails 22 is so held and supported by the same that during advancement of the cans toward and upon the can aligning rods, the flange 171 of the cans (see Fig. 4) is prevented from entering the grooves 136. In other words, the positional relation between the ends of the rails 22 and the grooves 136 is such that the leading ends of the cans do not drop onto the rods 133 until the leading can flanges 171 have passed over the grooves 136 of adjacent rods 133. Thereupon, the cans tip over so that their flanges 171 will contact the supporting rods 133 somewhere in the region between the grooves 136 and 137 as shown in the dotted lines in Fig. 4.

After the cans have tipped over, in the manner above described, the reciprocating movement of the guide rails 22 causes them to slide completely onto the can discharge rods so that the cans are now supported on their flanges lengthwise between adjacent rods. Due to the inclined position of the supporting rods and the rotation of the same, which causes a corresponding rotation of the cans supported thereon, the cans slide along the rods 133 until the flanges 171 and 172, at opposite ends of the cans are in registration with the grooves 136 and 137 of the can supporting rods. In view of the fact that the bottoms of the grooves 136 and 137 of adjacent separating rods are spaced apart a distance greater than the flange diameter of the cans and the portion of the rods intermediate their grooves are spaced a distance greater than the diameter of the body portion of the cans, the cans are no longer supported by the rods when the can flanges are in registration with the grooves 136 and 137 and the cans drop downwardly between the aligning rods 133 into the discharge chute unit 110 and fall thereupon into one of the individual can chutes 120 or

121 formed by the guide rails 115, 116 and 117, 118 in conjunction with the front and rear walls 111 and 112, respectively, of the discharge unit 110. The inclined rear wall portion 140 of the rear wall 112 of the can discharge unit 110 functions to properly guide the falling cans into one of the respective chutes 120 or 121 positioned below the same. In this manner the aligned cans of each guide channel 31 delivered to the can diverting unit 95 are deposited into the can delivery chute 120 or 121, respectively, from which they discharge sidewise in rolling procession in view of the inclination of the guide rails 115, 116, and 117 and 118 and roll into a common can assembly chute 124 which arranges the cans in a single file and conveys them in said order to any desired location.

It frequently happens that cans are dented during handling and processing. Such cans have a wider diameter at portions adjacent their dents and if they are deposited upon the can supporting rods 133 with their wider diameter transversely disposed between the rods they may not drop downwardly between the same although the flanges of the cans are in registration with the grooves 136 and 137. This is due to the fact that the wider diameter of the body portion of the dented cans may be larger than the distance between adjacent rods 133. Such dented cans remain therefore supported between adjacent rods and are rotated thereby until the cans assume a position in which their wider diameter is no longer located transversely between adjacent rolls, i. e., the cans are disposed with their normal diameter between adjacent rolls in which position they will immediately drop downwardly between the rods 133 into the can discharge unit 110.

Fig. 7 diagrammatically illustrates two positions a dented can may assume in which it is supported between adjacent rods with its wider diameter disposed transversely between the rods while the can flanges are in registration with the grooves 136 and 137. In one position the dented portion 190 (shown in full lines) of the can may be disposed above the rod 133 at the left hand side of Fig. 7, in another position the dented portion 191 (shown in dotted lines) may be disposed above the rod 133 at the right hand side of Fig. 7. In either position the wider diameter is transversely disposed between adjacent rods and exceeds the distance between adjacent rods so that the can cannot discharge therebetween.

While the can is held in this manner between adjacent rods the rotation of the rods 133 in a common direction as indicated by arrows 192 in Fig. 7 causes rotation of the can in the direction of arrow 193 so that the dented portion 190 and the wider diameter of the can adjacent the same are turned until they assume a position as indicated at 190*a* (in full lines) in Fig. 8 in which the normal diameter of the can is transversely disposed between adjacent rods and the can drops downwardly therebetween. If the dented portion of the can is in a position as shown in dotted lines at 191 in Fig. 7 the can is turned until the dented portion is substantially in a position as shown in dotted lines at 191*a* in Fig. 8 and the can is disposed with its normal body diameter between adjacent rods so that it will discharge therebetween.

It is therefore apparent that irrespective of the dented condition of the cans, the cans deposited upon the can aligning rods 133 are discharged therebetween into the can discharge chute 120 or 121, which in turn deliver the cans into the can assembly chute 124 wherein the aligned cans are assembled into a single file and conveyed to any desired place of use.

In the modified structure disclosed in Fig. 9 only alternate can aligning rods 133ª are provided at their rear ends 141ª with sprocket wheels 143ª, which are fixed thereto for rotation therewith, while the remaining can aligning rods 133ᵇ are freely rotatable. Trained around the sprocket wheels 143ª and the sprocket wheel 156, fixed to shaft 148, is a sprocket chain 157ª so that upon rotation of the shaft 148 and sprocket wheel 156 in a manner as previously described herein only the can aligning rods 133ª are positively rotated to effect rotation of the cans supported between the can aligning rods 133ª and 133ᵇ, while in turn the rotation of the cans causes rotation of the can aligning rods 133ᵇ in contact therewith.

To prevent slipping between the can aligning rods 133ª and the cans and to assure rotation of the cans the aligning rods 133ª are roughened or knurled as shown at 133ᶜ in Fig. 10. Otherwise the structure and operation of the modified disclosure shown in Figs. 9 and 10 is the same as previously described herein.

While I have described particular embodiments of the present invention, it will be understood that various changes and modifications may be made without departing from the spirit of the present invention and the scope of the appended claims.

Having thus described my invention and in what manner the same may be used, what I claim and desire to protect by Letters Patent is:

1. A can aligning machine comprising an inclined table provided with troughs for receiving cans in lengthwise position therein, inclined parallel rods forming continuations of said troughs, means for reciprocating said table for advancing the cans along said troughs and for discharging them upon said rods lengthwise therebetween, said rods being spaced from each other a distance less than the flange diameter of the cans, but more than the normal body diameter of the cans and being provided with opposed grooves for registration with the flanges on the cans, the spacing between opposite grooves being larger than the flange diameter of the cans, whereby the cans discharged upon the rods slide therealong and discharge there-between upon registration of the flanges of the cans with said grooves, means for insuring the discharge of out of round cans between said rods comprising drive means associated with said table reciprocating means for rotating the rods in a common direction incident to the reciprocation of said table to thereby rotate the out of round cans supported by said rods until their normal diameters are disposed crosswise of the rods and the cans discharge there-between upon registration of their flanges with said grooves.

2. A can discharge device for can handling machines, comprising parallel can supporting rods, means rotatably mounting said rods in spaced position for receiving cans lengthwise therebetween, said rods being spaced from each other a distance less than the flange diameter of the cans, but more than the normal body diameter of the cans and being provided with opposed grooves for registration with the flanges on the cans, the spacing between opposite grooves being larger than the flange diameter of the cans, and means for rotating said rods in a common direction to rotate out of round cans supported by said rods until a portion of normal diameter of the

cans is disposed transversely of the rods and the cans discharge there-between when the flanges of the cans are in registration with the grooves of said rods.

3. A can handling machine comprising a table over which cans are advanced, a pair of inclined grooved parallel rotatable rods adjacent said table for receiving the cans lengthwise therebetween, said grooved rods being spaced from each other a distance less than the flange diameter of the cans, but more than the normal body diameter of the cans and being provided with opposed grooves for registration with the flanges on the cans, the spacing between opposite grooves being larger than the flange diameter of the cans, and means for rotating one rod of said pair of rods in such manner as to rotate out of round cans supported thereon so as to dispose their normal diameters transversely of the rods to allow such cans to drop between the rods when their flanges register with said grooves.

4. A can discharge device for can handling machines comprising a pair of parallel rotatable can supporting rods provided with opposing grooves and spaced from each other a distance less than the flange diameter of the cans, but more than the normal body diameter of the cans and being provided with opposed grooves for registration with the flanges on the cans, the spacing between opposite grooves being larger than the flange diameter of the cans, and drive means for rotating one of said rods of said pair of rods to rotate an out of round can supported by said rotatable rods until a portion of normal diameter of the can is disposed transversely of the rods and the can discharged there-between when the flanges of the can are in registration with the grooves of said rods, said driven rod being provided with a roughened surface portion to assure rotation of the can in contact therewith.

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