July 21, 1953 C. H. NEER 2,646,156

ELEVATOR DIVIDER

Original Filed Sept. 24, 1945 7 Sheets-Sheet 1

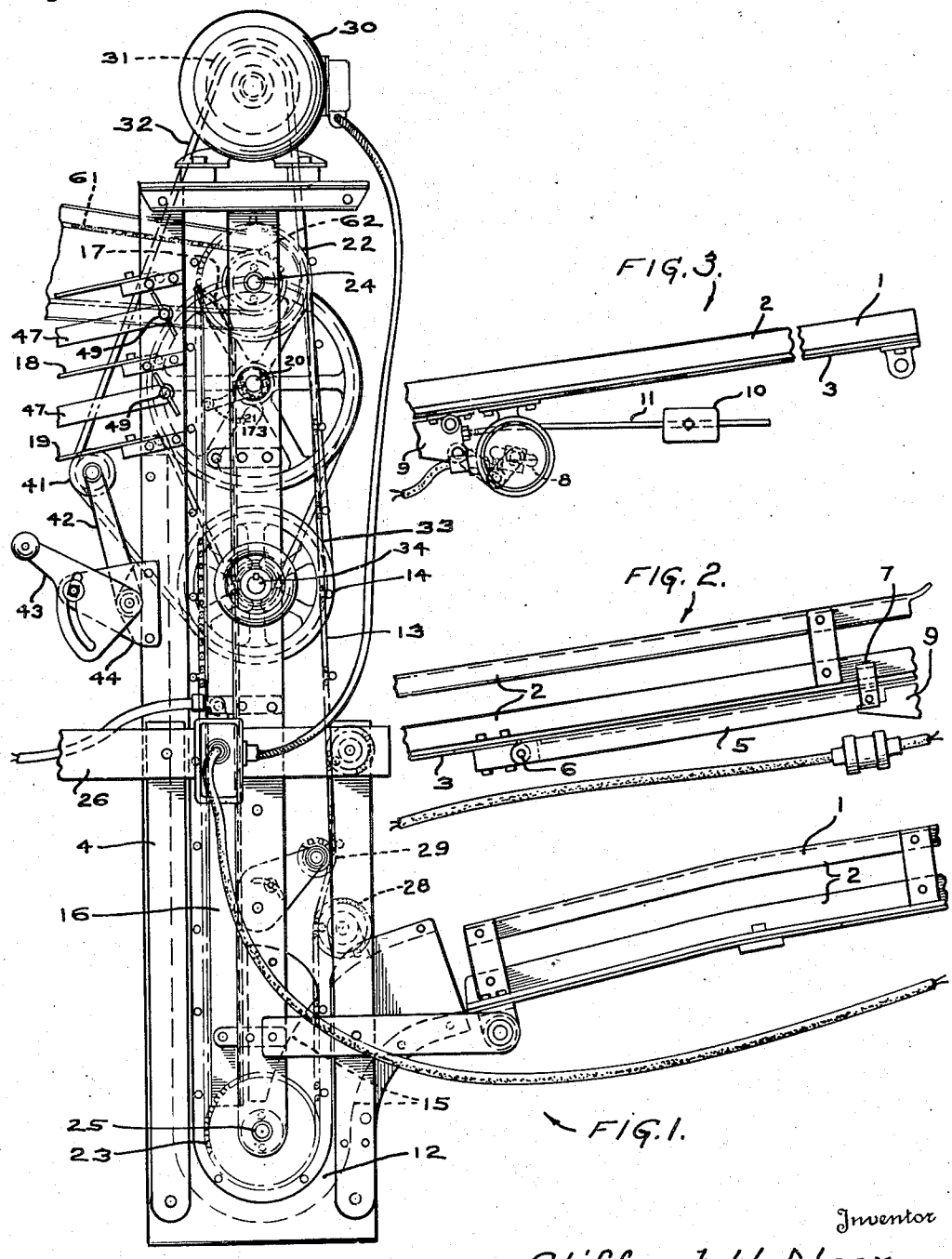


FIG. 1.

FIG. 3.

FIG. 2.

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ELEVATOR DIVIDER

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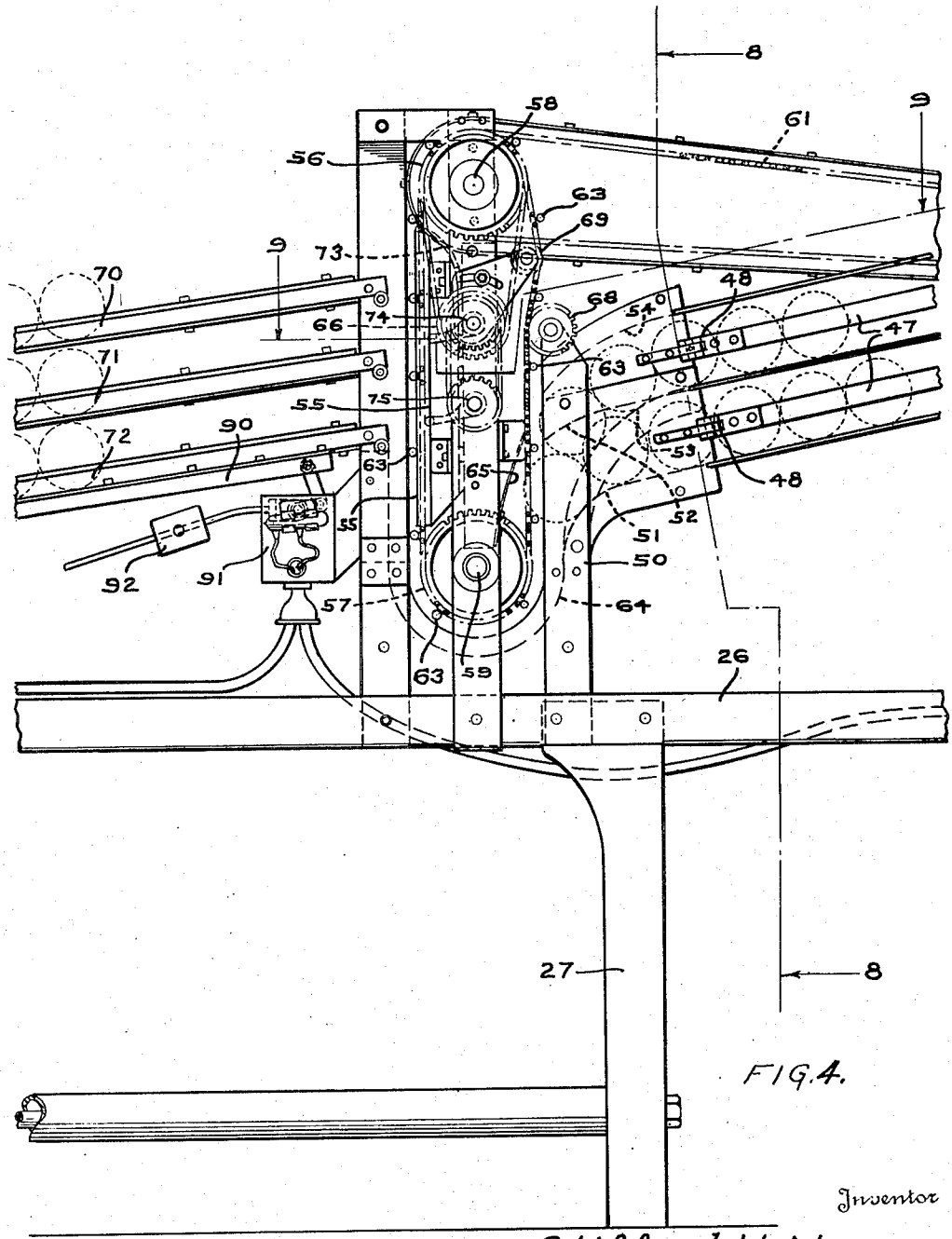


FIG. 4.

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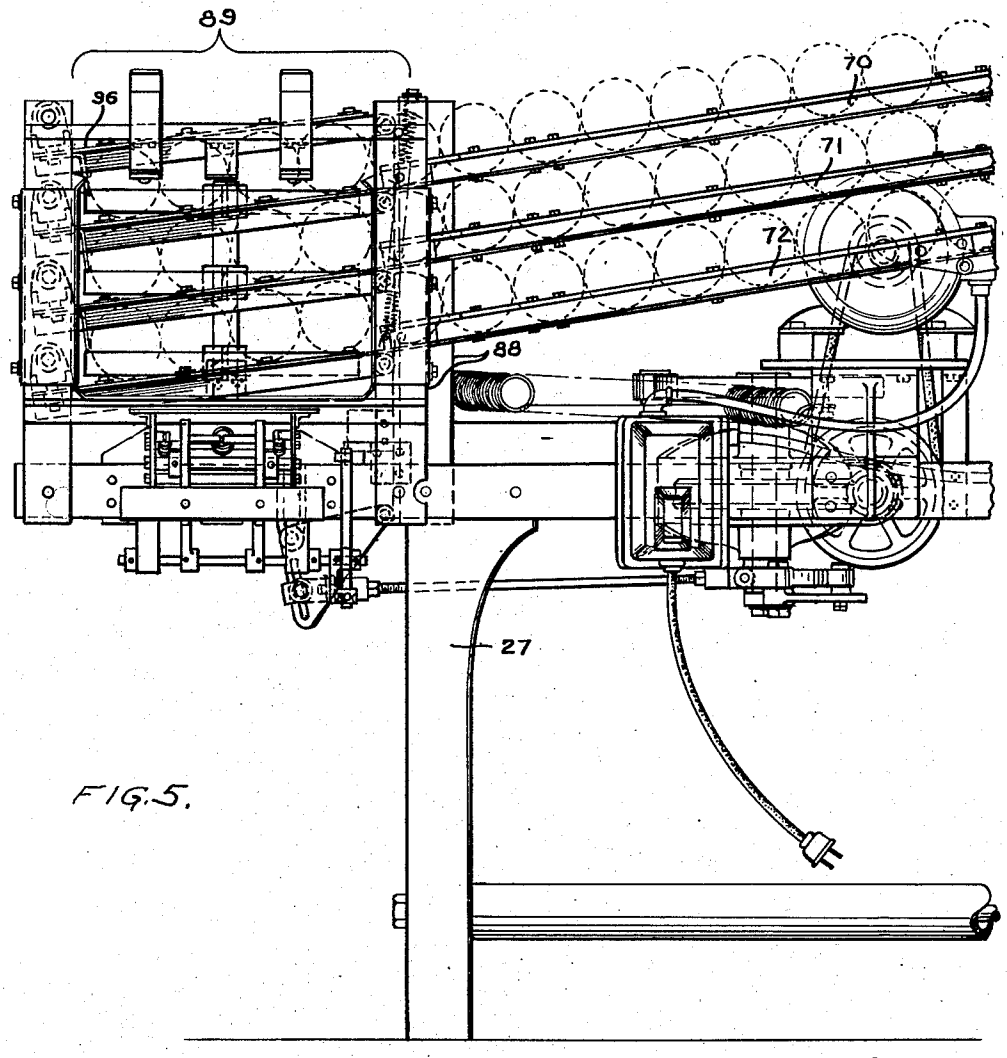


FIG. 5.

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ELEVATOR DIVIDER

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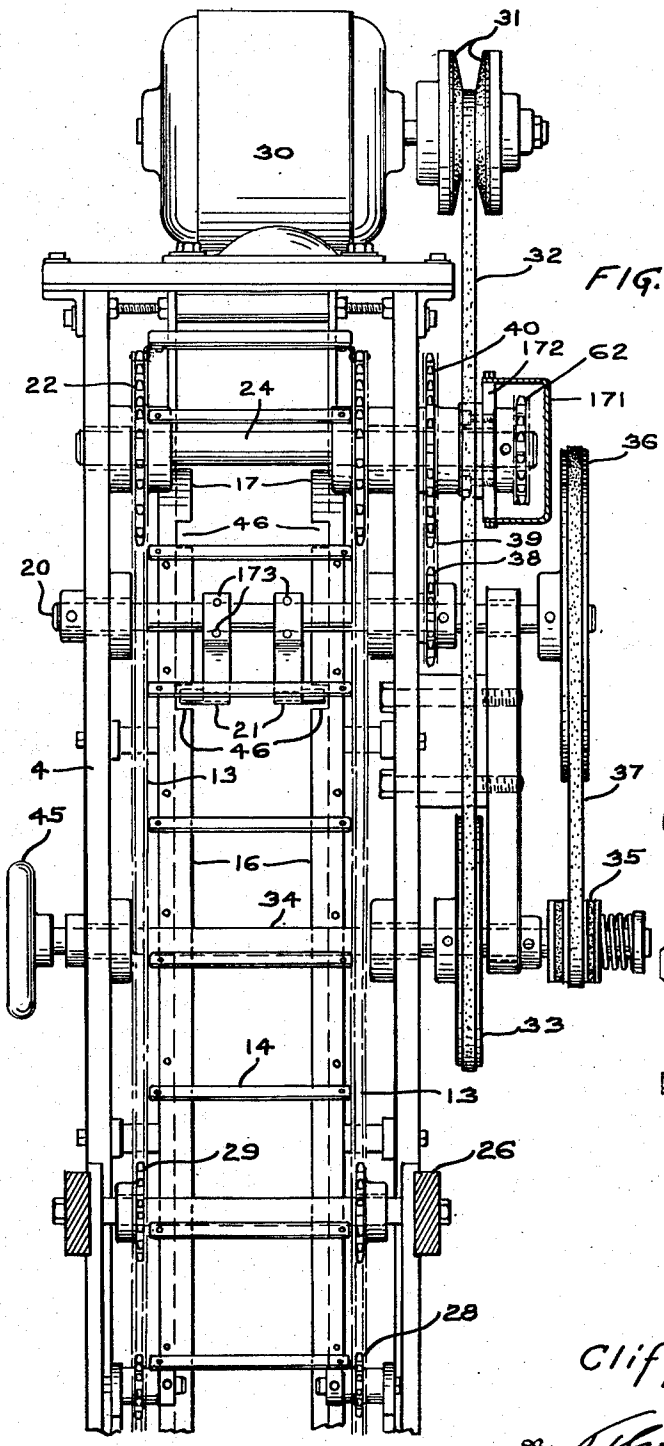


FIG. 6.

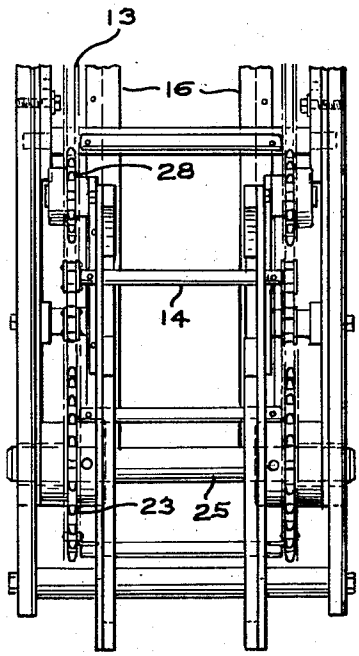


FIG. 7.

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ELEVATOR DIVIDER

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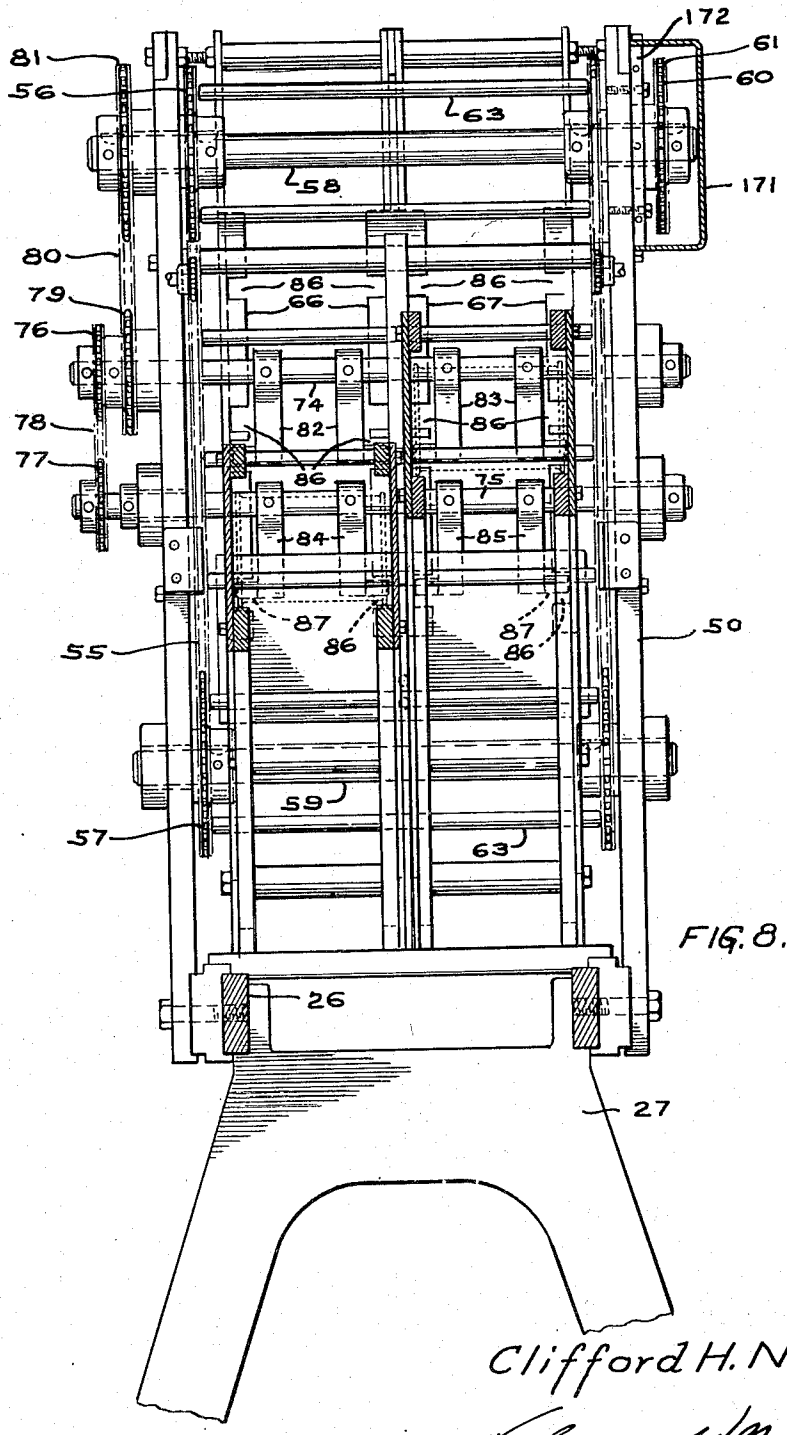


FIG. 8.

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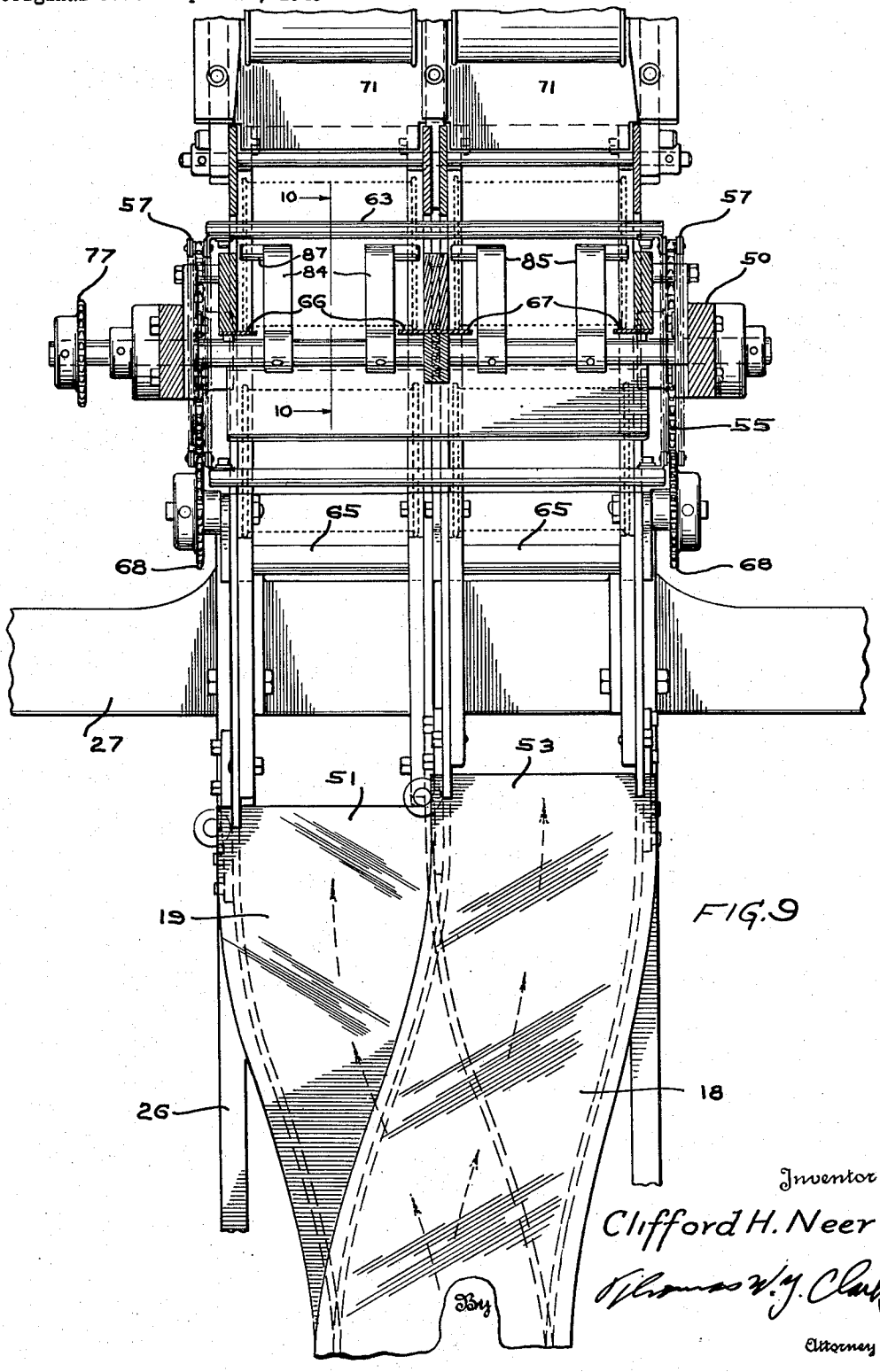


FIG. 9

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ELEVATOR DIVIDER

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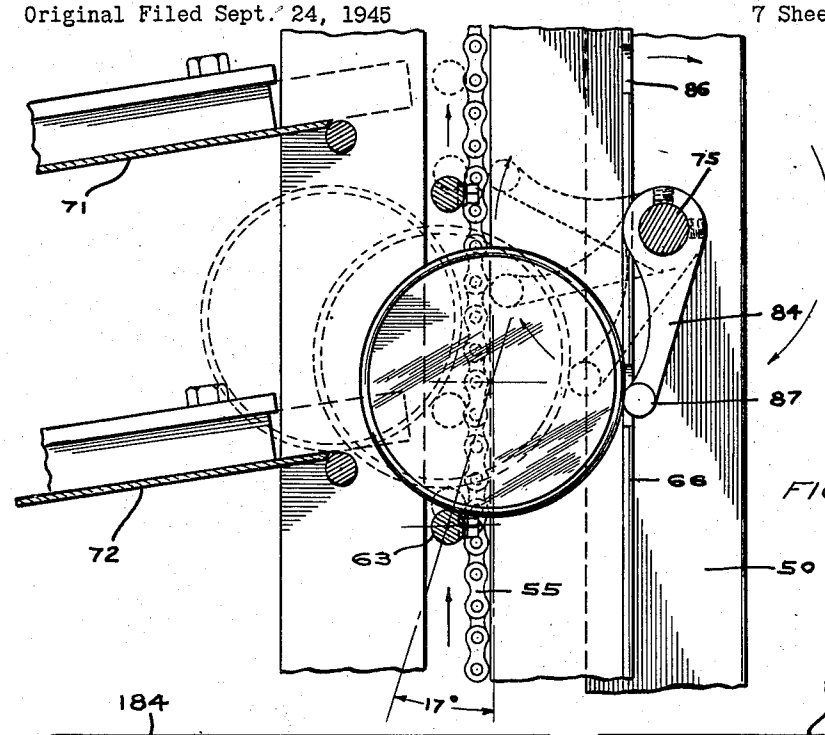


FIG. 10.

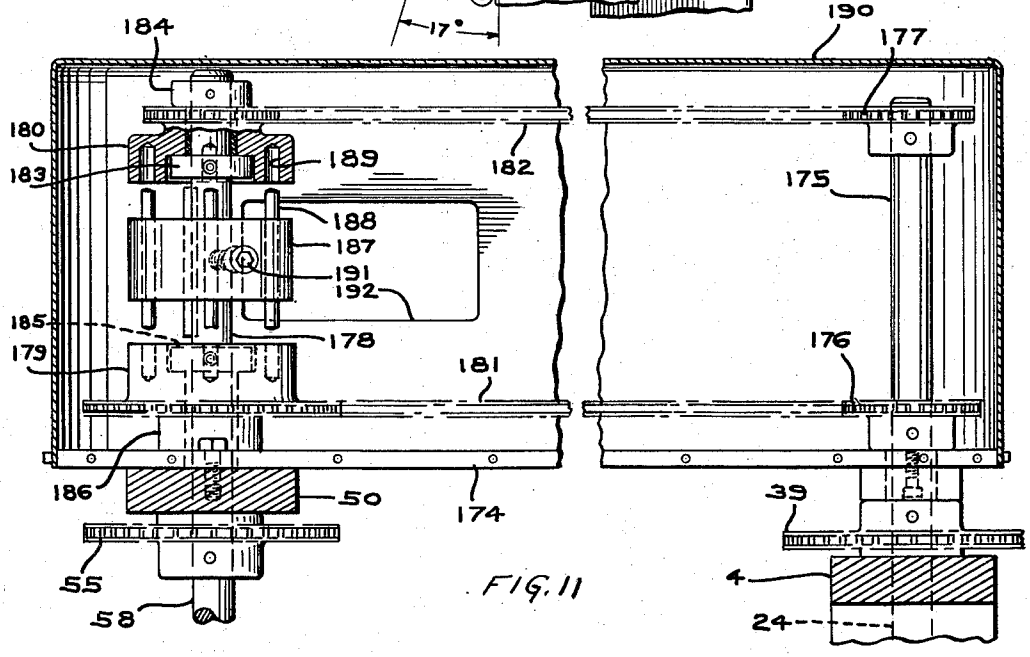


FIG. 11

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2,646,156

UNITED STATES PATENT OFFICE

2,646,156

ELEVATOR DIVIDER

Clifford H. Neer, Baltimore, Md., assignor to Burt Machine Company, Inc., Baltimore, Md., a corporation of Maryland

Original application September 24, 1945, Serial No. 618,278. Divided and this application August 2, 1948, Serial No. 42,040

9 Claims. (Cl. 198—31)

1

This invention relates to a case filling machine, particularly to a machine for filling cases or cartons with cans that have previously been filled and labeled and in preparation for storage or shipment. Such machines are composed of a plurality of ways or tracks over which the cans roll, and they are taken from a single rolling line and arranged into a plurality of rolling lines, side by side and in tiers so that they may be placed in cases or cartons of varying sizes. One object of this invention is to arrange the cans from a single line into these multiple parallel lines.

It is an object of the present invention to avoid forceful movement of the cans on their ways or moving mechanism that may crush or otherwise injure or deform the cans.

Another object of the invention is to make a machine that may be adapted to fill cases with several tiers of cans or one layer only, and the elements of which may be adapted to machines for casing any desired number of layers of cans, or any desired number of cans in the rows of each layer.

Another object of the invention is to make a machine that will operate quietly, and with a minimum of supervision and from which cans that may become out of line may be quickly removed without interfering with the complete case charge and assembly.

Another object of the invention is to so arrange the timing of the different operations that there will be the least possible lost time or action between those operations, and so that if for any reason the supply of cans to the machine were delayed, the line dividing means would be stopped, and yet which will permit any full case loads in the magazine of the machine to be cased.

Another object of the invention is to arrange the cans in the magazine or section of the machine just prior to their passage to the casing section evenly, rather than filling one of the section ways and then another.

This application is a division of the application filed September 24, 1945, Serial No. 618,278, Patent No. 2,559,655, July 10, 1951, directed to the case filling part of the machine.

In the machine of the present invention cans roll on their sides in a single runway, which is inclined downwardly toward the machine and which may receive the cans from any preceding operation machine such as a labeler, and roll to the lower end or boot of an initial one track elevator-divider. This elevator-divider carries the cans around under its boot and elevates them substantially vertically to two inclined runways

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which are superimposed at their upper ends which are connected to the elevator-divider and the elevator-divider discharges the cans, each alternate can going to one of the respective runways. These runways are also inclined downwardly and they diverge outwardly from one another so that at their delivery ends they are no longer superimposed but they rather deliver two rows of cans abreast of one another. These two rows of cans are then dropped into the boot of a second elevator-divider having again a single elevator but with two tracks or sets of guides, or sections, each section receiving cans from one of the preceding runways. This elevator then raises the two lines of cans, again substantially vertically and two groups or tiers of three superimposed runways each is attached to the delivery side of this elevator-conveyor, one tier for each section and the cans are discharged from the elevator-conveyor so that all the cans of each section go to one tier of runways and every third can goes to the same receiving runway of that tier. There are two groups or tiers of these superimposed ways, so that each group receives three rows of superimposed cans and the cans are arranged as they leave this elevator three deep and two abreast as they roll down the runways. From these runways the cans are delivered to a casing apparatus described in the above identified copending application.

The instant machine is also designed so that it may be operated to produce a single layer of cans for each carton in which case only half of the second elevator-divider would be utilized.

Other objects and advantages of the invention will be apparent from the following description and the accompanying drawings, in which:

Figure 1 is a side elevation of the infeed end of the machine, showing the first elevator-divider.

Figure 2 is a side elevation of the can runway switch actuating shelf.

Figure 3 is a side elevation of the infeed switch.

Figure 4 is a side elevation of the second elevator-divider, being a continuation to the left of Figure 1.

Figure 5 is a side elevation of the rear end of the machine, being a continuation from the left of Figure 4.

Figure 6 is a front elevation of the upper part of the elevator-divider of Figure 1.

Figure 7 is a similar view of the lower portion of the elevator-divider shown in Figure 6.

Figure 8 is a front view of the elevator-divider shown in Figure 4 substantially on line 8—8 of Figure 4.

Figure 9 is a plan view, partly in section, substantially on line 9—9 of Figure 4.

Figure 10 is a partial sectional view substantially on line 10—10 of Figure 9.

Figure 11 is a partial sectional view of a modification of the drive for the second elevator-divider.

Similar numerals refer to similar parts throughout the several views.

The initial runways 1 have sides 2 and a bottom 3, and in the runway feeding the first elevator-divider 4, and somewhat removed from it, the bottom 3 has a hinged section 5, hinged at 6 and having an angle bracket 7 on each side to limit its vertical swing. "Mercoid" switch 8 which is open when no cans are on the runway, is operated by the swinging shelf 5 through pivoted angular member 9 to close the switch when a line of cans accumulates in the runway 1 and up to the swinging shelf 5. The elevator-dividers of the machine do not operate until this switch is closed. The weight required to tilt the switch 8 may be varied by adjustment of the weight 10 on the bar 11 attached to the member 9.

The runways 1 feed the cans into the boot 12 of the first elevator-divider 4 which consists of endless chains 13 having flights or bars 14 thereon. The cans entering the boot fall between two flights. As the cans enter the boot 12 they ride between guides 15 and are pulled around and up by the flights 14 and then the cans ride between the flights 14 and upon the guides 16, the cans being slightly overbalanced toward the guides 16. As shown in Figure 10, this overbalance is about 17° from the vertical. The guides 16 at the top are turned upwardly and outwardly as at 17 to guide or push the cans off the conveyor flights 14.

Toward the top of the elevator-divider 4 are two runways 18 and 19 and the curved part 17 of the guides 16 would force all cans to runway 18 were not other provision made. Immediately opposite the opening of runway 19 is a shaft 20 having pushers 21 thereon. These pushers rotate with the shaft 20.

The conveyor chains 13 ride over upper sprockets 22 and around lower sprockets 23 which sprockets are on shafts 24 and 25 respectively mounted in the frame of the elevator-divider 4. This frame is supported on rails 26 of the machine and these rails are in turn supported by frames 27. The conveyor chains 13 have slack take up sprockets 28—29, the latter being adjustable. A motor 30 furnishes power through speed varying pulleys 31 and belt 32 driving pulley 33 fast on shaft 34 which in turn drives slip pulley 35 and pulley 36 fast to shaft 20 through means of belt 37. Shaft 24 is driven from sprocket 38 on shaft 20 by chain 39 and sprocket 40 on shaft 24. Belt 32 on speed varying pulley 31 may be tightened or loosened by pulley 41 on arm 42 fast to hand lever 43 which may be fixed in position on bracket 44. The sections of pulley 31 are urged together by spring means. Handwheel 45 on shaft 34 may be used to move the chains 13 small distances.

The flights 14 are so placed upon the conveyor chains 13 and the ratio of the sprockets is such that the pusher shaft 20 on which the pushers 21 are fixed rotate them once, or one revolution, with the passage of every other flight of the chains 13 so that in the machine shown every other can in the elevator-divider 4 will be discharged on shelf 19 and the remaining can on the conveyor passes to the top of the guides 16 and

is pushed by the inclined portion 17 of the guide 16 onto the shelf or runway 18. The pushers 21 at their outwardly extending ends pass through openings 46 in the guides 16.

As best shown in Figure 10, illustrating a portion of the second elevator-divider, the action of the conveyor flight is to slide the can up the guide, and the first contact of the pusher is to unbalance the can, to roll it forward, off the flight, and the can tilts forward to the runway, and as it becomes overbalanced outwardly, the continued upward movement of the flight further overbalances it, so that both the flight and the pusher force the can to the runway down which it rolls.

This elevator-divider 4 divides the group of cans received as a single line into two lines, initially superimposed and the elevator-divider 4 has its motor connected with the switching mechanism 8 so that the elevator-divider is operated only when the initial runways 1 are full of cans, at least as far from the elevator-divider 4 as the pivoted shelf 5. When cans are lacking on this pivoted shelf 5 the elevator-divider conveyor operation is stopped. It will be noted that the drive for the conveyor of the elevator-divider being non-positive because of the slipping driving pulley 35, the conveyor will not crush the cans if by any chance they should be misplaced.

The runways 18 and 19 have side members 47 which are pivoted at one end at 48 and are fastened at the other end with thumbscrews 49 so that the side members 47 could be quickly opened and an unsuitable can removed by the operator without disturbing the other cans in the runway. The runways 18 and 19 fork outwardly at their lower delivery ends as shown in Figure 9, so that they enter the second elevator-divider 50 shown best in Figures 4 and 8 substantially abreast by means of guides 51—52 and 53—54.

The second elevator-divider 50, mounted on rails 26, has in it chains 55 riding on upper and lower sprockets 56 and 57 respectively, these sprockets being on shafts 58 and 59 respectively and shaft 58 is driven by sprocket 60 fast thereon and chain 61 from sprocket 62 on shaft 24 of the first elevator-divider 4. The chains 55 have on them flights 63.

Guides 51—52 and 53—54 drop the cans between the flights 63 in the lower part or boot of the elevator-divider 50, in two rows, each of which is guided in its entrance by guides 64 and 65 and between which the cans pass on their entrance to the flights. As the cans pass around the bottom of the elevator-divider 50, in two rows, they are lifted by flights 63 into two sets of guides, 66 and 67.

The flights 63 on the chains 55 are slightly over twice the height of the cans in length so that they carry the two rows of cans abreast in their movements. This is best shown in Figure 8.

The chains 55 likewise have slack take-up sprockets 68 and 69, the latter being adjustable.

Adjacent elevator-divider 50, and supported thereon at their upper ends are two horizontally spaced groups of three shelves or inclined runways 70, 71 and 72. These are inclined downwardly away from the elevator-divider 50. Elevator-divider 50 has the two sets of guides 66 and 67 against which the cans ride in overbalanced position when carried upwardly by the flights 63, see Figure 10. Toward the top the guides are directed outwardly as at 73, so that when a can reaches the top of the guides it is pushed from the flights 63 to the top runway 70.

The guides 66 and 67 curved at their tops 73, act upon the cans to overbalance them outwardly, at which time the flights 63 aid in their further removal from the conveyor to the runways.

Below shaft 58 are shafts 74 and 75 having sprockets 76 and 77 thereon connected by chain 78 and shaft 74 has sprocket 79 thereon connected by chain 80 with sprocket 81 on shaft 58 from which the two other shafts 74 and 75 are driven. Shafts 74 and 75 have sets of pushers 82, 83, 84 and 85 thereon. Guides 66 and 67 have openings 86 therein for the passage of the extending ends 87 of the pushers therethrough. Again the spacing of the flights 63 on chains 55 and the relation of the size of the sprockets is such that every third can in each vertical set of runways is moved by a pusher 84 or 85, to one of the runways 72 and two adjacent cans, above those discharged on runways 72 are discharged to runways 71 and two cans, on the flights 63 riding above the four previously discharged reach the upper part of the guides 66 and 67 and are pushed from the guides by the sloping portion 73 onto the two runways 70. By this action six cans, two abreast and three deep are rolled from the elevator-divider 50 with every complete rotation of the shafts 74 and 75.

The runways 70, 71 and 72, each numeral referring to two runways abreast are fixed at their lower ends to uprights 88 on rails 26 and deliver the rolling cans from the magazine formed by these runways to the loading space indicated generally at 89. The length of these runways, of the magazine section, is such as to hold substantially two charges for the loading space and the upper end of one runway 72 has a pivoted bottom section 90 which operates a "Mercoid" switch 91 to shut off both elevator-dividers 4 and 50 when the magazine is full. The bottom 90 of the runway is counterbalanced by counterweight 92 so that the switch may be made to operate when precisely the right weight is upon the lower runway 72 and the machine thus far described operates continuously to fill the magazine when cans are on the initial runway 1 and it stops operating when the magazine is full.

The loading space 89 is fully described in the above designated copending application.

As shown in Figures 6 and 8, sprockets 60 and 62 and chain 61 are enclosed in a housing 171, fast to a panel 172 passing between elevator-dividers 4 and 50.

At times it is desirable to operate the machine to fill a carton with one layer of cans, and the machine as shown may be readily adapted to that purpose. Elevator-divider 4 would then have its pushers 21 removed from their shaft 20. As shown in Figures 1 and 6, these pushers are mounted on the shaft by means of a split collar, with bolts 173 to hold them together. When the pushers are removed, all cans will be removed from elevator-divider 4 by the curved top of guides 16, and pass to the upper runway 18.

Figure 11 shows an alternate form of drive for elevator-divider 50, which may be installed originally if desired. In this drive, a panel 174 connects elevator-dividers 4 and 50, and shaft 24 is elongated, as shown at 175, and has on it two sprockets, 176 and 177. Likewise shaft 58 is extended, with a section 178, on which are mounted two clutch sections 179 and 180, to freely rotate thereon. These sections both have sprockets integral therewith, driven by chains 181 and 182 from sprockets 176 and 177. Collars 183 and 184, and 185 and 186 maintain the longitudinal positions of clutch members 180 and 179 on the shaft 178. Shaft 178 has splined thereon clutch 187, which has pins 188 therein projecting on each side, these pins being adapted to be placed in holes 189 in either clutch member 179 or 180.

When elevator-divider 4 is feeding to both runways, 18 and 19, the clutch 187 is set to operate clutch member 179. When only runway 18 is fed, clutch 187 is set to operate clutch member 180; this doubles the speed of elevator divider 50, but, of course, the delivery capacity of the machine is cut in half, because only single layers of cans are delivered to the loading space 89. A housing 190 covers the drive mechanism just described and clutch 187 is held in its longitudinal position on shaft section 178 by set screw 191, to which access may be had through opening 192 in housing 190.

Many modifications and changes of proportion and design may be made in the illustrative form of the structure described and shown in the drawings without departing from the invention.

What is claimed as new and is desired to be secured by Letters Patent is:

1. In a can arranging machine, a plurality of inclined ways for the rolling of cans thereon superimposed at their upper ends, a distributor adjacent the said upper ends of said ways, means to feed a continuous line of cans to said distributor, said distributor comprising guides, a power driven conveyor having flights thereon, each flight receiving a can from said means, said conveyor cooperating with said guides carrying a can to adjacent the upper ends of each of said ways and means in said distributor to periodically discharge adjacent cans from said conveyor to different ones of said inclined ways, certain of said discharge means comprising a continuously rotating pusher timed to contact and push its respective can from said conveyor to the adjacent inclined way.

2. In a can arranging machine, a plurality of inclined ways for the rolling of cans thereon superimposed at their upper ends, a distributor adjacent the said upper ends of said ways, means to feed a continuous line of cans to said distributor, said distributor comprising a continuously driven conveyor means adjacent the face of the upper ends of said ways, said conveyor means having flights thereon, each flight receiving a can from said feed means and continuously carrying the cans to discharge position, one adjacent each of said ways, means to push one can from the conveyor to one of said ways and continuously operating rotary pushing means to periodically push the adjacent can to another of said ways.

3. In a can arranging machine, a plurality of inclined ways for the rolling of cans thereon superimposed at their upper ends, a distributor adjacent the said upper ends of said ways, means to feed a continuous line of cans to said distributor, said distributor comprising a continuously driven endless conveyor having flights therein, said feeding means feeding a can to each flight, said conveyor carrying a vertical row of cans to the upper ends of said ways, one in front of each way, and means to periodically discharge adjacent cans to their respective adjacent different ways, certain of said last named means comprising a continuously rotating pusher timed to contact and push its respective can from the conveyor to the adjacent inclined way.

4. In a can arranging machine, a plurality of inclined ways for the rolling of cans thereon, superimposed at their upper ends, a distributor adjacent the said upper ends of said ways, means to feed a continuous line of cans to said distributor, said distributor comprising an endless conveyor having flights therein, said feeding means feeding a can to each flight, said conveyor carrying a vertical row of cans to the upper ends of said ways, one in front of each way and guides pushing certain of said cans from the conveyor to one way and continuously rotating power driven means to contact and pushing other of said cans to other of said ways.

5. A rolling can line separator comprising a power driven conveyor, means to feed a continuous line of rolling cans to the conveyor, a plurality of inclined ways for the rolling of cans thereon superimposed at their upper ends, the upper end of each way being adjacent said conveyor, said conveyor carrying a continuous line of cans opposite the upper ends of each way and separate means to push each adjacent can from the conveyor to different ways, certain of said separate means comprising a continuously rotating pusher timed to contact and push its respective can from said conveyor to the adjacent inclined way.

6. A rolling can line separator comprising a power driven conveyor, means to feed a continuous line of rolling cans to the conveyor, a plurality of inclined ways for the rolling of cans thereon superimposed at their upper ends, the upper end of each way being adjacent said conveyor, said conveyor carrying a continuous line of cans opposite the upper ends of each way and separate means to push each adjacent can from the conveyor to different ways, certain of said separate means comprising a continuously rotating pusher timed to contact and push its respective can from said conveyor to the adjacent inclined way, means controlled by said feeding means to stop the conveyor in the absence of a continuous line of cans in said feeding means.

7. A rolling can line separator comprising a power driven conveyor, means to feed a continuous line of rolling cans to the conveyor, a plurality of inclined ways for the rolling of cans thereon superimposed at their upper ends, the upper end of each way being adjacent said conveyor, said conveyor carrying a continuous line of cans opposite the upper ends of each way, one in front of each way, a guide to push certain of said cans to one of said ways and continuously rotating power driven means to contact and push other of said cans to other of said ways from the conveyor.

8. A rolling can arranger comprising a power driven conveyor, means to feed a continuous line of rolling cans to the conveyor, a plurality of inclined ways for the rolling of cans thereon, the upper end of each way being superimposed over the next lower way and being adjacent said conveyor, said conveyor carrying a continuous line of cans opposite the upper end of each way and means to push each adjacent can from the conveyor to different ways, each of said ways diverging horizontally from each of the others at their lower ends and a sectioned power driven conveyor one section receiving the cans from each of said ways, a plurality of groups of superimposed inclined ways for the rolling of cans thereon the upper end of each said way of one group being adjacent one section of said last named conveyor, each section of said last named conveyor carrying a continuous line of cans opposite the upper end of each of said superimposed ways of each group and means to push each vertically adjacent can from its conveyor section to different vertically superimposed ways of the respective group.

9. A can arranging machine, a plurality of inclined ways for the rolling of cans thereon superimposed at their upper ends, a distributor adjacent the said upper ends of said ways, means to feed a continuous line of cans to said distributor, said distributor comprising guides, a power driven conveyor having flights thereon, a boot within which said conveyor operates, said boot guiding a can from said feed means to space one can between each pair of adjacent conveyor flights, said conveyor being spaced from said guides to overbalance the cans toward the guides, said conveyor cooperating with the guides to carry a can to adjacent the upper ends of each of said ways, means in said distributor to periodically discharge adjacent cans from said conveyor to different ones of said inclined ways, certain of said discharge means comprising a continuously rotating pusher timed to overbalance its respective can from the conveyor and urge it to the adjacent inclined way.

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