

July 18, 1967

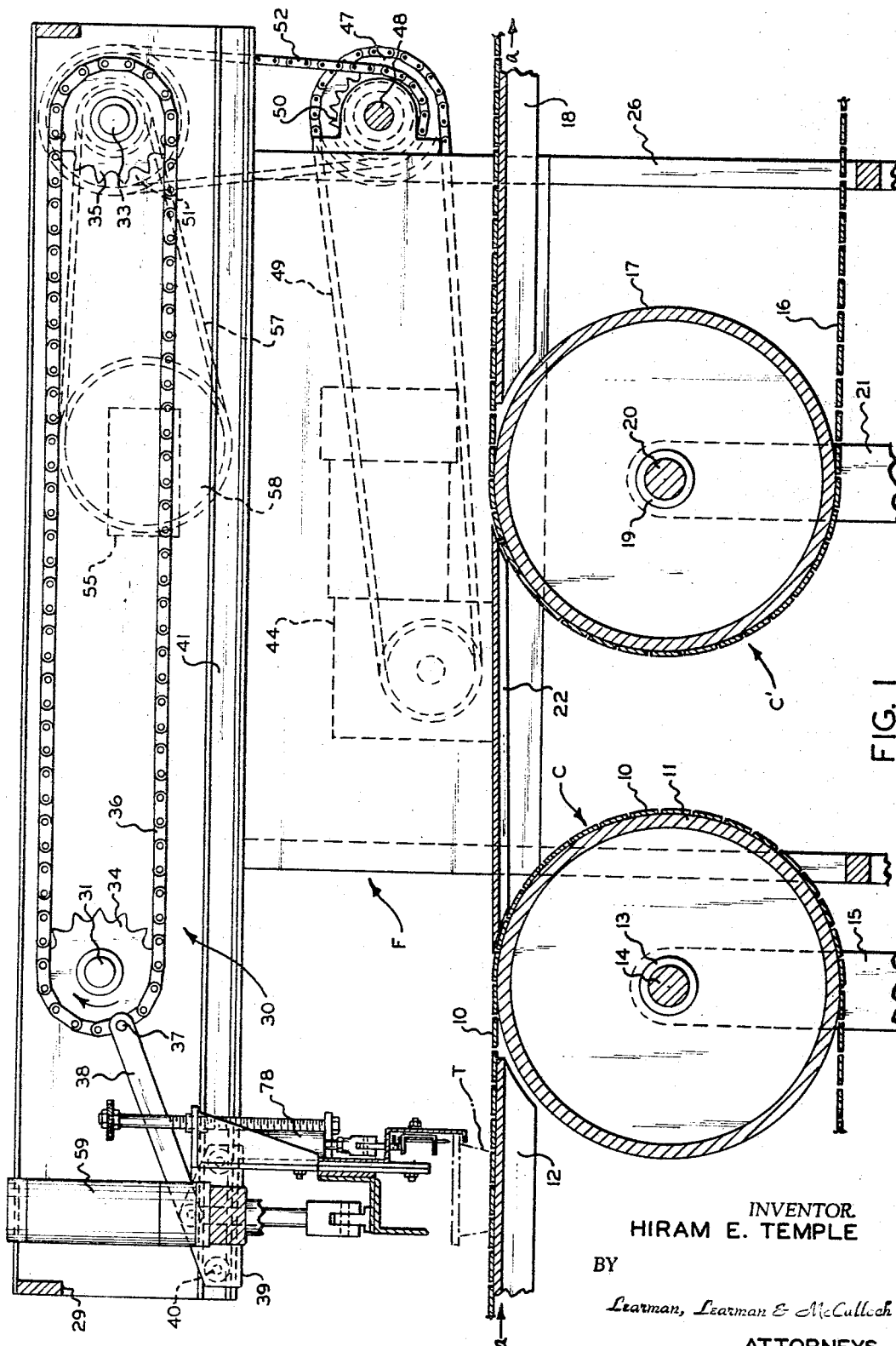
H. E. TEMPLE

3,331,485

FOIL TIN TRANSFER DEVICE

Filed April 1, 1965

5 Sheets-Sheet 1

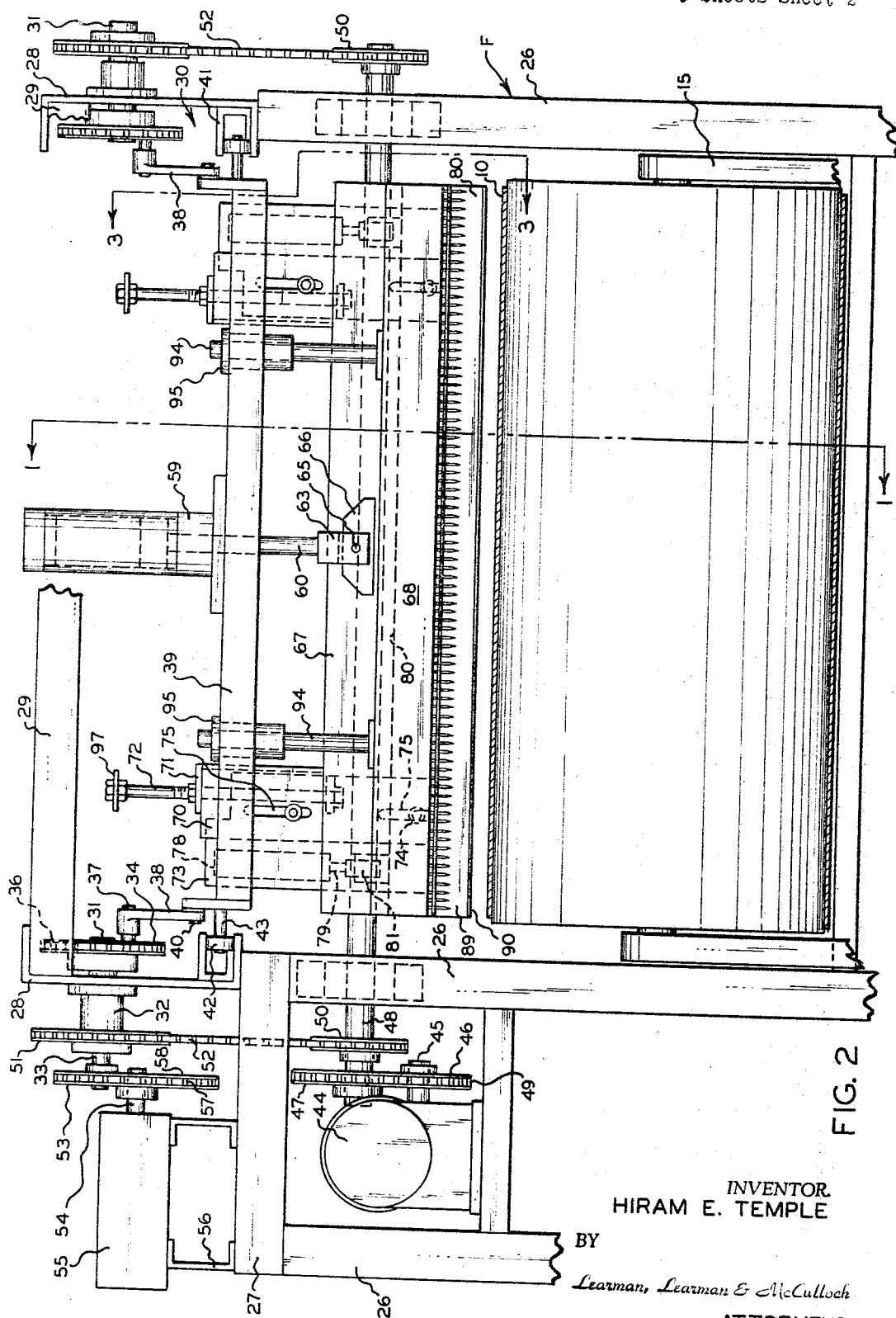


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5 Sheets-Sheet 2



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FOIL TIN TRANSFER DEVICE

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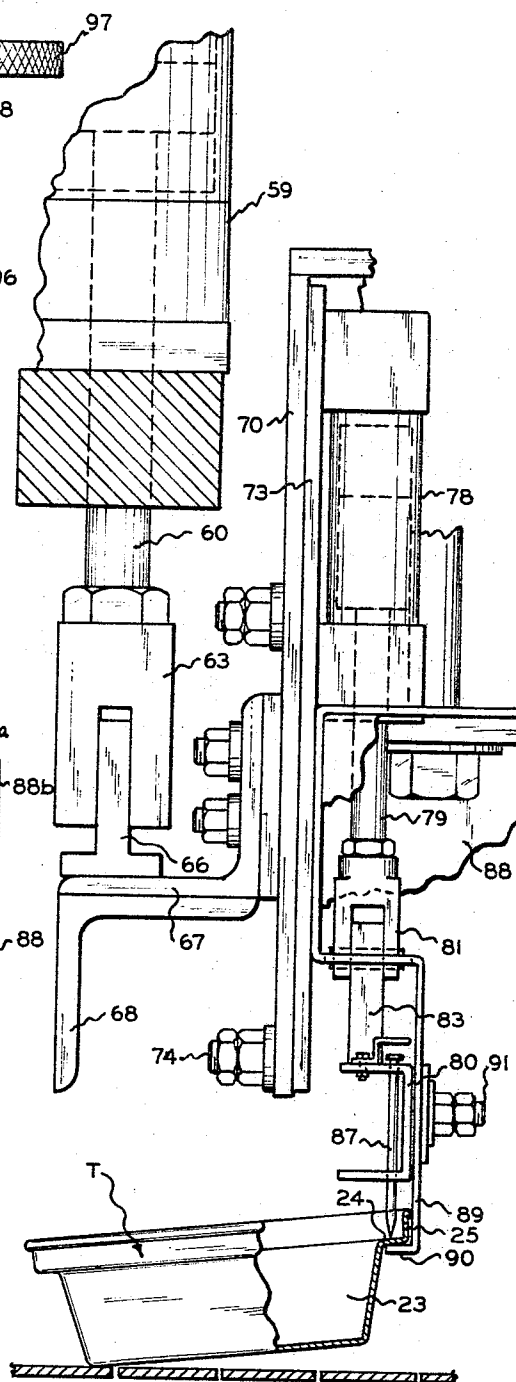


FIG. 5

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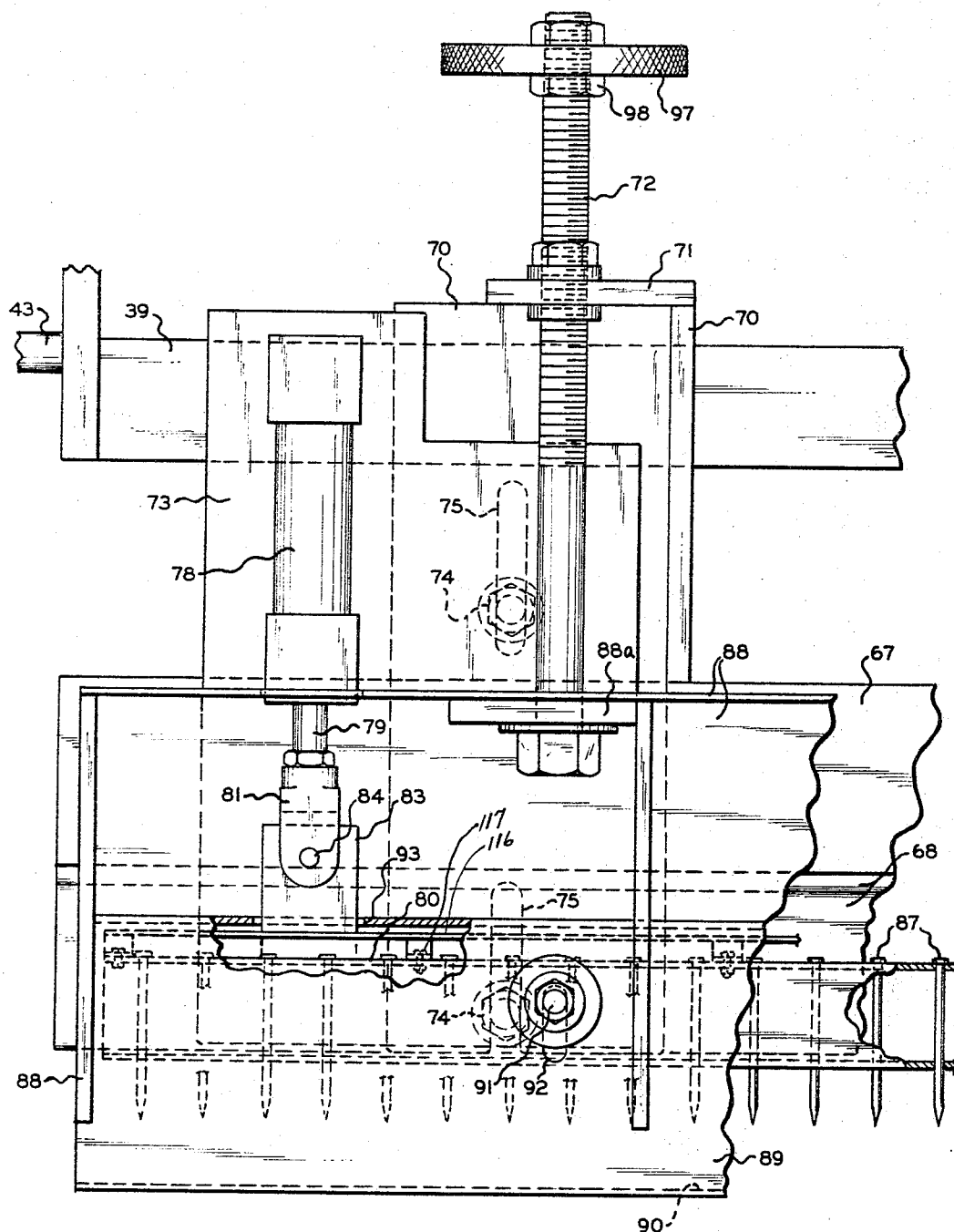


FIG. 4

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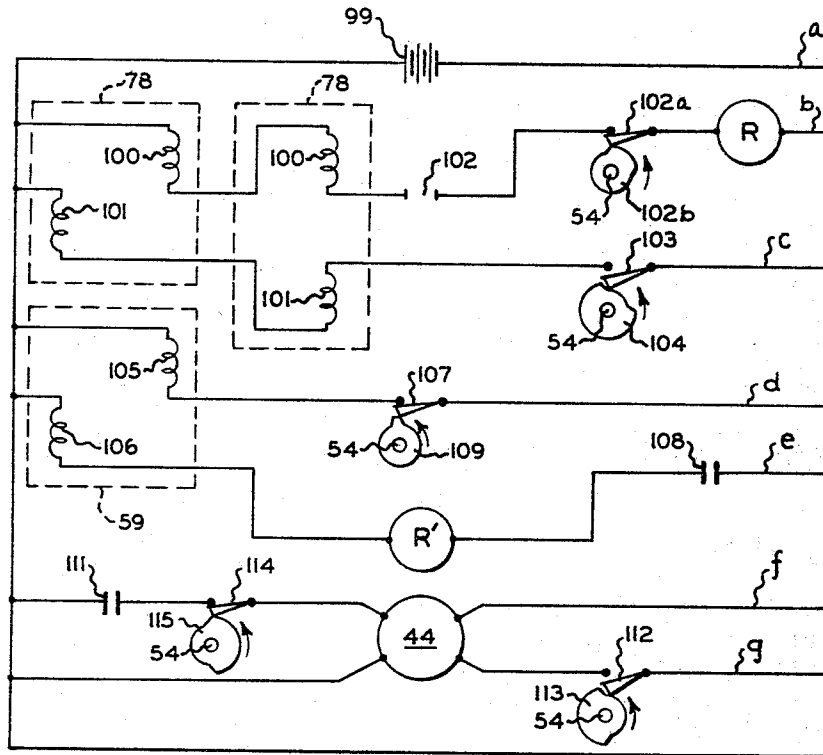


FIG. 6

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3,331,485

FOIL TIN TRANSFER DEVICE

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10 Claims. (Cl. 198-24)

This invention relates to transfer devices, and more particularly to transfer apparatus capable of moving foil tins containing farinaceous products from one position to another without in any way damaging or deforming the tins. Throw-away tins of the character indicated may be about .003 to .004 inch in thickness and, as they come from the oven, contain coffee cakes and the like. The shape of the tin will be dictated by the shape of the product it is to receive, and apparatus of the character mentioned must be capable of transferring both round and oblong tins and also tins of various sizes.

Generally speaking, tins of the character which will be illustrated include at their upper ends a horizontal rim portion and an upwardly extending terminal rim portion which is shaped to receive and resiliently hold a paper cover disk or the like on the horizontal portion. Thus, if the transfer machinery in any way damages the upwardly extending terminal rim portion particularly, subsequent machinery may be rendered incapable of fitting the cover on the container or the container may be deformed so that it cannot hold the cover in sealed relation and such products will have to be removed from the processing line. It is very difficult to deal with tins of the thickness mentioned, which are so easily bent and deformed, and the result has been a relatively high percentage of discards in processing lines.

One of the prime objects of the present invention is to design transfer apparatus capable of smoothly transferring a transverse row of 36 to 48 product filled tins from an oven to a cooler without in any way damaging the tins and rendering them unsuited to their purpose.

A further object of the invention is to provide apparatus capable of advancing the tins at a relatively high rate of speed which will move a single row of tins the relatively great distance from the oven to the cooler and returning in the time that the following row of tins, which may be only 1/2 inch removed as the tins come from the oven, proceeds a distance equal to the width of the tins, or a distance of perhaps 6 to 7 inches.

A further object of the invention is to design transfer apparatus of the type described which is capable of handling round tins as well as oblong tins, and of handling a wide variety of tins of widely varying size in a processing plant.

A still further object of the invention is to design transfer apparatus capable of handling tins which have been deformed to some extent, so that tin jams in the oven are avoided.

Other objects and advantages of the invention will be pointed out specifically or will become apparent from the following description when it is considered in conjunction with the appended claims and the accompanying drawings, in which:

FIGURE 1 is a side elevational view showing the transfer apparatus disposed in position above an oven conveyor and the cooler conveyor to which the products are being transferred, the view being taken on the line 1-1 of FIGURE 2 and the gripping apparatus being shown in position to grip tins coming from the oven;

FIGURE 2 is a left end elevational view of the apparatus shown in FIGURE 1;

FIGURE 3 is an enlarged, fragmentary, side elevational view more particularly illustrating the tin gripping

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members in position to be dropped vertically to engage the tin shown;

FIGURE 4 is a fragmentary, end elevational view thereof;

FIGURE 5 is a view similar to FIGURE 3 with the gripper assembly raised to lift the tin to the transfer position;

FIGURE 6 is a typical electrical circuit for the elements which operate the apparatus.

Referring now more particularly to the accompanying drawings, wherein I have shown a preferred embodiment of the invention only, the aluminum foil tins which are to be transferred are generally designated T and are shown in FIGURE 1 proceeding from left to right on an oven conveyor generally designated C, which includes an endless hearth plate member 10 trained around a discharge end, tubular roller 11 and longitudinally extending guides 12. The roller 11 may be driven continuously at a relatively slow rate of speed, dependent on the baking time involved, and has hub portions 13 fixed on a shaft 14 which is journaled by bearing posts 15. Also shown in FIGURE 1 is the endless advance conveyor, generally designated C', of a cooler or other processing unit to which the tins T are to be delivered. The conveyor member 16 is preferably an endless grid which, in FIGURE 1, is shown trained around a charge end, tubular roller 17 and longitudinally extending guides 18. The roller 17 may have its hubs 19 fixed to a shaft 20 which is journaled by bearing posts 21. Both the endless members 10 and 16 are driven in the direction a in any suitable and conventional manner and a bridging plate 22 is supported between them in any suitable manner from framework generally designated F supporting the transfer apparatus which will be presently described.

The tins T (FIGURE 3), which contain products 23, have laterally directed rim portions 24 and upwardly directed rim portions 25 so that a cover may be placed on the laterally directed portions 24 and be resiliently held in position by the upwardly directed wall portions 25. It is thus important that the wall portion 25 of the tins T not be bent outwardly or inwardly, in order not to create problems in the apparatus for covering the containers.

As shown particularly in FIGURE 2, the framework F includes vertical members 26 which, on one side of the apparatus are connected by a horizontal platform 27. Fixed on the platform 27 at one side and on members 26 at the other are channel side members 28 which are connected by transverse brace members 29 and provide a housing for transfer operating apparatus generally designated 30 which moves the dependent gripper assembly generally designated G from the conveyor C to the conveyor C' and back again. At the left end of both the side channel 28 shown in FIGURE 1 and the opposite side channel 28, a stub shaft 31 is journaled in a bearing 32 supported on the respective channel member 28, and at the opposite right end of the apparatus 30 in FIGURE 1 similar stub shafts 33 are journaled in similar bearings supported on the side members 28. Sprockets 34 and 35 are fixed on each of the shafts 31 and 33, respectively, at both sides of the apparatus 30, and chains 36 are trained around the sprockets 34 and 35 as shown. Each of the pair of chains 36 includes an inwardly projecting pin 37 on which a crank arm 38 is journaled and at the opposite ends of arms 38 the crank arms connect with a carriage member 39, the carriage member 39 mounting pins 40 which are pivotally received by the ends of the crank arms 38. Longitudinally disposed tracks 41 are supported by the transfer unit side members 28 in a manner to receive the guide rollers 42, which are journaled on support shafts 43 which extend laterally from each side of carriage 39.

The chains 36 are driven by an electric motor 44 or other suitable drive unit. Provided on the motor 44 is an output shaft 45 on which is a sprocket 46 which is connected to a sprocket 47 on a shaft 48 which spans the transfer apparatus by a chain 49. Sprockets 50 on the shaft 48 drive sprockets 51 on the shafts 33 by means of chains 52 which are trained around the sprockets 50 and 51. Further, a sprocket 53 mounted on one of the rear shafts 33 connects with the shaft 54 of a cam box unit 55, supported on channels 56, via a chain 57 which is trained around sprocket 53 and around a sprocket 58 fixed on the shaft 54. The purpose of this will be later considered.

Mounted on the transfer unit carriage 39, which travels horizontally in tracks 41, is a double-acting, pneumatic cylinder 59 having a piston rod 60 which is threaded as at 61 into the threaded bore 62 of a clevis 63 which is secured in vertically adjusted position by a nut 64. The clevis 63 supports the dependent gripper assembly G and is pinned as at 65 to a member 66 which is fixed to and supports a conveyor-spanning support bar comprising an angle iron assembly made up of angle members 67 and 68 and spacers 68a.

At each side of this angle iron assembly, countersunk screw members 69 secure vertically extending, gripper mechanism mounting plates 70 which include upper plate parts 71 supporting threaded adjusting bolts or shafts 72. Backer plates 73 are mounted for vertical movement on the members 70 by bolt and nut assemblies 74 which extend through slots 75 provided in the strap members 70. The plates 73 are supported by the shafts 72 in a manner which will be described presently. Mounted on the backer plates 73 by means of bolts 77 are double-acting, pneumatic cylinders 78 which have dependent piston rods 79 supporting a gripper member guide channel 80 through clevises 81, piston rods 79 which are threaded into the clevises 81 as at 82, and mount blocks 83 which are pinned to the clevis members 81 as at 84. The transversely extending channel guide 80 includes openings 85 and 86 freely accommodating nails 87 which are supported in relatively closely spaced relation along the length of the guide 80 as shown in FIGURE 2 and constitute very light-weight upper gripper members.

Connecting each backer plate 73 with one of the adjusting shafts 72 is a bracket 88 having an upper flange portion 88a including a reinforcing block 88b, the head portion 72a of each bolt shaft 72 supporting each bracket 88 and thereby each backer plate 73 for vertical movement with each of the shafts 72. Each bracket 88 includes a dependent leg portion 89 projecting below the guide bar 80 which has a horizontally extending terminal flange portion or anvil 90 underlying the nail or pin members 87 and, as shown in FIGURE 5, providing a support gripper surface for the laterally turned rim portion 24 of the tins T. Threaded stud and nut assemblies 91 projecting from the nail or pin supporting guide 80 extend through vertically slotted openings 91 in the portions 89 and insure proper vertical travel of the guide 80 relative to the dependent portions 89 when the piston rods 79 are moved vertically to move the nails into or out of gripping relation. Slots 93 are provided in the brackets 88 to freely pass the blocks 83 when the guide 80 is moved vertically.

Mounted on the angle plates 67 are guide rods 94 received in slide bushings 95 on the carriage 39 to insure true vertical travel of the gripper support assembly 67 relative to the horizontally traveling transfer carriage 39. The adjusting shafts 72, which are supported for axial movement by the plates 70, the shafts 72 extending through threaded openings 96, are provided at their upper ends with knurled adjusting wheels 97 to facilitate the manipulation thereof. Nuts 98 are provided to secure the end wheels 97 in vertically fixed position on the shafts 72.

In FIGURE 6 I have shown a typical circuit diagram including a source of power 99 in a circuit line *a*, and circuit lines *b-g*. The advance and retract solenoids 100 and 101, respectively, of double-acting air cylinder 78 are included in the lines *b* and *c*, respectively, the line *b* being open as at 102 and adapted to be closed by the tins T themselves, and the line *c* including a normally open switch 103 disposed in the cam box 55 and adapted to be closed by a rotary cam 104 positioned in the cam box 55 and driven by shaft 54. The line *b* includes a similar switch 102a controlled by a cam 102b on the shaft 54. Provided in lines *d* and *e* are the advance and retract solenoids 105 and 106, respectively, of the air cylinder 59. Line *d* includes a normally open cam box switch 107 and line *e* a normally open switch 108. Switch 107 is closed at proper times by cam 109 provided also on the cam box shaft 54 and a relay R in line *b* operates to close the switch 108. Circuit lines *f* and *g* are the advance and reverse lines for the motor 44 and include normally open switches 111 and 112, respectively. Switch 111 in line *f* is closed by a relay R' energized when switch 108 is made and switch 112 in line *g* is a cam box switch made by a cam 113 on shaft 54. A cam box switch 114 controlled by a cam 115 is also provided in line *f*.

In operation, the apparatus is initially in the position indicated in FIGURE 3, with the pins or nails 87 raised and the bar 89 lowered, awaiting receipt of the transverse row of tins T proceeding from the oven. When the tins T contact the bar 89, as in FIGURE 3, the gap 102 is closed and, with switch 102a closed, circuit line *b* is made. The advance solenoids 100 of air cylinders 78 are energized to lower nail bar 80 and drop the nails 87 into engagement with the portions 24 of the tins T. If the tins T are round, rather than of oblong configuration as shown, only a few of the nails 87 will, of course, actually be in engagement with the tins. At the time line *b* is made, relay R closes switch 108, which is operated by a time delay device (not shown) so there is a slight delay, and closing of switch 108, after nails 87 have engaged the tins T, makes the circuit to the retract solenoid 106 of air cylinder 59 so that the whole gripper assembly is raised to the position shown in FIGURE 5. At the same time, relay R' closes contacts 111 to energize motor 44, assuming switch 114 is closed, and carriage 39 moves to drag the tins T across the remaining portion of conveyor 10, across bridge plate 22, and onto the conveyor C'. At this point and while the carriage 39 continues to move to the right in FIGURE 1, the retract solenoids 101 in circuit line *c* are energized on closing of the switch 103 by the cam 104 and the nail bar 80 is lifted to raise the nails 87 and release the tin T so that it is deposited on the conveyor C' as the carriage 39 continues to move to the right. By the time the carriage 39 has moved to a position of release, cam 102b has permitted switch 102a to open. Shortly thereafter, motor circuit line *g* is energized so that the motor 44 is driven in the reverse direction. At this time cam 115 has permitted switch 114 to open. Since the piston rod 60 of cylinder 59 is still in retracted position, the member 90 will return over the top of the tins T deposited to the position in which it is shown in FIGURE 1. Just before it reaches the leftward position, as shown in FIGURE 1, the advance solenoid 105 of cylinder 59 is energized by the switch 107 being closed by cam 109 and the gripper assembly is lowered so that part 90 is moved to the position in which it is shown in FIGURES 1 and 3.

To adjust the position of the gripper assembly to transfer pans of different size or shape, hand wheel 97 can be actuated to move backer plate 73 relative to member 70 and thereby provide changed initial positions for the bar 80 and member 90.

In the event one of the cylinders 78 should momentarily be inoperative so that when it suddenly became operative the sharp jerk would tend to displace the nails 87 upwardly out of openings 86, a guard 116 is secured by

bolts 117 to the member 80 to prevent such displacement of nails 87. (Note FIGURES 3 and 4.)

It is to be understood that the drawings and descriptive matter are in all cases to be interpreted as merely illustrative of the principles of the invention rather than as limiting the same in any way, since it is contemplated that various changes may be made in the various elements to achieve like results without departing from the spirit of the invention or the scope of the appended claims.

I claim:

1. Apparatus for transferring articles having lateral rim portions spaced above the bottoms thereof from one position to a second position generally longitudinally remote therefrom comprising: support surface means for the articles; relatively movable, vertically spaced apart members for releasably gripping said rim portions, one of said members comprising a plurality of spaced apart pins; means for raising the gripping means slightly to raise the article, except for an opposite edge, off the support surface means; means for dragging said article across the support surface means and moving the gripping means generally longitudinally to said second position; and means for releasing said gripping means.

2. Apparatus for transferring a row of tins having lateral rim portions from one position to a second position generally longitudinally remote therefrom comprising: support surface means for said tins a first gripper part having a lateral portion disposed in one position a spaced distance above said support surface means and adapted to receive the lateral rim portions of the tins; a second gripper port comprising a row of spaced apart tin contacting members normally disposed a spaced distance above said lateral portion and mounted for relative vertical movement therewith to engage a plurality of tins; means for moving the gripper parts relatively vertically to engage the tin contacting members with the tins; means for moving the gripper parts generally longitudinally to said second position; and means for releasing one of said gripper parts to release the tins.

3. The combination defined in claim 2 in which the second gripper part includes a bar and the tin contacting members comprise dependent pin means mounted thereon.

4. The combination defined in claim 3 in which said pin means comprise nails capable of upward movement relative to said bar.

5. Apparatus for transferring an article from one position to another position generally longitudinally remote therefrom comprising: carriage means; a gripper assembly carried thereby including upper and lower article gripper parts; said upper part comprising a bar means having a series of openings therein; pins carried in said openings and mounted therein for upward movement so that the gripping pressure exerted thereby is a matter of the weight of the pins engaging the article; means preventing said pins from falling completely through said openings; means operable to raise and lower said assembly; means operable to move one of said gripper parts relatively to the other for releasably gripping an edge of the article between said pins and lower gripper part; means moving the carriage generally longitudinally to said second position; means for releasing said gripper parts; and means for returning said carriage.

6. The combination defined in claim 5 in which guard means is mounted a spaced distance above said pins to prevent upward movement thereof beyond a point where they would be removed from said openings.

7. The combination of claim 5 in which means mounts the gripper parts and means operable to move one of said gripper parts relatively to the other for vertical movement on said gripper assembly.

8. Apparatus for transferring a row of product filled tins, having horizontal rim portions bounded by terminal vertical rim portions, from one position to another position generally longitudinally remote therefrom comprising: carriage means; means supporting said carriage means for forward and rearward travel; a dependent gripper part having a lateral portion extending forwardly into the path of the tins so that the tins have their horizontal portions received on the lateral portion; nail bar means mounted on said gripper part for movement vertically thereon; the nail bar means having nail accommodating openings and nails loosely received therein; means responsive to the arrival of tins at said gripper part operative to lower said nail bar means for releasably gripping one end of the article; support surface between said first and second positions; means for raising the gripper part and nail bar means slightly to raise the article to a tilted position on the support surface; means for moving the carriage means generally longitudinally and dragging said article across the support surface to said second position; and means for raising said nail bar means and releasing said tins at the second position while the carriage is still moving longitudinally.

9. Apparatus for transferring a row of product filled tins, having horizontal rim portions bounded by terminal vertical rim portions, from one position to another position generally longitudinally remote therefrom comprising: carriage means; means supporting said carriage means for forward and rearward travel; endless drive and crank means for moving said carriage means in a reciprocating path; a gripper assembly carried by said carriage means and including a support part; threaded shaft means carried by said support part and movable vertically relative thereto; a dependent gripper part having a vertical portion supported by said shaft means and a lateral portion extending forwardly into the path of the tins so that the tins have their horizontal portions received on the lateral portion; a support surface between said first and second positions; pin bar means mounted on said gripper part for limited movement vertically thereon; the pin bar means having pin accommodating openings and pins loosely received therein; means supported by said shaft means, operative to lower said pin bar means for releasably gripping one edge of the tins; means for raising the gripper assembly relative to the carriage to raise the tins to a tilted position on the support surface; and means for moving the pin bar means upwardly, when the carriage means has moved generally longitudinally to said second position and dragged said article across the support surface, for releasing said tins at the second position.

10. A method of transporting deformable tins comprising: mechanically gripping one edge of a tin as it comes from a product treating device raising the tin to a tilted position while supporting it from beneath so that the full weight of the tin is not placed on the edge; and dragging the tin to a second position and releasing it.

References Cited

UNITED STATES PATENTS

2,244,988	6/1941	Fuller	294—103
2,696,927	12/1954	Copping	198—179
2,808,285	10/1957	Robuck	294—103
2,996,204	8/1961	Jensen	214—514
3,198,309	8/1965	Ogawa	198—24

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