Jan. 4, 1938. L. E. LA BOMBARD 2,104,657

MACHINE FOR ARRANGING DISKS HAVING PERIPHERAL PROJECTIONS IN A PREDETERMINED ORDER

Filed July 20, 1935 3 Sheets-Sheet 1

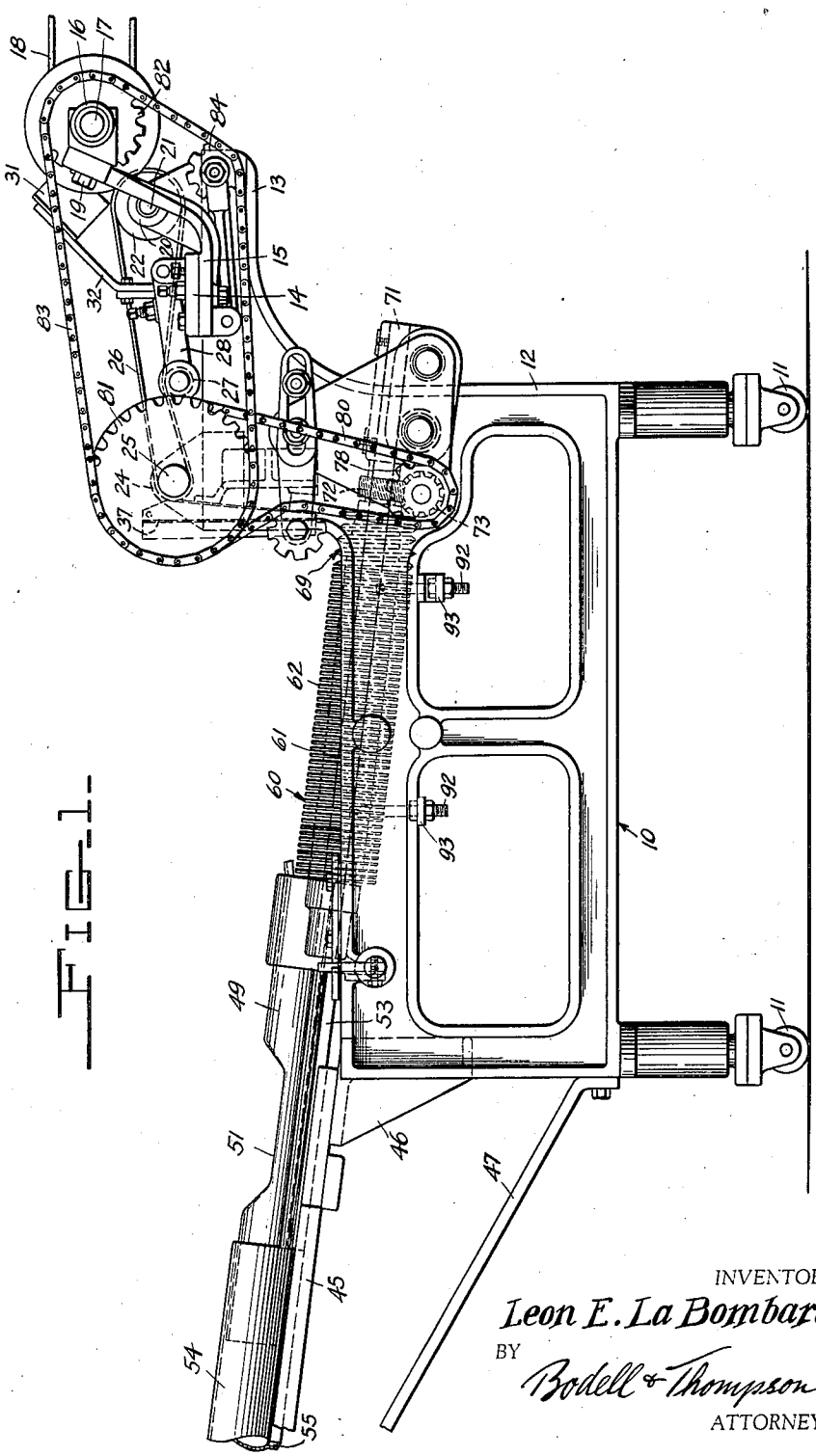

FIG. 1.

INVENTOR:
Leon E. La Bombard,
BY
Bodell & Thompson
ATTORNEYS.

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Filed July 20, 1935 3 Sheets-Sheet 2

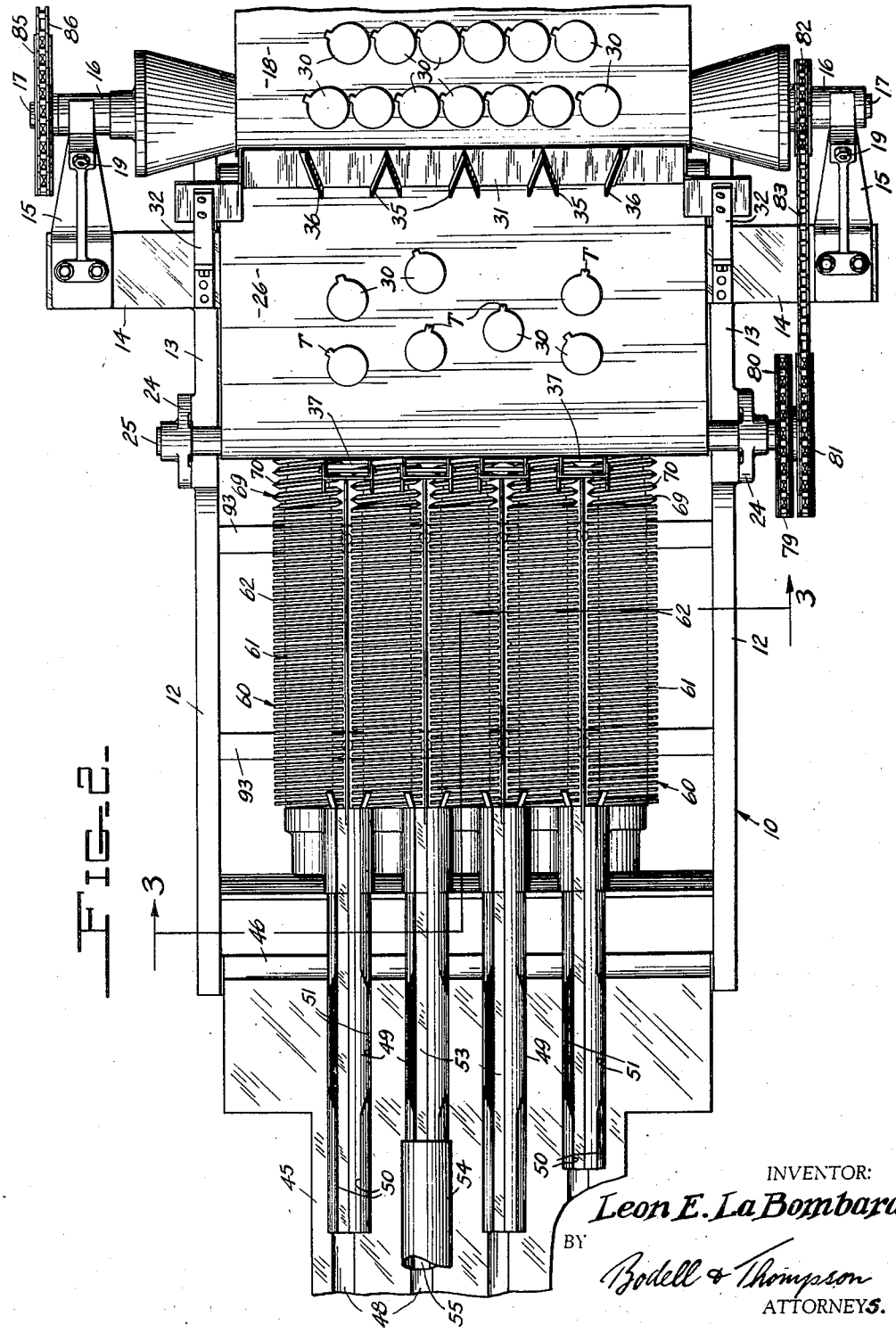

FIG-2-

INVENTOR:
Leon E. La Bombard,
BY
Bodell & Thompson
ATTORNEYS.

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Filed July 20, 1935 3 Sheets-Sheet 3

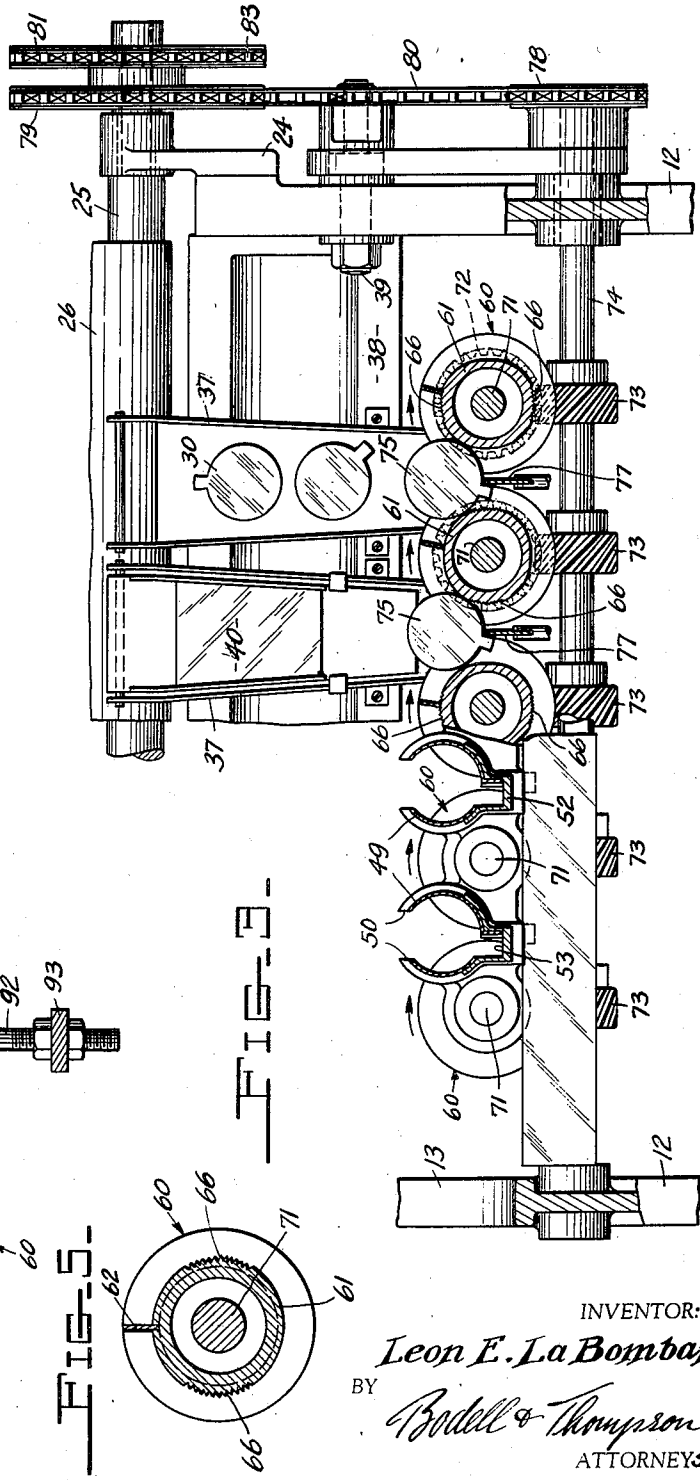

FIG. 4.

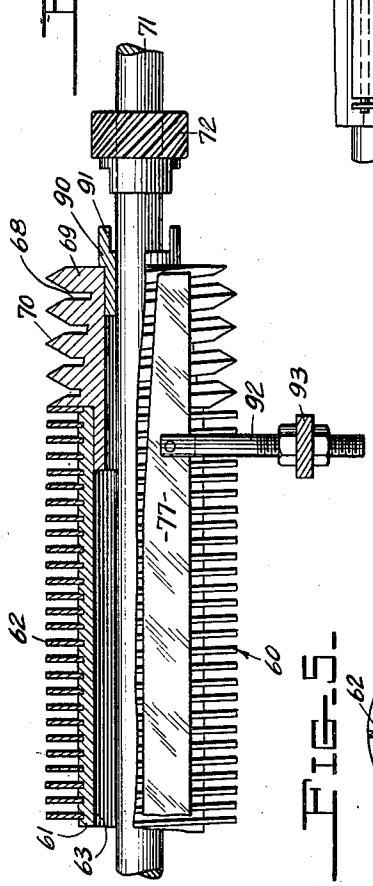

FIG. 5.

FIG. 3.

INVENTOR:
Leon E. La Bombard,
BY
Bodell & Thompson
ATTORNEYS.

Patented Jan. 4, 1938 2,104,657

UNITED STATES PATENT OFFICE

2,104,657

MACHINE FOR ARRANGING DISKS HAVING PERIPHERAL PROJECTIONS IN A PREDETERMINED ORDER

Leon E. La Bombard, Fulton, N. Y., assignor to Oswego Falls Corporation, Fulton, N. Y., a corporation of New York

Application July 20, 1935, Serial No. 32,453

5 Claims. (Cl. 214—7)

This invention relates to a machine for automatically arranging disks having peripheral projections in a predetermined order, whereby they may be packaged. More particularly, the invention relates to a machine for collecting, in orderly form, disks such as milk bottle caps as they are discharged in a commingled state from the cap making machine.

The invention has as an object, a machine of such construction as to automatically arrange, in a particularly economical manner, the caps in rows and effect a uniform relative arrangement of each cap in the row with the other caps.

The invention consists in the novel features and in the combinations and constructions hereinafter set forth and claimed.

In describing this invention, reference is had to the accompanying drawings in which like characters designate corresponding parts in all the views.

Figure 1 is a side elevation of the machine referred to herein.

Figure 2 is a top plan view of the machine shown in Figure 1.

Figure 3 is a view, taken on lines 3—3, Figure 2, partly in section and certain parts being omitted.

Figure 4 is a fragmentary view of one of the conveyor members partly in section and partly in elevation, and also showing a contiguous portion of a guide bar.

Figure 5 is an enlarged, cross-sectional view of one of the conveyor members.

This machine comprises generally, a suitable frame, a flat conveyor belt for advancing the caps from the cap making machine, a plurality of tubular members mounted on the frame to receive the caps after they have been arranged with the tabs extending in the same direction, conveyor members arranged in pairs, there being one pair for each tubular receiving member, the conveyor members being rotatably mounted in the frame and being arranged in parallel spaced apart relationship to receive the caps from the conveyor belt in vertical or edgewise position, and advance them from that point to the tubular receiving members, and means cooperable with said conveyor members for arranging the tabs of the caps all in the same radial direction during such advancement by the conveyor members.

The formation of disks, such as paper milk bottle caps, is well known to those skilled in the art. Briefly stated, a web of paper is fed between a constantly operating punch and die mechanism, and a plurality of caps are blanked from the web at each stroke of the punch. The blanks or caps generally drop upon a belt, or moving conveyor, and either pass through a waxing bath, or are delivered directly in rows to the end of the machine where the caps are then placed in cardboard tubes in which they are delivered to the dairies.

In the case of the ordinary round milk bottle cap, it is only necessary to provide means for arranging the caps in rows, whereby they may be manually, or automatically, pressed into the cardboard tubes which are arranged axially of the rows of caps. In connection with the production of what is known as flipper caps, which are caps with the pull tab extending radially beyond the periphery of the cap, it is necessary not only to properly arrange the caps in rows, but it is also necessary to arrange the caps so that the peripheral tab of each cap extends in the same direction, or is arranged in the same relative relationship to the tabs of all other caps in the row. This is essential inasmuch as the stacking tubes, in which the caps are shipped, are either provided with a slot through which the tabs project, or the tubes are provided with a lengthwise extending rib to receive the peripheral tabs.

The chief object of this invention is the provision of a machine which will receive the caps as they are delivered in a more or less commingled state from the cap forming machine, and will automatically arrange them in rows with the pull tab of each cap extending in the same direction.

The machine comprises a suitable frame 10 which, as here shown, is mounted upon rollers or casters 11 so that it may be readily moved about the cap making plant from one cap making machine to the other. The side members 12 of the frame 10, at one end, extend upwardly and outwardly to form a bracket 13 which supports, in suitable bearings, the conveyor belt rollers and drive mechanism. The brackets 13 are formed, or provided, with suitable supplementary brackets 14 which extend laterally and outwardly from the frame of the machine, and to which are secured bearing brackets 15, at the upper end of which is carried bearings 16 in which is rotatably journalled a shaft 17.

The shaft 17 is provided with a suitable roller over which the conveyor belt 18 passes. The other end of the conveyor belt 18 is supported by a suitable roller mounted in the frame of the cap making machine. The belt 18 receives the caps after they have been blanked by the punch and die mechanism, and carries them forward to the front end of the machine. The bearings 16 are detachably secured to the brackets 15 as by screws 19, so that the cap assembling or arranging ma-

chine can be readily disconnected from the cap making machine when desired.

The frame brackets 13 are also provided with bearings 20 in which is journalled the shaft 21, and on which is mounted a suitable roller 22. The side members 12 of the frame 10 are also provided with bearings 24 in which is journalled a shaft 25. An endless conveyor belt 26, similar to the belt 18, is carried by the roller 22 and shaft 25, and extends in substantially parallel relationship to the belt 18. The upper run of the belt 26 is maintained in taut condition by an idler roller 27 coacting with the lower run of the belt and carried by an adjustable arm 28.

It will be observed that the upper run of the belt 26 is located a substantial distance below the upper run of the belt 18. Means is provided for preliminarily arranging the caps 30 on the belt 18 into rows while passing from the belt 18 to the belt 26. This means comprises a flat plate 31 extending across the belts 18 and 26, and arranged so that it inclines downwardly and toward the belt 26 with the upper edge of the plate 31 in close contact with the belt 18 as it passes over the roller on the shaft 17. The plate 31 is supported at its ends by a bracket 32 secured to the side members 12 of the frame. The caps 30 are thus caused to pass, or slide, over the surface of the inclined plate 31 and onto the belt 26. In so doing, the caps 30 are arranged in rows by guide members carried by the plate 31. These guide members consist of inverted V shaped projections 35 secured to the surface of the plate 31. As here shown, there are three such guide members located centrally of the plate 31, and a pair of outside guides 36 arranged at an angle to coact with the complemental side of the guides 35. When the caps 30 slide, or pass, over the plate 31 they are arranged in rows on the belt 26, as indicated in Figure 2.

The opposite or forward end of the machine is provided with a shelf 45 supported by the bracket 46 and brace 47. The shelf 45 is formed with a plurality of lengthwise extending grooves 48, which grooves are arranged in alinement with the rows of caps on the conveyor belt 26.

A plurality of tubular members 49 are mounted upon the shelf 45 and formed with a lengthwise extending slot 50. This slot is of appreciable width as at 51. The tubular members 49 are mounted upon the shelf 45 so that the slots 50 face upwardly. The tubular members 49 are provided, on their lower side, with a rib or elongated boss 52 in which is formed a rectangular slot or recess 53 which opens into the interior of the tubular member 49, see Figure 3. Paper or cardboard tubes 54 are pushed or sleeved over the outer ends of the tubular members 49. The caps are shipped to the dairies in the tubes 54, which tubes are provided either with a lengthwise extending rib 55, as indicated in Figures 1 and 2, or may be of the type provided with a lengthwise extending slot, as shown in Patent No. 1,999,879, to Lee, April 30, 1935. The tubes 54 are sleeved over the ends of the tubular members 49 with the lengthwise extending ribs 55 arranged in the slots 48 in the shelf 45, and in alinement with the slots 53 in the members 49. The caps are transferred from the conveyor belt 26 to the tubular members 49 and arranged with the tabs T extending into the slots 53. The ribs 55 or slots, if the tubes 54 are provided therewith, are arranged in axial alinement with the slots 53, and the caps 30 may be readily pushed into the tube 54 by the operator or attendant, access to the caps for this purpose being obtained through the cut-out portion 51 of the tubular members 49.

Means is provided between the discharge of the caps from the belt 26 and the tubular members 49 for transferring or conveying the caps in vertical position to the tubular members 49, and at the same time arranging each cap with the peripheral tab arranged in alinement with the slots 53. This means comprises, in part, a plurality of constantly rotating conveyor members of the screw type for conveying the caps or disks from the conveyor belts to the tubular members 49, and means cooperable with the conveyors for alining the caps.

60 designates generally these conveyor members which, as here shown, consist of a core 61 and a helical flange or thread 62 providing a spiral groove for transferring the cap axially of the conveyor member 60. As indicated in Figure 4, the core 61 is provided with a bore 63. The outer surface of the core 61 is provided with a spiral groove and subsequently, a strip of flat metal of thickness complemental to the width of the spiral groove is wound edgewise in the groove. In this manner, the continuous helical flange of thread 62 is formed. After the spiral groove is cut or formed, the cores 61 are formed elliptical, as indicated in Figures 3 and 5, the major axis being vertical, and the minor axis horizontal in Figure 5. The minor axis is only slightly less than the major axis, and the portion of the periphery of the core 61 adjacent the major axis is knurled, as indicated at 66. A preliminary feeding screw 69, having a coarse thread 70, is attached to the rear end of the member 60 and rotatable therewith. The purpose of the preliminary feeding screw 69 will be explained hereinafter.

The rows of caps 30, on the second conveyor belt 26, are transferred therefrom to the conveyor screw 60 in vertical edgewise relationship. This transfer is accomplished by vertically arranged chutes 37 which are supported by a bar 38 extending transversely of the machine and being secured to the side members 12, as by bolts 39. The upper ends of the chutes 37 are arranged to receive the caps as they are discharged from the forward end of the belt 26. The caps 30 fall vertically, the chutes 37 being arranged to discharge the caps between the conveyor members 60. The face of the chutes 37 may be provided with a mirror 40 for the purpose of permitting the operator, who usually stands at the forward end of the assembling machine, to ascertain at a glance if any caps are turned over. That is, if any of the caps are traveling in the conveyor members 60 with the printed side of the cap facing in the wrong direction.

The coarse thread portion 69 of the conveying screw 60 is located below the discharge end of the chutes 37, and as the caps pass downwardly through the chutes, as indicated in Figure 3, they fall into the coarse thread 70. The bottom of the thread 70 is formed with a straight sided groove 68, Figure 4. The groove 68 is of greater depth at the inner end of the member 69 than at the end adjacent the helical flange 62. The purpose of the coarse V thread 70, with the bottom groove 68, is to prevent the caps 30, as they fall through the chutes 37, from bounding or falling out of place, or riding on the top of the thread, which might happen where the helical flange 62 continued the full length of the conveyor 60.

The coarse pitch portion 69 may be formed integral with the core 61, or as here shown may comprise a separate piece secured to the core 61, in any suitable manner.

Means is provided for effecting constant rotation of the conveyor members 60. As here shown, the conveyor members 60 are rotatably mounted upon shafts 71 suitably supported at their ends. The forward end of the conveyor member is provided with a suitable bushing, not shown, and the inner end provided with a bushing 90 having clutch faces 91 to engage complemental clutch faces formed on a gear 72 rotatably mounted upon the shaft 71. The bushing 90 is secured to the coarse threaded portion 69 in any suitable manner, and the gear 72 meshes with a gear 73 mounted upon a transversely extending shaft 74. The gears 72, 73 are of spiral formation, the gears 73 being each fixed to the shaft 74 and rotatable therewith. The studs or supporting shafts 71 are so arranged or spaced relatively as to locate a conveyor member 60 on each side of the chutes 37 to receive the caps 30 as they drop therethrough, and to permit the caps to initially ride in the bottom of the groove 68 and subsequently on the core 61 as they are moved along in edgewise position by rotation of the conveyor members 60. That is, the spacing of the shafts 71 is such that the caps 30 are not permitted to drop between the conveyor members 60, but will assume a position shown at 75 in Figure 3. The conveyor members all rotate in the same direction, with the result that adjacent sides of these members rotate in opposite directions which causes the caps to rotate while they are being conveyed axially of the conveyors.

Each of the conveyor members 60 is so initially adjusted that the high or narrow portions of one core is offset relatively to the similar portion of the adjacent core, as indicated in Figure 3. That is, the core 61, to the right Figure 3, is so adjusted relatively to the adjacent core on the left that its major axis is vertical while the major axis of the adjacent core on the left is horizontal, with the result that the periphery of the cap is contacting the right hand core on the minor axis, or some portion thereof, and is contacting the core to the left on the high or narrow portion of the core. It will be appreciated that while the caps 30 are arranged in rows by the guides 35, 36, the tabs T extend in all directions and accordingly, when they pass downwardly through the vertical chutes from the belt 26, the tabs will extend in all directions. After the caps have been fed to the feeding member 60 by the feeding member 69, they immediately commence to rotate due to the rotation of the members 60, and in the event any of the caps which have been waxed, or coated with paraffin, have a tendency to ride or slide on the core, the cap will be rotated by the frictional contact with the knurled surfaces of the core.

As shown in Figure 3, the conveyor members 60 rotate in a clockwise direction which effects a counter-clockwise rotation to the caps. To prevent continuous rotation of the caps, guide bars 77 are arranged between the conveyor members 60. The inner ends of the guide bars 77 are tapered downwardly to correspond to the radially inward taper of the slot 68 in the bottom of the thread 70. The guide bars 77 are mounted upon adjustable supports 92 carried by bars 93 extending transversely of the machine and being secured at their ends to the side members 12 of the frame 10. The guide bars 77 are preferably adjusted so that there is a slight clearance between the top of the bar 77 and the periphery of the cap 30 while traveling in the threads 70 of the portion 69 of the conveyor and the forward end of the guide bar 77 adjusted so that the weight of the cap is substantially carried by the guide bar. As the caps 30 are rotated in a counter-clockwise direction, the peripheral tabs of the caps contact the guide bar 77 and rotation of the cap is thereby ceased, and the caps travel along the spiral groove of the conveyor member with the tab of the cap riding against the upper edge of the guide bar 77, and the caps are discharged into the tubular members 49 with the tabs arranged in the slots 53.

In the event that a cap should become so positioned that the tab is riding along the upper edge of the guide bar 77, it will be displaced on account of the elliptical formation of the core 61 which, because of their relative offset, impart a jiggling movement, so to speak, to the caps as they are being conveyed.

The shaft 74 is provided at one end with a sprocket 78 arranged in alinement with a similar sprocket 79 upon the shaft 25. A chain 80 operatively runs over the sprockets 78, 79. The shaft 25 is also provided with a sprocket 81 which is connected to a pulley 82 by chain 83 passing about a suitable idler sprocket 84. The shaft 17 is provided at its opposite end with a sprocket 85 which is connected by chain 86 to a motor, or other suitable source of power.

In operation, the cardboard shipping tubes 54 are sleeved on the outer ends of the tubular members 49. The caps 30 are deposited on the conveyor belt 18 which extends under the die mechanism of the cap forming machine. The belt 18 conveys the caps forwardly and discharges them over the plate 31 provided with the guides 35, which causes the caps to pass upon the second conveyor belt 26 in row formation. The rows of caps are discharged from the belt 26 through the vertical chutes 37, passing or dropping into the coarse thread portion 70 of the conveyor members 60, and are transferred axially thereof by the rotary motion of the conveyor members, and during the axial movement of the caps, the tabs of all the caps are arranged in the same direction and are conveyed into the inner ends of the tubular members 49 with the tabs of the caps located in the slots 53. The operator then pushes, or moves, the row of caps thus arranged into the cardboard tube 54, having access to the caps through the cut-out portion 51 of the tubular members 49.

It will be observed that my invention comprises a simple and particularly economical machine for gathering the caps from the cap forming machine, and assembling them in a predetermined order, whereby they may be readily inserted into the shipping tubes 54.

What I claim is:

1. A machine for arranging disks having peripheral projections, with the projection of each disk arranged in the same radial plane, said machine comprising a suitable frame, a pair of conveyor members, each consisting of a core portion, the periphery of which is formed elliptical and being provided with a helical thread, said members being rotatably mounted and arranged in spaced apart parallel relationship to receive and convey the disks axially along said members during rotation thereof, with the periphery of the disk riding on the elliptical core portions, a guide bar located between the conveyor members and

arranged to engage the projections on the disks while the same are being conveyed along said members, means for discharging the disks in the threads of said members in one end thereof, means for receiving the disks as they are discharged from the opposite ends of the conveyor members, and means for rotating said members.

2. A machine for arranging disks having peripheral projections, with the projection of each disk arranged in the same radial direction, said machine comprising a suitable frame, a conveyor belt for the disks, a pair of conveyor members rotatably mounted in the frame in spaced apart parallel relationship and arranged to receive disks discharged from the belt, said members being provided with a helical groove on their peripheries, said groove being in the nature of a comparatively coarse pitch V thread at the end of said members toward the belt, and the remaining portion of the groove being straight sided and of a pitch complemental to the thickness of the disks, means operable to receive the disks discharged from said conveyor belt and transfer them to the coarse pitch portion of said conveyor members, means cooperable with said conveyor members for arranging the projection of each disk in the same radial direction, means arranged at the discharge end of said conveyor members for receiving said arranged disks, and means for rotating said members.

3. In a machine for arranging bottle caps having peripheral tabs with the tabs arranged in the same radial direction, said machine comprising a suitable frame, a pair of conveyor members rotatably mounted in said frame and being formed with a helical groove in their peripheries, said conveyor members being arranged in spaced apart parallel relationship to receive and convey the caps axially of said members in vertical or edgewise position, means for rotating said conveyor members in the same direction, the bottom of said helical groove being knurled to impart rotation to said caps as they are conveyed by rotation of said conveyor members, a guide bar located between said members and arranged to engage the tabs of the caps as they are rotated, a tubular member mounted in the frame at the discharge end of said conveyor members and being provided with a slot arranged in alinement with said guide bar, whereby said caps are conveyed into said tubular member with their tabs arranged in said slot.

4. In a machine for arranging disks having peripheral radially-extending tabs, a pair of parallel rotatable conveyer members spaced apart between which the disks are passed, each conveyer member being rounded and non-circular and having major and minor diameters and having peripheral spiral feeding means for receiving the margins of the disks, said members being arranged relatively to each other, so that the portions of the minor diameter of one member comes in confronting relation with the portion of the major diameter of the other member, whereby a jiggling and rotary motion is imparted to the disks being fed by the two members and means coacting with the tabs of the disks for limiting the rotation of the disks when the disks have been jiggled and rotated to a position wherein the tabs are in a predetermined radial angle.

5. In a machine for arranging disks with peripheral, radially-extending tabs, two rotatable, peripherally-threaded members arranged parallel to each other and between which the disks pass with the margins extending into the threads of said members, whereby a rotary and feeding motion is imparted to the disks, the threads on the receiving ends of said members being comparatively coarse and shaped to define a V-shaped groove and said coarse threads having a parallel sided groove extending inwardly from the apex of the V portion and the remainder of the threads of each of said members being shaped to form a parallel sided groove, the parallel sided groove in the coarse threaded portion gradually decreasing in depth from the receiving end of said member toward the receiving ends of the threads of the remainder of said member and being of substantially the same depth at the rear ends as the groove between the threads of the remainder of said members.

LEON E. LA BOMBARD.