April 4, 1961 B. C. EISENBERG 2,978,231

CONTAINER PACKER

Filed March 29, 1960 6 Sheets-Sheet 1

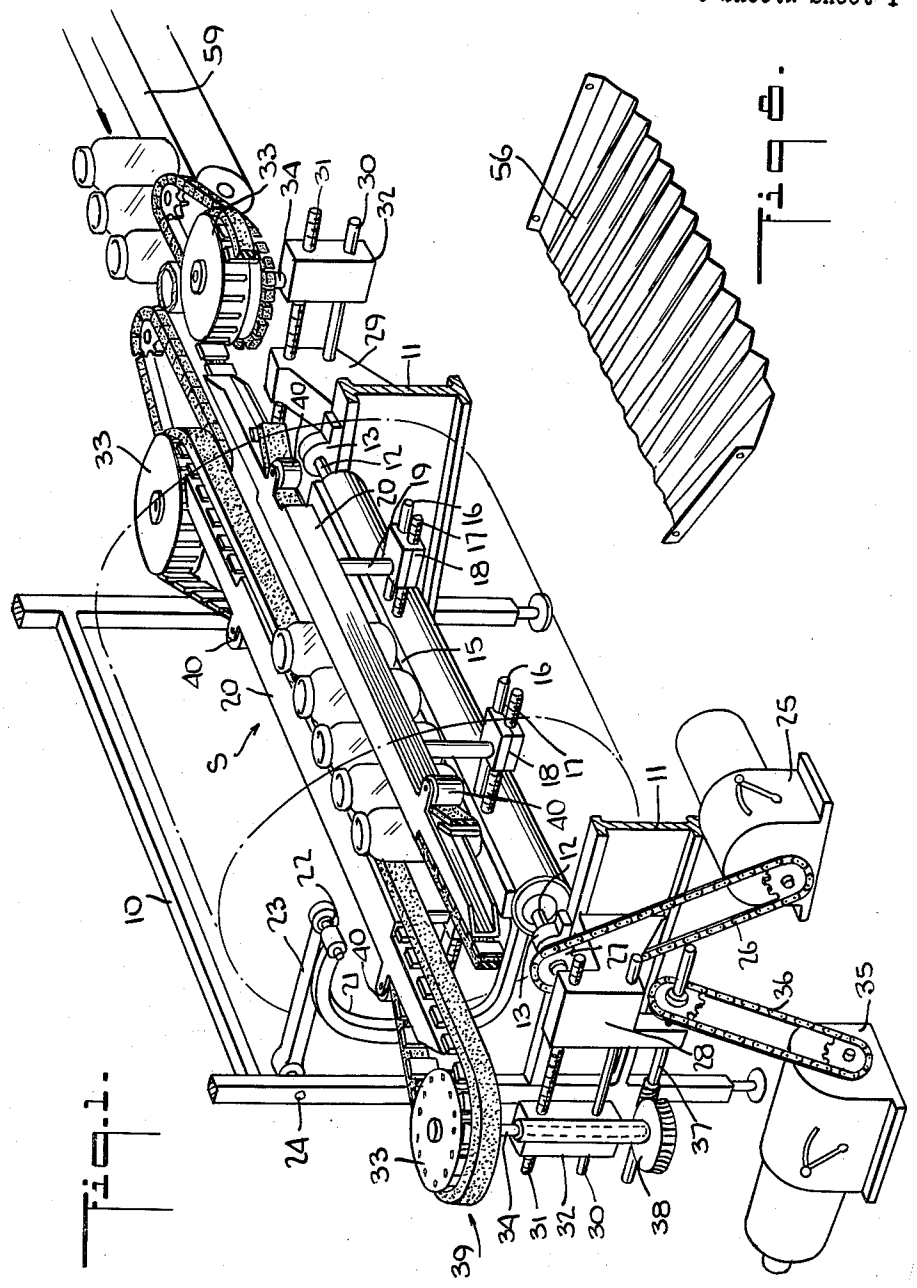


Fig. 1.

Fig. 6.

INVENTOR.
BERNARD EISENBERG

BY

Kenyon & Kenyon

ATTORNEYS

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CONTAINER PACKER

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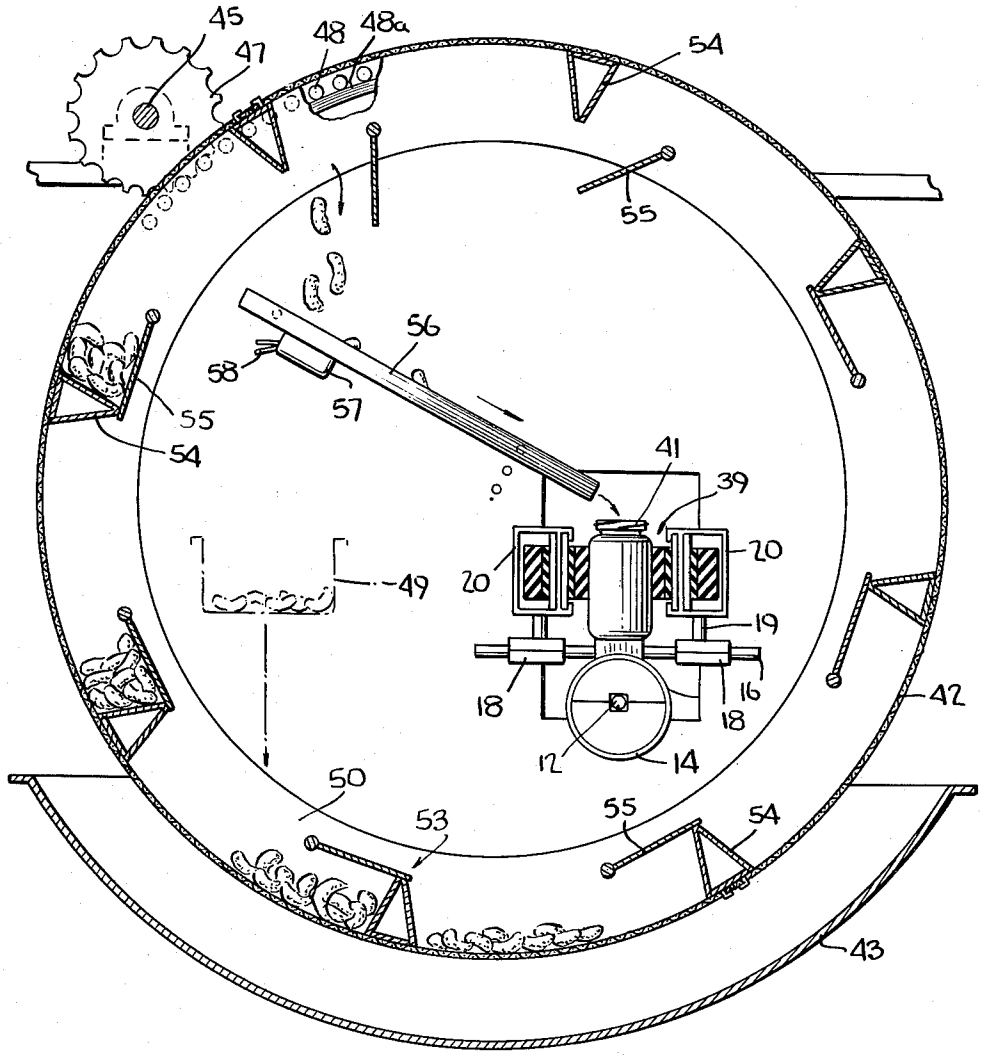


Fig. 2.

INVENTOR.
BERNARD EISENBERG
BY
Kenyon & Kenyon
ATTORNEYS

April 4, 1961 B. C. EISENBERG 2,978,231

CONTAINER PACKER

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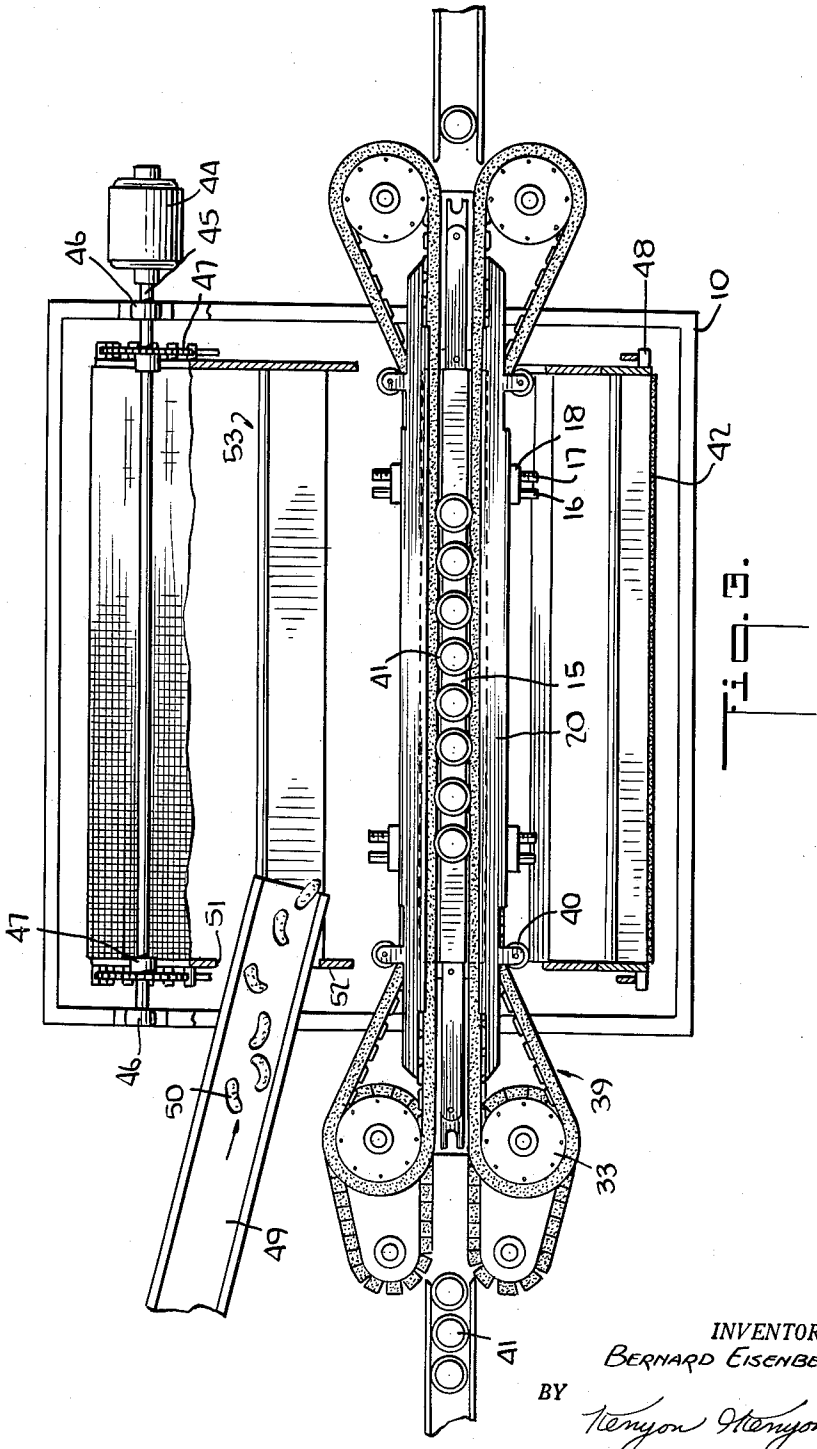


Fig. 3.

INVENTOR.
BERNARD EISENBERG
BY
Kenyon & Kenyon
ATTORNEYS

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CONTAINER PACKER

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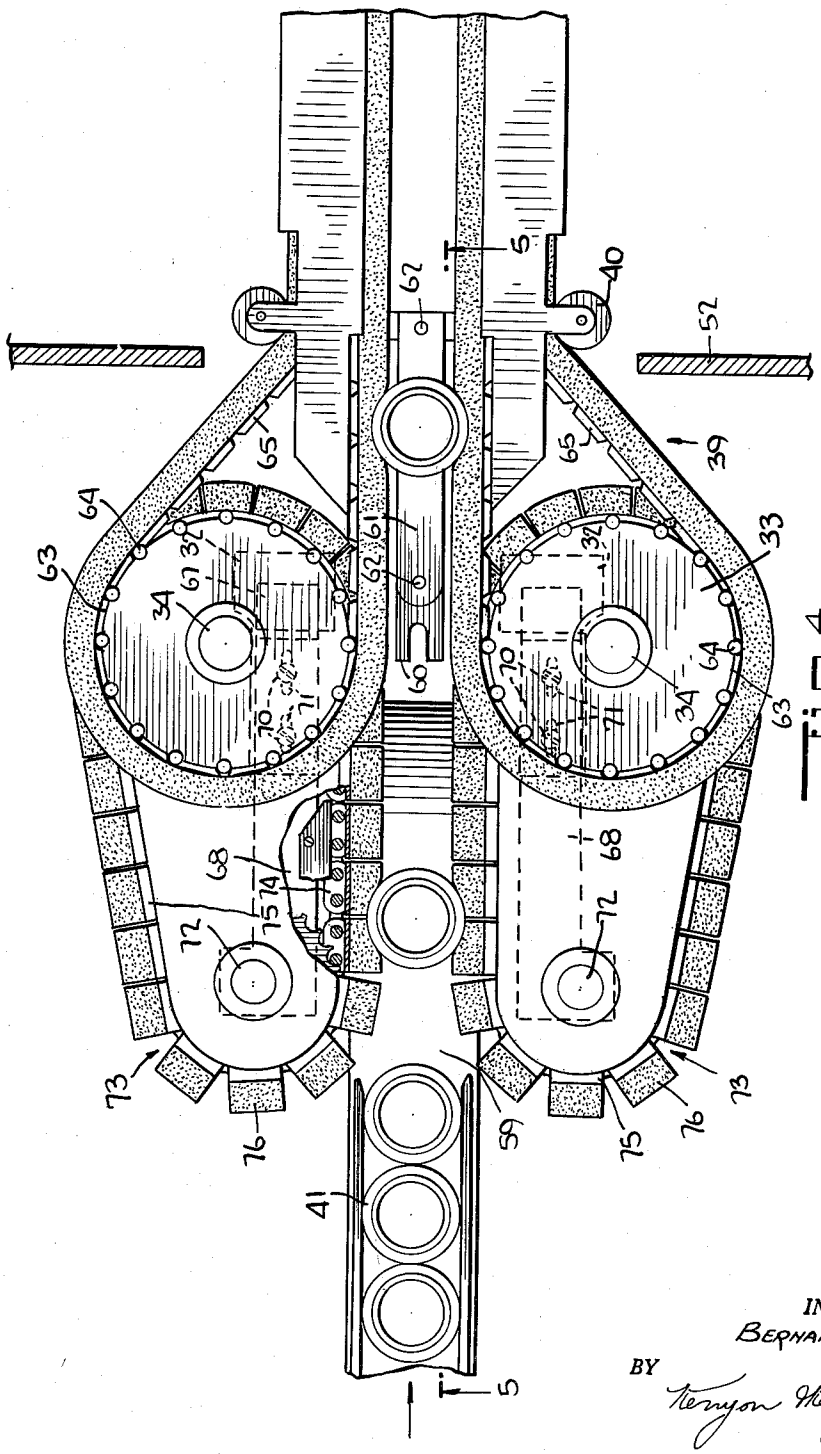


Fig. 4.

INVENTOR.
BERNARD EISENBERG
BY
Kenyon & Kenyon
ATTORNEYS

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CONTAINER PACKER

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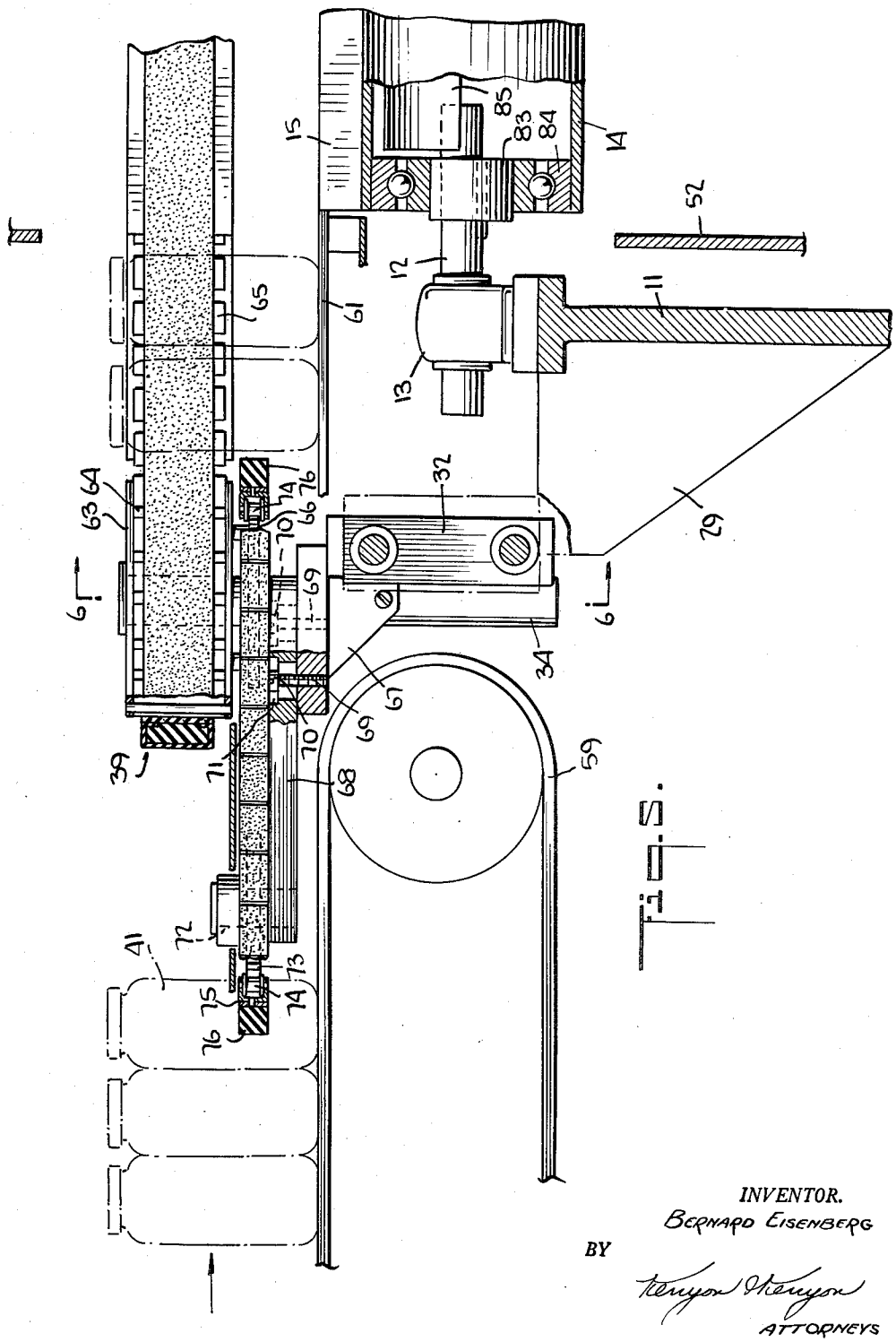


Fig. 5.

INVENTOR.
BERNARD EISENBERG

BY

Kenyon & Kenyon

ATTORNEYS

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CONTAINER PACKER

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Fig. 7.

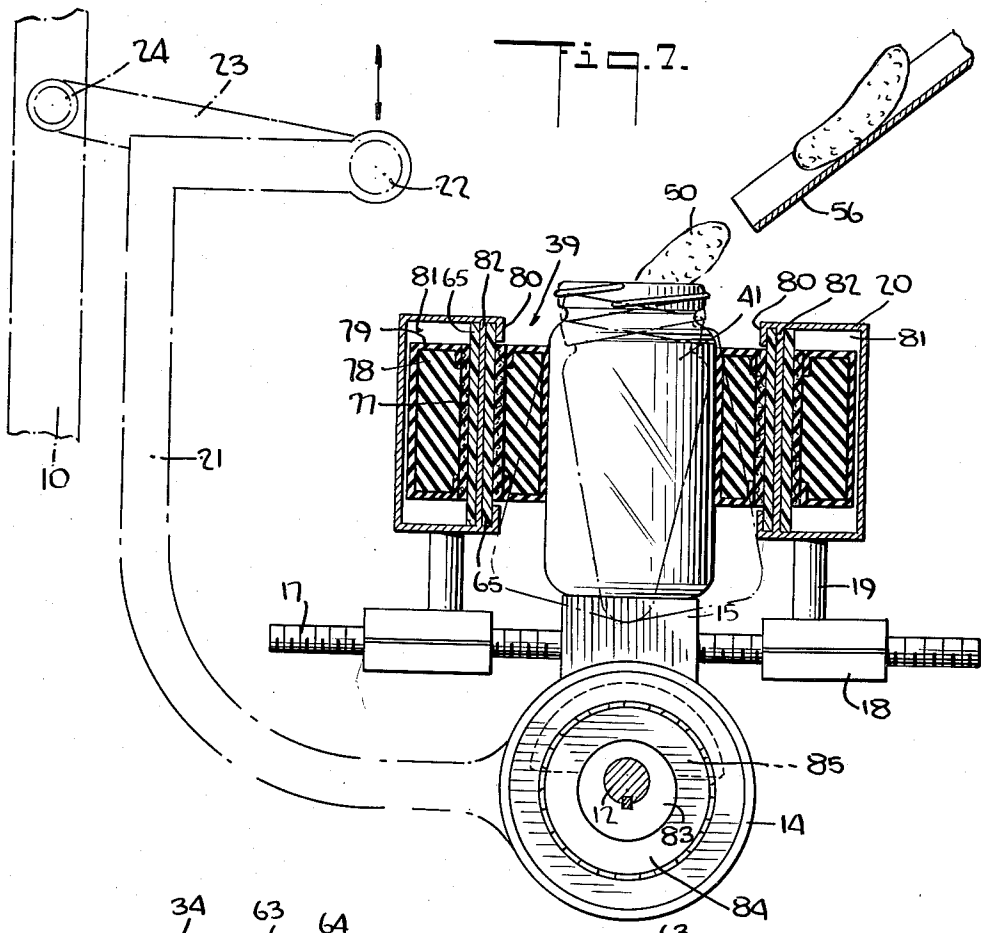
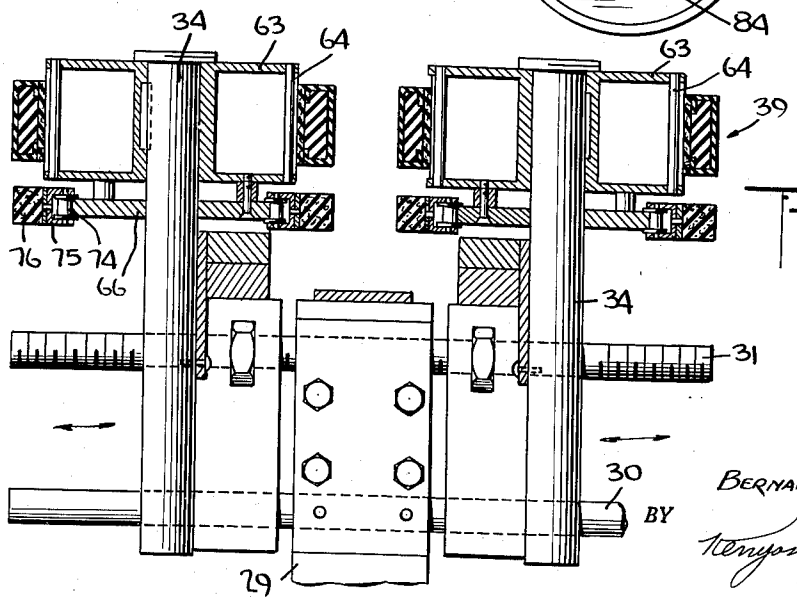


Fig. 8.



INVENTOR.
BERNARD EISENBERG
BY
Kenyon & Kenyon
ATTORNEYS

United States Patent Office 2,978,231 Patented Apr. 4, 1961

2,978,231

CONTAINER PACKER

Bernard C. Eisenberg, Rockaway, N.J. (Solbern Manufacturing Corp., P.O. Box 567, Caldwell, N.J.)

Filed Mar. 29, 1960, Ser. No. 18,396

16 Claims. (Cl. 259—72)

This invention relates to devices for compactly packing the contents of jars or other containers; and more particularly, concerns machines for disposing irregularly shaped articles or packing items in compact, close relation to each other within the containers.

When packing articles of irregular outline into containers, it is important that each container carry a predetermined quantity or weight of such articles. Usually, the containers move in a line past a filling station where the articles are delivered to the containers for filling the same. Attempts have been made to achieve optimum packing of each container by accurate delivery of the articles to the containers and vibration of the filled containers to obtain a more compact orientation of the individual articles within the container.

However, known packers and vibrators are not uniform in their operation and in cases where the articles are improperly delivered to the containers, the vibrators may aggravate a badly oriented arrangement of the articles within the containers. Furthermore, in many instances, machine packing must be augmented by some hand packing in order to bring the contents of the container to a predetermined quantity or weight. If the initial machine packing operation results in a bad orientation of the packed articles, the supplemental hand packing operation is impeded.

Accordingly, an object of this invention is to provide improved means for vibrating containers in a novel manner while the same are being filled with articles of irregular outline, or immediately after the filling operation, to obtain an orientation of the packed articles which will insure close contact thereof within the containers.

Another object of this invention is to provide improved means for vibrating a moving line of containers while the same are being filled with articles of irregular outline, such as pickles or the like; the vibratory action being of a character which will produce optimum orientation of the packed articles and will correct any initial irregular disposition of the articles due to improper delivery thereof to the containers.

Still another object of this invention is to provide improved vibrating means for a moving line of containers which are being machine filled with articles of irregular outline such as pickles or the like; said vibrating means being operative to produce a compact pack of articles within the container which will facilitate any necessary supplemental hand packing to bring the total contents of the containers to a predetermined quantity or weight.

Still another object of this invention is to provide improved vibrating means for a moving line of containers, which means will cause said containers to undergo one type of vibratory motion in the bottom portions thereof and another type of vibratory motion in the upper portions thereof.

Yet another object of this invention is to provide improved vibrator means for a moving line of containers to be packed, together with improved means for moving the line of containers while they are being filled and vibrated; the moving means being adjustable to accommodate containers of varying sizes.

In machine packing containers, it is usual to provide a conveyor for bringing the line of containers to the filling and vibrating position, and a second conveyor for removing the filled and vibrated containers. The transition of the moving line of containers between non-vibratory conveyors and the intermediate vibratory conveyor presents a number of problems in respect to the containers and the filling thereof.

Accordingly, still another object of this invention is to provide an improved combination conveyor and vibrator for a moving line of containers, which is to be associated with non-vibratory supply or delivery conveyors; the combination device including improved means for effecting a gradual transition between the vibratory and non-vibratory conveyors, and including means for effecting a spacing between adjacent containers on the vibrating conveyor whereby damage to containers caused by contact with one another is avoided.

Other objects may be inferred from the following description of a specific example of this invention, illustrated by the accompanying drawings, in which:

Fig. 1 is a perspective view, partially cut away for purposes of clarity, of the container packer;

Fig. 2 is a vertical sectional view of the packer;

Fig. 3 is a plan view partially cut away for purposes of clarity of the interior of the packer;

Fig. 4 is a plan view, partially cut away and partially in shadow form, of the container entrance portion of the packer;

Fig. 5 is a vertical sectional view taken along lines 5—5 of Fig. 4;

Fig. 6 is a vertical sectional view taken along lines 6—6 of Fig. 5;

Fig. 7 is a vertical sectional view of a portion of the interior of the packer; and

Fig. 8 is a perspective view of a chute portion of the packer.

In a preferred embodiment of my invention, as shown in Fig. 1, a framework 10 and cross beams 11 support a main drive shaft 12 mounted in drive shaft bearings 13. The drive shaft 12 is eccentrically and rotatably situated within a tube 14 which forms a base for a container support structure, indicated generally by the letter S. On the tube 14 is an elongated platform 15 for containers. Projecting horizontally from the tube 14 are horizontal guide shafts 16 and right and left takeup screws 17 which engage guide blocks 18. Vertical guide shafts 19 extend upwards from the guide blocks 18 and support guide frames 20. A stabilizer arm 21 extends from a point on the tube 14 around one of the guide frames 20 to a point vertically above the tube 14 and the tops of any containers thereon, where it is hinged by a connecting pin 22 to a stabilizer link 23 which in turn is hinged to the framework 10 by a pin 24. Power is supplied to the main drive shaft 12 by a variable speed motor 25, a belt 26, and gear 27 on the shaft 12.

Also mounted on the cross-beams 11 are bearing blocks 28 and 29, one on each beam 11. The bearing blocks 28 and 29 support cage-wheel guide shafts 30 and right and left take-up screws 31. Cage-wheel bearing assemblies 32 are situated at opposite ends of each set of guide shafts 30 and take-up screws 31. Cage-wheels 33 are mounted on cage-wheel drive shafts 34 which pass through the cage-wheel bearing assemblies 32. (One cage-wheel 33 is omitted from Fig. 1 for the sake of clarity.) Power is transmitted to cage-wheel 33 from a variable speed motor 35, through a belt 36, a keyed or splined drive shaft 37 and a gear 38. Conveyor belts indicated generally at 39 pass around the cage-wheels 33

and through the guide frames 20. Idler wheels 40 on the guide frames 20 guide the belts 39 into the frames 20. The belts 39 project outwards from the opposing faces of the two guide frames 20 and grip containers 41 positioned therebetween.

Referring now to Figs. 2 and 3, a drum 42 surrounds the tube 14, guide frames 20 and their accessory structures, and the drum is rotatably supported (as described below) by the framework 10. A pan 43 may be fixed beneath the drum 42 to the framework 10. The drum 42 may be of solid or perforated construction or of a more or less open mesh construction. A motor 44 applies power to a shaft 45 mounted in bearings 46 on the framework 10, and gears 47 on the shaft 45 engage rollers 48 circumferentially spaced around both sides of the drum 42 for rotating it. Rollers 48 serve an additional function of supporting the drum 42 for rotation on tracks 48*a* fixed to the framework 10.

A conveyor chute 49 is arranged to deliver articles 50 to be packed in containers 41 to the interior of the drum 42, passing through an opening 51 in an end wall 52 of the drum 42. As shown in Fig. 2, buckets 53, comprising base elements 54 and side plates 55, are provided for scooping up articles 50 and conveying them to the top of the drum 42. The sides plates 55 releasably engage the outer edges of the base elements 54 and are disengageable automatically by means (not shown) at or near the top of the drum 42.

A shaker pan 56 is adjustably fixed to the framework 10 by fastening means (not shown) and is positioned within the drum 42 beneath the point at which the side plates 55 of the buckets 53 become disengaged. As shown in Fig. 8, the shaker pan 56 is of fluted construction. Beneath the shaker pan 56 is an air-operated piston 57 connected by tubes 58 to an air compressor (not shown) of conventional design. The shaker pan 56 can be oscillated by the piston 57 at a variable rate, and the shaker pan 56 and piston 57 form a unit assembly which may be adjusted to an optimum position for discharging articles into containers 41.

Figs. 4 and 5 show cage-wheels 33 and belts 39 at the container 41 entrance to the packer. An endless conveyor belt 59 of conventional design extends up to a point where belts 39 grip containers 41 for transporting them into the packer. A bracket 60 is mounted on the bearing block 29, and a flexible strip 61 is fastened by bolts 62 at one end to the bracket 60 and at the other end to the platform 15 on the tube 14. At the container 41 exit from the packer, a similar strip 61, bracket 60, and conveyor belt 59 are provided.

Cage-wheels 33 are comprised of top and bottom plates 63 separated by rods 64 so as to form a cage structure. Belts 39 are backed by a plurality of evenly spaced apart slide blocks 65, composed of a low friction material such as Teflon. The slide blocks 65 are spaced in such positions that the blocks 65 coincide with spaces between the rods 64 of the cage-wheels 33 when the bolts 39 are in engagement with the cage-wheels 33.

Mounted beneath the cage-wheels 33 on the same shaft 34 are sprockets 66 of a smaller diameter than cage-wheels 33. Brackets 67 are fixed to the cage-wheel bearing assemblies 32, and extension arms 68 are adjustably fixed to the brackets 67 by bolts 69. Heads 70 of the bolts 69 engage slots 71 of the arms 68 for adjusting the positions of the arms 68 relative to the brackets 67. Shafts 72 are journalled in ends of the arms 68 and second sprockets 73 are rotatably mounted on the shafts 72. Endless roller chains 74 engage the sprockets 66 and second sprockets 73. Clips mounted on the roller chain 74 hold blocks 76 of a suitable resilient material such as rubber.

As shown most clearly in Fig. 7, belts 39 each comprise an endless belt core 77, backed by slide blocks 65, and faced by a soft resilient material 78 which has an outer firm yet flexible covering 79. The soft resilient material 78 may be preferably sponge or other soft rubber, and the outer firm covering 79 may be a firmer rubber sheet material, resulting in a belt 39 which can grip containers 41 resiliently but has good wearing qualities. The various sections of belts 39 are fastened together by any suitable fastening means such as rivets (not shown).

Flanges 80 on the guide frames 20 retain the slide blocks 65 within the frames 20 and allow the cores 77, resilient material 78 and coverings 79 of the belts 39 to project from the opposing faces of the two guide frames 20. A return path for the endless belts 39 is provided by enclosed spaces 81 within the guide frames 20. Center walls 82 in the guide frames 20 provide a bearing surface for slide blocks 65 when containers 41 are gripped by the belts 39. The guide frames 20 and their center walls 82 are preferably formed from stainless steel or some similar material which creates as little friction as possible when slide blocks 65 are pressed against it.

In Figs. 5 and 7, tube 14 is shown in cross section with internal structure of the main drive shaft 12. The shaft 12 is keyed to an eccentric 83 which is journalled in bearings 84. A half-round counterweight 85 within the tube 14 is fixed to ends of the shaft 12 in such a position as to balance forces produced by the rotation of the eccentric 83.

In operation, containers 41 are conveyed by belt 59 to a point where resilient blocks 76 on roller chains 74 grip the sides of the containers 41. The motion of the chains 74 and blocks 76 conveys containers 41 to a point where belts 39 grip the sides of the containers 41 and convey them into the packing machine. An important feature of my invention is the use of sprockets 66 on common shafts 34 with the cage-wheels 33 wherein the sprockets 66 are of smaller diameter than cage-wheels 33. Accordingly, while rotational velocities of both sprockets 66 and cage-wheels 33 are equal, the linear velocity of roller chains 74 will be less than the linear velocity of belts 39. Since blocks 76 are fixed to roller chains 74, the blocks 76 will convey containers 41 more slowly than belts 39. This difference in velocity causes the containers 41, when gripped by belts 39 to be spaced farther apart than when gripped by blocks 76. Since vibratory motion is imparted to containers 41 only when gripped by belts 39, the increased spacing between the containers 41 assures that there will be no contact between adjacent containers 41 during vibration, so as to avoid danger of breakage.

Adjustments can be made to provide for the packing of containers of different widths by moving opposing pairs of cage-wheels 33 closer or farther apart. As shown in Fig. 6, nuts 86 on right and left take-up screws 31 may be turned, causing bearing assemblies 32 to be moved together towards or away from each other. As the bearing assemblies 32 are moved, cage-wheel drive shafts 34, cage-wheels 33, sprockets 66, etc. are moved also. The same kind of adjustment can be made at the opposite end of the packer.

Adjustments can be made in the distance between the guide frames 20 by turning the left and right take-up screws 17 engaging blocks 18 which support the guide frames 20.

Articles 50, such as pickles or other vegetables or fruits, are conveyed into the drum 42 by conveyor 49 and are dumped into the bottom of drum 42. If a drum 42 of mesh or perforated sheeting is used with the pan 43 in place, the pan may be filled with liquid so as to maintain a bath through which the drum 42 rotates. Such a bath may be desirable to cushion the fall of articles 50 from the conveyor 49 if said articles are subject to bruising. However, if desired, pan 43 may be omitted and excess liquid carried in on conveyor 49 will thereby be drained off.

Articles 50, having fallen into the bottom of the drum 42, are carried by buckets 53 to a point near the top of the drum 42 where side plates 55 of the buckets 53 are disengaged from their bases 54 and articles 50 are dis-

charged onto a shaker pan 56. The shaker pan 56 is oscillated by an air-operated piston 57, causing the articles 50 to be propelled downwards towards containers 41 gripped between belts 39. The fluted construction and the oscillatory motion of the shaker pan 56 combine to orient articles 50 so that their longest dimension is parallel to the direction of the fluting. Accordingly, when articles 50 are propelled from the shaker pan 56 into containers 41, the articles 50 will enter the containers lengthwise. This feature is of particular importance in packing elongated articles such as pickles, whose longest dimension may be such as to preclude their entrance into containers 41 transversely. Any articles 50 which fail to enter containers 41 drop back into the bottom of the drum 42 and are picked up again by buckets 53.

Vibratory motion is imparted to container 41 by eccentric rotation of drive shaft 12 within tube 14. Tube 14 describes a substantially circular path transversely to its longitudinal axis. Due to the linkage of tube 14 to framework 10 through stabilizer arm 21 and link 23, guide frames 20 and the upper portions of containers 41 describe a nearly vertical path, while the bases of containers 41 resting on platform 15 on tube 14 follow the substantially circular path of the tube 14.

Elongated artticles 50 dropping from, or propelled from, shaker pan 56 into containers 41, will tend to enter containers 41 lengthwise, as explained in connection with the fluted shape of pan 56. I have found that the novel vibratory motion afforded by my invention, combining as it does substantially rotary motion at the bottom and vertical motion at the top of containers 41, tends to maintain elongated articles 50 in a vertical position relative to the container side walls, and is greatly more effective than the types of vibratory motion offered by devices heretofore known. Thus the greatest possible number of articles 50 can be packed into a container 41 in the shortest possible time, and there is the least chance of transversely situated elongated articles 50 impeding the entrance of other articles 50 and decreasing the solid contents in the container.

In order to aid in a smooth transition from the non-vibratory longitudinal motion of belts 39 at cage-wheels 33 to the vibratory and longitudinal motion of belts 39 within the guide frames 20, flexible strips 61 provide support for bases of containers 41 as they enter and leave the drum 42.

As shown in Fig. 1, the speed of belts 39 and chains 74 is controllable by varying the speed of motor 35, and the rate of vibration is controllable by varying the speed of motor 25. The rate of oscillation of shaker pan 56 is also controllable, and optimum speeds may thereby be chosen for each moving element of the packer to ensure close and compact packing with the utmost speed. The faster the rate of vibration of containers 41, as controlled by the speed of motor 25, the more compactly articles 50 will be packed. Any required additional hand packing will be eased by the fact that elongated articles 50 will be vertically disposed within the containers 41.

It will be understood that modifications may be made in the structure above described without departing from my invention, which is set forth in the appended claims.

I claim:

1. A machine for compactly packing the contents of containers comprising a horizontally disposed, flat, elongated support structure for supporting a moving line of said containers, means for resiliently gripping and moving said containers along said support structure, and means for eccentrically moving said support structure transversely of the longitudinal axis thereof for vibrating the containers supported thereby.

2. A machine as in claim 1 wherein said container moving means comprises a pair of opposed endless conveyor belts located on opposite sides of said support

structure and arranged for rotation about vertical axes, and means for guiding the inner facing runs of said belts in predetermined rectilinear paths and at a predetermined spacing therebetween.

3. A machine as in claim 1 wherein said container moving means comprises a pair of opposed endless conveyor belts located on opposite sides of said support structure and arranged for rotation about vertical axes and means mounted on said vibrating means for conjoint movement therewith for guiding the inner facing runs of said belts in predetermined rectilinear paths and at a predetermined spacing therebetween.

4. A machine for compactly packing the contents of containers comprising a horizontally disposed, flat, elongated support structure for supporting a moving line of said containers, means mounted on said support structures for resiliently gripping and moving said containers along said support structure, means for eccentrically moving said support structure transversely of the longitudinal axis thereof for vibrating the containers supported thereby, and means for converting said transverse motion of said support structure to vertical motion of upper portions of said containers moving means.

5. A machine for compactly packing the contents of a moving line of containers comprising a horizontally disposed platform for supporting the bottoms of said line of containers, an elongated member arranged for eccentric movement about its longitudinal axis, means fixing said platform to said elongated member, eccentric means rotatably disposed relative to said elongated member and operatively connected thereto, means for rotating said eccentric means to impart transverse vibratory movement to said platform, opposed endless conveyor means arranged on opposite sides of said platform and above the upper surface thereof for gripping and moving said containers over said platform guide means for said conveyor means, and bracket means adjustably mounted on said elongated member for adjusting the spacing between portions of said conveyor means.

6. A machine as in claim 5 wherein the opposite end portions of said platform are laterally flexible, the opposite ends of said platform being fixed against vibratory movement.

7. A machine for compactly packing the contents of a moving line of containers comprising a horizontally disposed platform for supporting the bottoms of said line of containers, an elongated member arranged for eccentric movement about its longitudinal axis, means fixing said platform to said elongated member, eccentric means rotatably disposed relative to said elongated member and operatively connected thereto, means for rotating said eccentric means to impart transverse vibratory movement to said platform, opposed endless conveyor means each comprising a resilient belt and flat block members secured to the inner surface of said belt in adjacent longitudinally spaced relation to said other, said conveyor means being arranged on opposite sides of said platform and above the upper surface thereof for gripping and moving said containers over said platform, guide means for said conveyor means, bracket means adjustably mounted on said elongated member for adjustably spacing said guide means to adjust the spacing between opposed portions of said conveyor means, and wheel means at the opposite ends of said belts comprising circumferentially spaced pins receivable in the spaces between said adjacent block members for positively moving said belt upon rotation of said wheel means.

8. A machine as in claim 7 wherein said guide means comprises an elongated channeled member open at the opposite ends thereof for passing the inner and outer runs of said belt therethrough, said channeled member including flanged portions on the inner side thereof for engaging portions of the said block members projecting above and below the longitudinal edges of said belt,

said belt projecting outwardly beyond said flange portions for gripping the side portions of said containers.

9. A machine as in claim 7, wherein each of said wheel means at the opposite ends of said belts is mounted on a vertical shaft for movement toward and away from each other, and gear means for driving one pair of opposed shafts in opposite directions.

10. A machine for compactly packing the contents of a moving line of containers comprising a base, a horizontally disposed platform for supporting the bottoms of said line of containers, an elongated member arranged for eccentric movement about its longitudinal axis, means fixing said platform to said elongated member, eccentric means rotatably mounted on said base and rotatably disposed relative to said elongated member, and operatively connected thereto, means for rotating said eccentric means to impart transverse vibratory movement to said platform, opposed endless conveyor means arranged on opposite sides of said platform and above the upper surface thereof for gripping and moving said containers over said platform, guide means for said conveyor means, and means for converting said transverse vibratory movement of said platform to vertical vibratory movement in upper portions of said guide means and conveyor means.

11. A machine as in claim 10 wherein said means for converting said transverse vibratory movement of said platform to vertical vibratory movement in upper portions of said guide means and conveyor means comprises a stabilizer arm fixed at one end to said elongated member and a stabilizer link hinged at one end to a free end of said stabilizer arm and hinged at its other end to said base.

12. A machine for compactly packing the contents of a moving line of containers comprising a horizontally disposed platform for supporting the bottoms of said line of containers, an elongated member arranged for eccentric movement about its longitudinal axis, means fixing said platform to said elongated member, eccentric means rotatably disposed relative to said elongated member and operatively connected thereto, means for rotating said eccentric means to impart transverse vibratory movement to said platform, first opposed endless conveyor means arranged on opposite sides of said platform and above the upper surface thereof for gripping and moving said containers over said platform, guide means for said conveyor means, bracket means adjustably mounted on said elongated member to adjust the spacing between portions of said first conveyor means and second opposed endless conveyor means arranged adjacent to one end of said first conveyor means for first gripping and moving said containers at a slower rate of speed than said containers are subsequently gripped and moved by said first conveyor means.

13. A machine for tightly packing the contents of containers comprising a base, an elongated support structure for supporting a moving line of said containers, means for movably mounting said support structure on said base, means for imparting eccentric vibratory movement to said support in directions transversely thereof, and means for moving said line of containers longitudinally over said vibratory support structure comprising a pair of opposed, endless belt conveyors arranged for movement about vertical axes, said conveyors being located on opposite sides of said support structure at a spacing for gripping therebetween opposed surface portions of said containers.

14. A machine for tightly packing the contents of containers comprising a base, an elongated support structure for supporting a moving line of said containers, means for movably mounting said support structure on said base, means for imparting eccentric vibratory movement to said support in directions transversely thereof, and means for moving said line of containers longitudinally over said vibratory support structure comprising a pair of opposed, endless belt conveyors arranged for movement about vertical axes, said conveyors being located on opposite sides of said support structure at a spacing for gripping therebetween opposed surface portions of said containers, and means for adjusting the spacing between said conveyors.

15. A machine for tightly packing the contents of containers comprising a base, an elongated support structure for supporting a moving line of said containers, means for movably mounting said support structure on said base, means for imparting eccentric vibratory movement to said support in directions transversely thereof, comprising an elongated tubular member, means for fixing said support structure to upper surface portions of said tubular member, eccentric means operatively connected to said tubular member and rotatable about the axis thereof, and means for rotating said eccentric means, and means for moving said line of containers longitudinally over said vibratory support structure.

16. A machine for tightly packing the contents of containers comprising a base, an elongated support structure for supporting a moving line of said containers, means for movably mounting said support structure on said base, means for imparting eccentric vibratory movement to said support in directions transversely thereof, comprising an elongated tubular member, means for fixing said support structure to upper surface portions of said tubular member, eccentric means operatively connected to said tubular member and rotatable about the axis thereof, means for rotating said eccentric means, at least one end portion of said support structure being flexible and projecting beyond the adjacent end of said tubular member, and means fixing the outer end of said end portion against vibratory movement, and means for moving said line of containers longitudinally over said vibratory support structure.

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UNITED STATES PATENT OFFICE

CERTIFICATION OF CORRECTION

Patent No. 2,978,231 April 4, 1961

Bernard C. Eisenberg

It is hereby certified that error appears in the above numbered patent requiring correction and that the said Letters Patent should read as corrected below.

Column 3, line 57, for "bolts" read -- belts --; line 69, after "clips" insert -- 75 --; column 5, line 26, for "artticles" read -- articles --; column 6, line 56, for "said", first occurrence, read -- each --.

Signed and sealed this 22nd day of August 1961.

(SEAL)
Attest:

ERNEST W. SWIDER
Attesting Officer

DAVID L. LADD
Commissioner of Patents