Feb. 24, 1953 W. DE BACK 2,629,482

NONAGITATING CAN HANDLING APPARATUS

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FIG_1

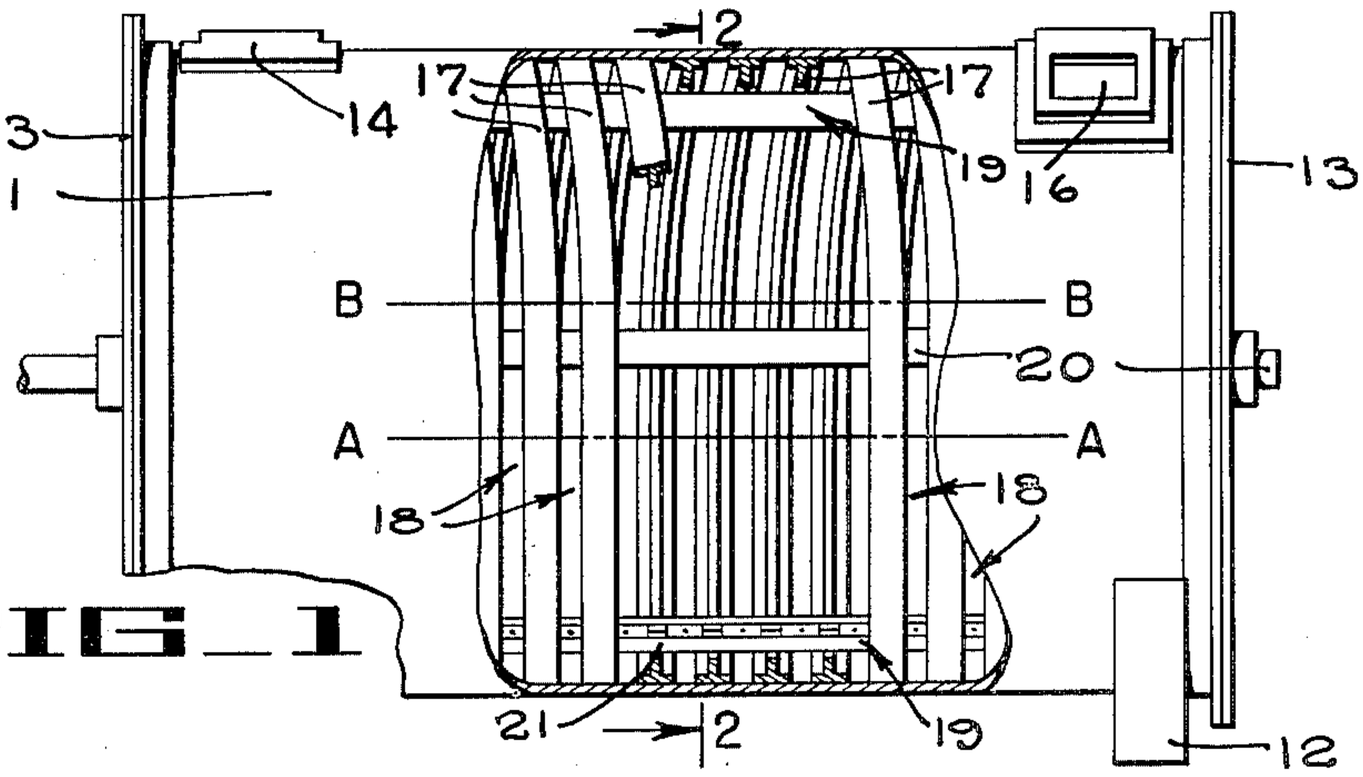


FIG_2

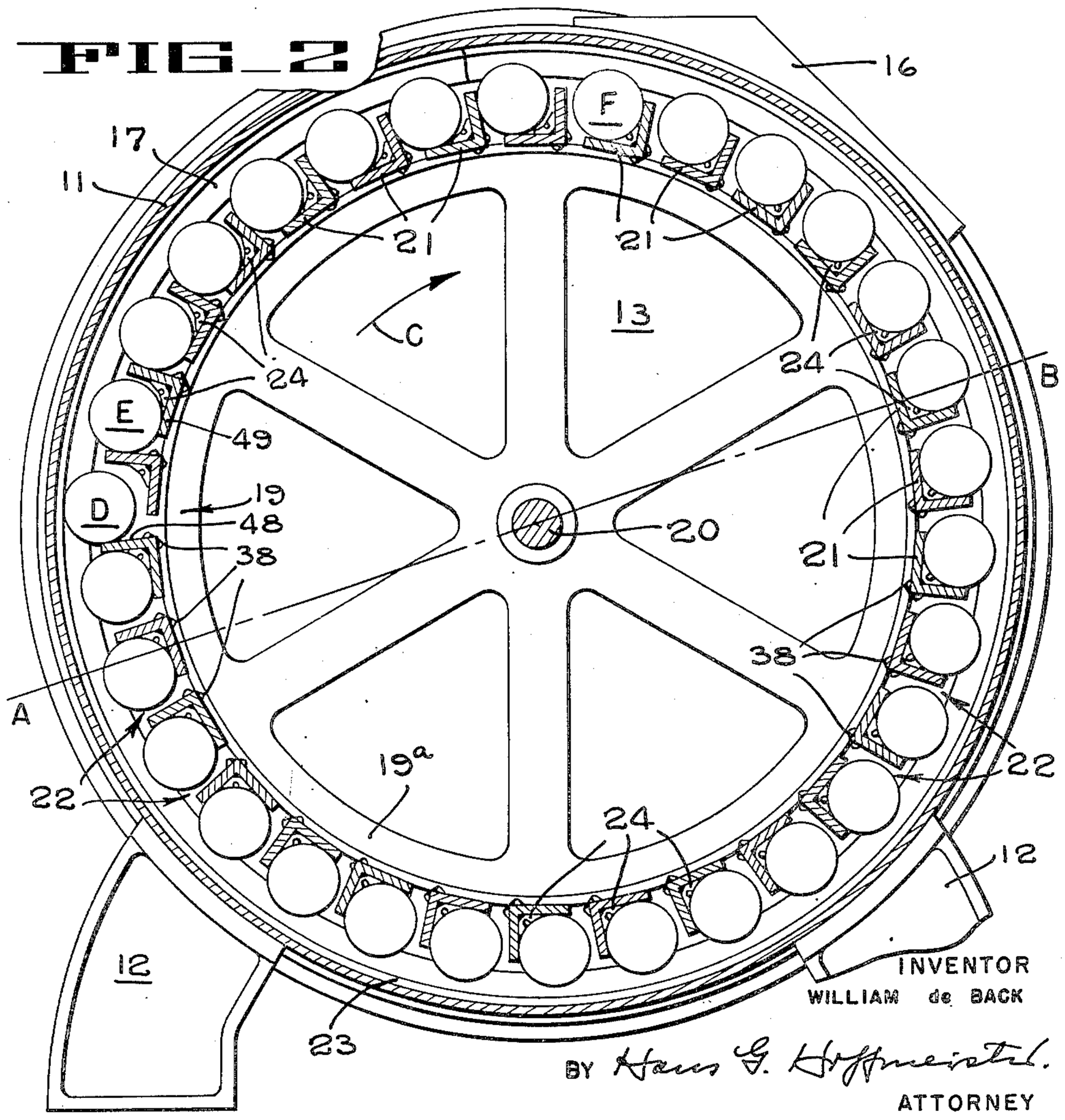


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FIG_3

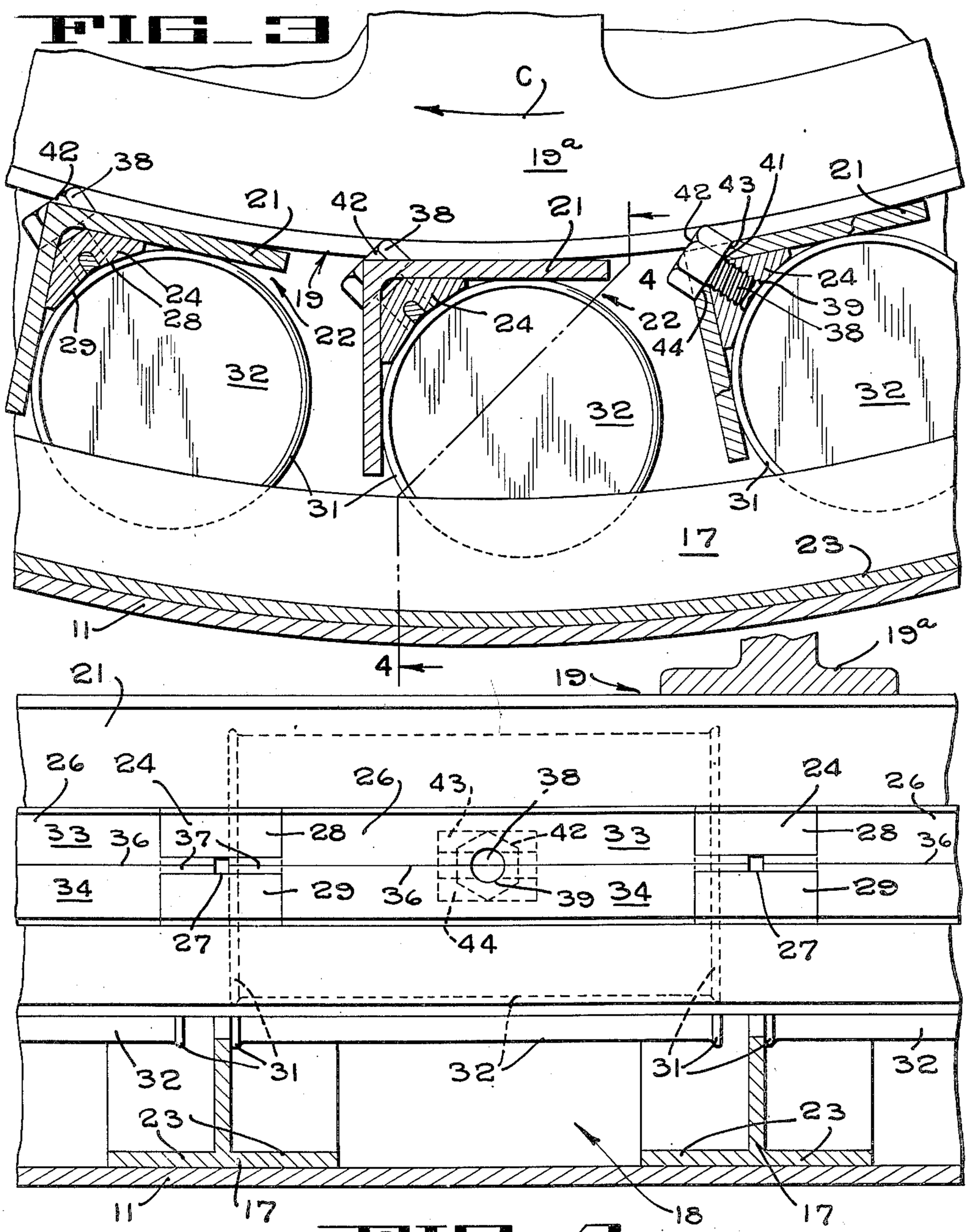


FIG_4

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NONAGITATING CAN HANDLING APPARATUS

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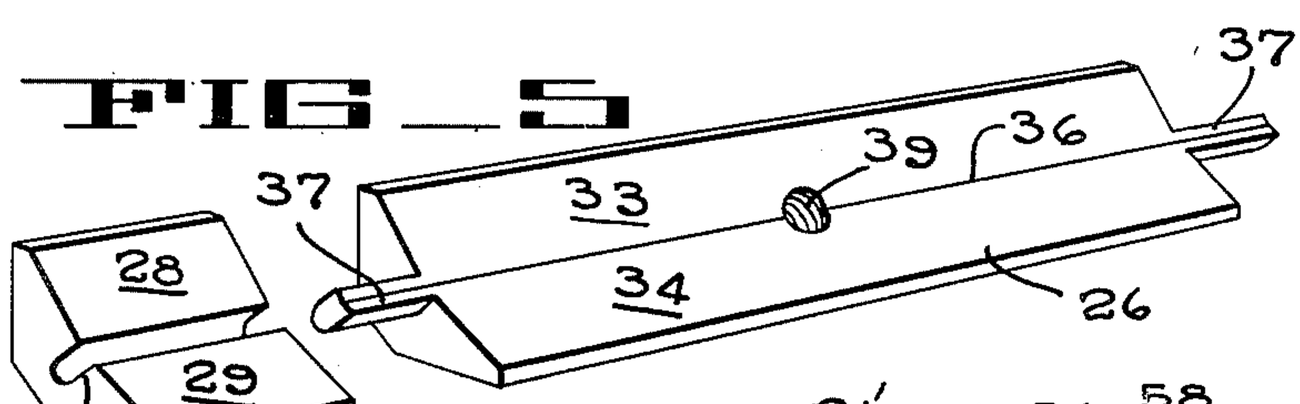
FIG_5



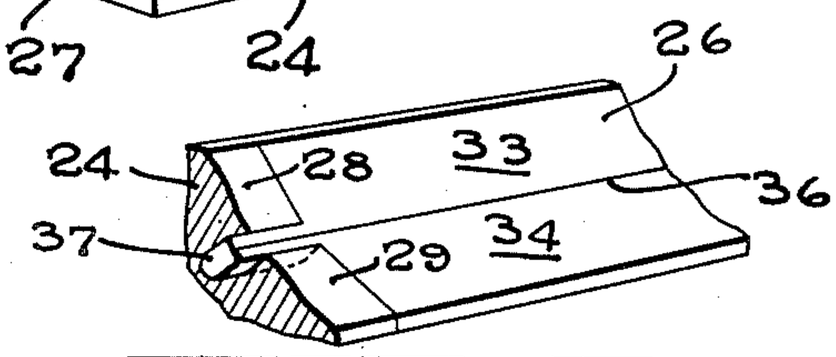




FIG_6

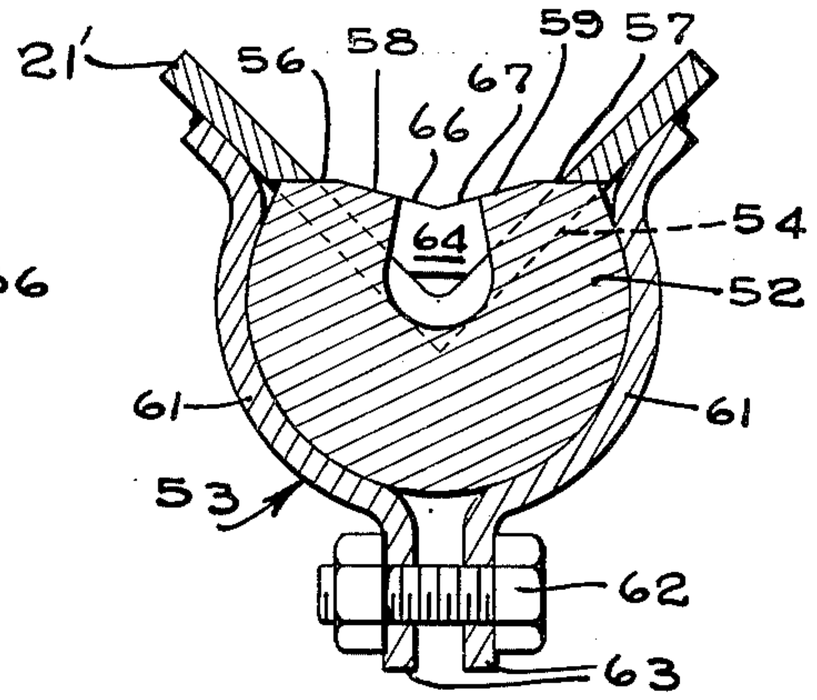



FIG_9

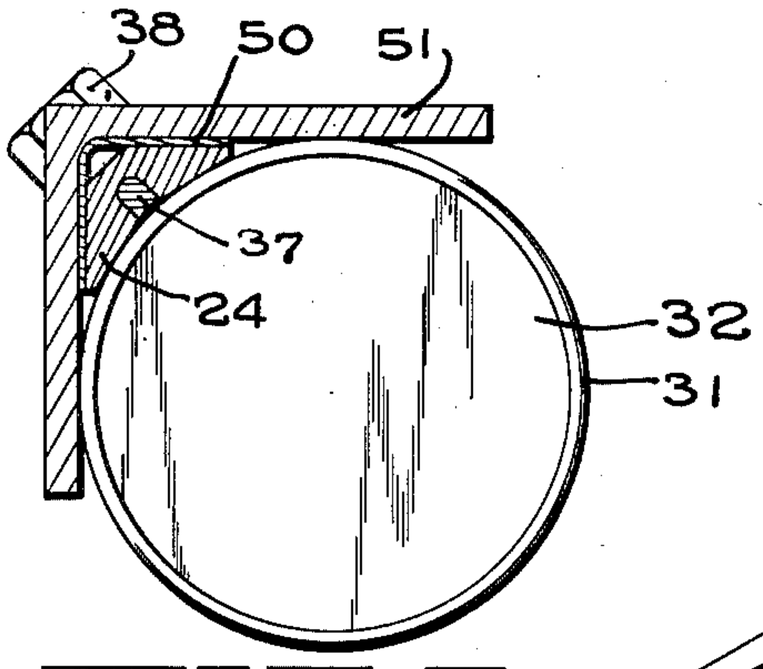



FIG_7




FIG_8

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# UNITED STATES PATENT OFFICE

2,629,482

## NONAGITATING CAN HANDLING APPARATUS

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Application May 28, 1951, Serial No. 228,619

10 Claims. (Cl. 198—41)

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The present invention relates to can handling machinery of the so-called reel and spiral type commonly employed in the canning industry to convey cans through cookers, coolers and similar processing equipment.

Can handling machinery of this type, briefly described, comprises a shell having an inlet to which cans are fed and an outlet from which they are discharged; and means within the shell for advancing the cans from the inlet to the outlet. The path of progress of the cans is generally a helical one and the conveying means comprises a reel of can carrying bars revolvable about a horizontal axis and circumscribed by a helically directed stationary rail.

The conveyed cans, lying freely endwise in the carrying bars of the rotating reel, one of their ends in contact with an adjacent convolution of the helically directed stationary rail, are carried around said reel in successive major revolutions. As the cans are progressed through the lower portion of the shell they rest by gravity on the foot flanges of the stationary rail and are rolled therealong by the reel-bars. Each can is thus given a rotation upon its own axis in addition to its major revolution about the reel axis during the time it is present in the lower portion of the shell. Such rotation of the conveyed cans upon their own axes is undesirable in treating certain kinds of food products, such as for instance tomatoes and peas, since it is liable to cause mashing of the solid product and to cloud the liquid portion of the pack.

One object of the present invention is to provide a can handling mechanism of the type above referred to which does not agitate the cans.

Another object is to provide a non-agitating can handling mechanism of the type referred to, which is simple, durable, reliable, and relatively inexpensive.

Another object is to provide a non-agitating can handling mechanism of the reel and spiral type which does not require specially-shaped, can-retaining, reel-bars.

Another object is to provide a non-agitating can handling mechanism of the reel and spiral type which holds the cans conveyed thereby against the base of the channels formed by the reel-bars and out of contact with the stationary spiral guide-rail during the portion of their major revolutions within the processing equipment where they normally would be rotated upon their own axes due to such contact.

Another object is to provide means for preventing the rotation of cans upon their axes in

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a reel and spiral type can handling apparatus, which may be easily and quickly attached to and detached from the standard reel angle-bars of such apparatus.

Another object is to provide a non-agitating can handling mechanism of the reel and spiral type which minimizes undesired movement of the cans within the channel formed by the reel-bars.

Another object is to provide a novel device for attaching magnets to the reel angle-bars of a reel and spiral type can handling mechanism.

These and other objects and advantages of the present invention will become apparent from the following description and the accompanying drawings wherein:

Fig. 1 is a side elevation of a pressure cooker embodying the invention, a portion of the cooker being broken away to expose its interior construction.

Fig. 2 is a section taken along the line 2—2 of Fig. 1.

Fig. 3 is an enlarged fragmentary view, similar to Fig. 2, of a lower region of the pressure cooker, the right hand reel-bar therein being sectioned along a plane through the attaching bolt of a locking strip.

Fig. 4 is a section taken along the line 4—4 of Fig. 3.

Fig. 5 is an exploded perspective of certain parts of the present invention.

Fig. 6 is a fragmentary perspective of the parts shown in Fig. 5 in assembled condition.

Fig. 7 is a section of a reel-bar similar to Fig. 3, illustrating a modified embodiment of the invention.

Fig. 8 is a fragmentary perspective of a further modified form of the invention.

Fig. 9 is a section taken along the line 9—9 of Fig. 8.

The cooker embodying the present invention comprises a horizontally disposed cylindrical shell 11 (Figs. 1 and 2) supported on suitable legs 12 and closed at both ends by suitable heads 13 to form a treating chamber therewithin, which may have supplied thereto a treating medium such as water or steam. The cans to be treated are introduced into the cooker through the usual port 14 by means of a conventional can transfer valve (not shown) and discharged from the cooker after treatment through a similar valve (also not shown) at 16. The structure and operation of such valves is well known in the art, and forms no part of the present invention so that the construction thereof is not illustrated.

The mechanism for conveying the cans through

the cooker includes a continuous T-shaped guide rail 17 secured to the inner wall of the shell 11 and extending therearound in a series of helix-like convolutions to form a helix-like can-path 18 extending from the can inlet 14 to the can outlet at 16. The cans are advanced along this can-path 18 by means of a rotatable reel 19 of conventional construction arranged concentrically of said can-path 18 and comprising a plurality of spider rings 19*a* secured to a drive shaft 20 and carrying on their peripheries a series of circumferentially spaced angle iron bars 21. Said bars 21 extend parallel to the reel axis and provide channels 22 for the cans introduced into the can-path 18 through the inlet port 14.

In operation, the reel shaft 20 may be driven from any suitable source of power so as to rotate the reel 19, and a continuous procession of cans may be introduced into the shell 11 through the inlet 14 which directs the cans one at a time into the successive spaces formed between adjoining convolutions of the stationary helical guide rail 17 and the continuously passing, spaced, parallel angle bars 21. As the cans are advanced along the can-path 18 by the rotating reel 19, the continuous T-shaped can rail 17 guides them longitudinally along the channels 22 to the discharge valve 16 through which they are finally discharged from the machine.

In traveling through can-paths of the type described, the cans have a major revolution about the reel axis. They also have, ordinarily, an individual rotation on their own axes, during their lower arc of major revolution, due to peripheral contact with the stationary inner surface of the shell 11, in case the guide rail be a single inwardly extending member, or, as herein shown, with the foot flanges 23, 23 (Figs. 3 and 4) of the T-shaped guide rail 17.

As previously pointed out it has been found that when treating certain kinds of food products the agitation resulting from this rolling of the cans upon their own axes impairs the quality of the pack. In accordance with the present invention magnetic means are therefore provided within the angle-bars 21 to hold the cans on the reel 19 out of peripheral contact with any fixed surfaces, during the period of their travel through the lower portion of the shell 11. This prevents the detrimental individual rotation of the cans and thus preserves the quality of the pack. In furtherance of this result the convolutions of the guide rail 17 are not made truly helical, but are formed in a series of alternately leading, helical sections and non-leading, semi-circular sections, as seen in Fig. 1. The leading sections are placed in substantially the upper half of the guide rail 17 above the plane indicated by the line AB in Figure 2 and the lines AA and BB in Figure 1. Hence, progress of the cans in a direction longitudinally of the shell occurs only in the upper half of said shell, whereas when within the lower half of the shell, the cans remain stationary with respect to the angle-bars 21 for a reason that will presently appear.

In the disclosed embodiment of the invention the previously mentioned magnetic means comprises a plurality of longitudinally spaced permanent magnets 24 (Fig. 4) held in the inside corner or bight of each reel angle-bar 21 by a plurality of locking strips 26. The number of magnets 24 held in each angle-bar 21 corresponds to the number of convolutions of the helix-like guide rail 17 and each of the magnets is preferably so located within its supporting angle-bar 21 that



it is symmetrically intersected by the vertical plane defined by a corresponding non-leading section of the rail convolution. The length of said magnets is such that cans traveling through the non-leading portion of the can-path 18 may contact two adjacent magnets 24 with their opposite chimes or flanges 31, as illustrated in phantom lines in Figure 4.

The magnets 24 (Fig. 5) are of the horseshoe type, having a groove 27 separating their poles and being generally isosceles right triangular in cross-section. The pole faces 28 and 29 of said magnets 24 are plane surfaces somewhat inclined toward the groove 27 so that both lie tangent to the flange 31 (Fig. 4) of a can 32 as it travels within a reel angle-bar 21.

The locking strips 26 (Fig. 5) are generally similar in cross-section to the magnets 24 except that they have no groove separating their two outer plane faces 33 and 34 which meet forming the line 36, and they are provided at their ends with tongues 37 which mate with the grooves 27 of neighboring magnets. The locking strips 26 and hence the magnets 24 are secured to the reel angle-bars 21 by means of tap bolts 38. These bolts protrude through suitable holes 41 provided in the corners of the angle-bars 21 and engage threaded holes 39 provided in the locking strips, with their heads 42 seated against correspondingly milled surfaces 43 and 44 at the corners of said angle-bars. The plane surfaces 28 and 33, and 29 and 34 of the magnets and locking strips respectively are flush with each other when said magnets and locking strips are assembled, thus forming two contiguous inclined longitudinal surfaces over which the cans 32 (Fig. 4) may glide as they are advanced through the shell 11 by the leading portions of the guide rail 17. The strips 26, therefore, not only lock the magnets 24 in position but also act as filling strips to prevent material from lodging beside the magnets 24, and as bridges to prevent the cans from colliding with the sides of the magnets should the reel bars 21 become worn.

The operation of the magnets to prevent agitation of the cans as they are advanced through the shell 11 by the cooperation of the helix-like guide rail 17 with the rotating reel bars 21 may be best understood by reference to Figs. 1 and 2. With the reel 19 rotating in the direction of the arrow C, the cans 32 on the upper, descending side of the reel rest in the angle-bars 21 and are in the latter half of a period of longitudinal advancement by the guide rail 17. As they approach the non-leading portion of the can-path 18, beginning at the line BB (Fig. 1), the can chimes 31 (Fig. 4) become aligned with and contact magnets 24. Thus, as a can descends below the level of the reel axis, its opposite chimes 31 engage and are attracted by the two adjacent magnets (Fig. 4). Consequently the can is unable to roll outwardly and rest against the foot flanges 23, but is retained within the reel angles 21. The cans (Fig. 2) are then conveyed along the lower portion of the can-path 18 and due to the fact that over this lower portion the can-path 18 is of non-leading, circular character, as has been pointed out hereinbefore, the cans are not shifted longitudinally out of contact with the magnets 24 and, thus, remain suspended from the bars 21 and out of peripheral contact with the inner shell surface or the foot flanges 23, as the case may be. Therefore said cans are not rotated upon their own axes and pass through

the lower half of the shell 11 with a minimum of agitation.

When the cans reach the leading or helical portion of the can-path 18, at AA (Fig. 1), they commence to move again longitudinally within the channel 22 (Fig. 2) due to the action of the guide rail 17. This longitudinal movement soon causes the can chimes 31 to slide in an axial direction out of contact with the magnets 24 and their restraining field. This releases the cans so that they drop on to the outwardly extending flange 48 of the succeeding reel-bar 21, for the field of the single magnet 24 over which the can passes during this longitudinal advancement will usually not be strong enough to retain the can upon said angle-bars 21, especially since the can is then spaced from the magnet 24 by its chimes 31.

Depending upon where the leading portion of the guide rail 17 begins, the pitch thereof, and the longitudinal dimension of the magnets 24, the can chimes 31 may move out of contact with said magnets 24 before the cans have been conveyed above the level of the reel axis. In such an event the released cans may, upon dropping to the succeeding reel-rail 21, roll outwardly against the foot flanges 23, as shown at D in Fig. 2. However, after the cans have ascended approximately forty-five degrees from the bottom of the shell 11, such contact with the foot flanges 23 will not cause the cans to rotate upon their own axes since at approximately forty-five degrees beyond the bottom point the friction between the cans and the outwardly extending flange 48 of the angle-bars 21 becomes greater than that between the cans and the foot flanges 23. Therefore, the cans will merely slide on the foot flanges 23 until they are conveyed above the level of the reel axis when they will roll inwardly and again rest completely on the reel, as shown at E in Fig. 2.

It will be understood that although in the particular form of canway here illustrated and described, the lead extends over substantially the upper half of the guide rail 17, it could, and under proper circumstances might desirably be extended over more or less than the upper half without sacrificing the advantages of the invention. However, the leading portion of the rail 17 should not be extended on the ascending side of the reel below the point, where, when it releases the cans from the magnets 24, said cans will be caused to roll on the foot flanges 23 rather than slide thereon. As previously mentioned this point is approximately forty-five degrees from the extreme bottom point of the shell 11 on the ascending side. Furthermore, it will be appreciated that the leading portion of the rail 17 should not be extended on the descending side of the reel much below the level of the reel axis, for if the can chimes 31 have not contacted the magnets 24 when the cans reach the level of the reel axis, the cans will roll outwardly against the foot flanges 23 and the chimes 31 will never be brought into contact with said magnets.

While the cans 32 are riding upon the upper ascending sector of the reel and are naturally out of peripheral contact with any stationary object, the leading section of the guide rail 17 advances them longitudinally within the reel channels 22. In this sector the cans rest on the outwardly extending flange 48 of the succeeding reel-bar 21 and the circumferentially extending flange 49 of the preceding reel-bar 21. After the cans have passed the uppermost point of the



shell 11 and begin to descend, they roll forwardly positioning themselves entirely on the preceding angle-bar 21, as shown at F in Fig. 2. The cans are then in a position so that their chimes 31 may contact the magnets 24 as said cans are advanced to the non-leading section of the can-path 18, where the previously described operation begins anew, repeating until the cans are taken from the shell 11 at the outlet port 16.

Both the reel angle-bars 21 and the locking strips 26 should be made of a non-magnetic material, such as brass or some of the stainless steels, so that the field of the magnets will not be diverted from the cans which would decrease the can attracting power of said magnets 24. However, if bars of magnetic material are employed on the reel, a spacer strip of non-magnetic material should be placed between each magnet and its supporting rail as indicated at 50 in Fig. 7, where the numeral 51 designates a reel bar of magnetic material. In this manner diversion of the magnetic flux through the angle-bar 51 is minimized and thus the attraction of the magnet for an adjacent can substantially preserved.

In Figs. 8 and 9 a modified horseshoe magnet 52 and locking means 53 therefor are shown associated with a non-magnetic angle-bar 21'. Said angle-bar 21' is provided at equal intervals along its length with transverse slots 54 adapted to receive the horseshoe magnets 52. The poles of the magnets 52 have bar abutting faces 56 and 57 and can contacting faces 58 and 59. The faces 56 and 57 are adapted to bear against the narrow edges of the slots 54 and thereby properly position the faces 58 and 59 within the bight of the angle-bars 21' in order that they may appropriately contact the chimes of cans passing along the channels 22, as previously described in connection with the embodiment of the invention illustrated in Figures 1 to 6.

The magnets 52 (Figs. 8 and 9) are held in the slots 54 by two non-magnetic straps 61 which are welded to the angle-bar 21'. These straps 61 are made of a resilient material, such as brass, so that they may be spread apart sufficiently to enable the magnets 52 to be fitted into the slots 54. Upon insertion of a magnet 52 in a slot 54 the straps 61 are pulled tightly around the magnet by means of a bolt 62 which engages ears 63 formed on the free ends of said straps 61.

Filler strips 64 of the same general cross section as the previously described locking strips 26 are attached to the angle-bars 21' between the magnets 52 in the same manner as said locking strips. These filler strips 64 have two inclined faces 66 and 67 which upon assembly are coplanar with the can contacting faces 58 and 59, respectively, of the magnets 52. Since the magnets 53 are held in position by the straps 61, as above described, the filler strips 64 are not provided with locking tongues and their sole function is to act as fillers to prevent the accumulation of foreign material between the magnets 52 and as bridges between the magnets to prevent the cans from colliding with said magnets should the reel angle-bars 21' become worn and allow said cans to ride lower in the rail 21.

While the preferred embodiments of the present invention have been described it will be understood that various changes and modifications may be made in the details thereof without departing from the spirit and scope of the appended claims.

Having thus described the invention what I

claim as new and desire to protect by Letters Patent is:

1. An apparatus for advancing cans of magnetic material through a processing chamber comprising a channel adapted to turn about an axis, means adapted to engage cans in said channel and effective upon turning of said channel to advance the cans along said channel, and magnetic means associated with said channel and adapted to retain the cans in said channel while said channel moves through a given sector of its rotary orbit.

2. An apparatus for advancing cans of magnetic material, such as steel, through a processing chamber comprising a substantially horizontally extending can channel adapted to rotate about a substantially horizontal axis, means adapted to engage cans in said channel and effective upon rotation of said channel to advance the cans along said channel while said channel is in upright condition and magnetic means provided in said channel and adapted to retain the cans in said channel during rotation thereof while said channel is in inverted condition.

3. An apparatus for advancing cans of magnetic material, such as steel, through a processing chamber comprising a substantially horizontally extending can channel adapted to turn about an axis substantially parallel with said can channel, means adapted to engage cans in said channel and effective upon rotation of said channel to advance the cans along said channel while said channel moves through an upper sector of its rotary orbit, and magnetic means provided in said channel and adapted to retain the cans in said channel while said channel moves through a lower sector of its rotary orbit.

4. An apparatus for advancing cans of magnetic material along a helical path with minimum agitation comprising a reel rotatable about a substantially horizontal axis having a can carrying channel, means engageable with a can in said channel and adapted upon rotation of said reel to advance said can along said channel, and magnetic means in said channel adapted to hold the can in said channel during the disposition of said channel at the lower side of said reel.

5. An apparatus for advancing cans of magnetic material along a helical path with minimum agitation comprising a reel rotatable about a substantially horizontal axis having a can carrying channel, means engageable with a can in said channel during disposition of said channel along the upper side of said reel for shifting said can longitudinally upon rotation of said reel, and magnetic means mounted in said can carrying channel and adapted to hold the can in said channel during disposition of said channel at the lower side of said reel.

6. An apparatus for handling cans of magnetic material with minimum agitation comprising a reel rotatable about a substantially horizontal axis having a can supporting channel, means engageable with a can in said channel during disposition of said can upon the upper portion of said reel and effective upon rotation of said reel to shift the can longitudinally within said channel, a plurality of magnets mounted in longitudinally spaced relationship within said channel to



hold the can on said reel during disposition of said can at the lower portion thereof.

7. A mechanism for advancing cans of magnetic material with minimum agitation comprising a reel rotatable about a substantially horizontal axis having a longitudinal can supporting channel, helically directed rails successively engageable with a can during disposition of the channel in the upper sector of the rotary orbit of said reel for successively shifting the can longitudinally within said channel upon rotation of said reel, and magnets mounted in said can supporting channel substantially in alignment with the ends of said rails to hold a can upon said reel during disposition of said channel in the lower sector of the rotary orbit of said reel.

8. An apparatus for advancing cans of magnetic material along a helical path with minimum agitation comprising a reel rotatable about a horizontal axis having can carrying channels, a continuous helix-like can guide surrounding said reel and having alternate leading and non-leading sections with said leading sections disposed over the upper surface of the reel for advancing cans along said channels upon rotation of said reel, and magnets mounted in said can carrying channels in alignment with the non-leading can guide sections upon rotation of said reel, each of said magnets being adapted to hold the confronting extremities of two adjacent cans whereby said cans are held in the channels during the passage of said cans along the non-leading section of said can guide.

9. A processing machine for cans embodying magnetic material comprising a horizontally disposed outer shell; longitudinally spaced, inwardly directed, helically extending, stationary, can-advancing rails within the upper portion of the shell; a reel rotatably mounted co-axially with and below said rails and having longitudinally extending outwardly directed, can-carrying bars, said stationary rails and said bars constituting means for carrying and advancing said cans upon rotation of said reel in a series of helical paths; and magnetic means associated with said bars and adapted to hold said cans out of peripheral contact with any stationary surface while the reel transports the cans through the lower portion of said shell from one stationary helically directed rail to another.

10. In a reel and spiral type conveyor of the kind described a can-carrying angle-bar adapted to be supported on the reel of said conveyor, said bar being provided with a plurality of longitudinally spaced magnets having a securing groove, and locking strips secured to said angle-bar between said magnets and provided with tongues mating with said magnet securing grooves to secure said magnets to said reel.

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