

Aug. 20, 1940.

A. R. THOMPSON

2,211,801

CAN HANDLING MACHINE

Filed May 5, 1937

2 Sheets-Sheet 1

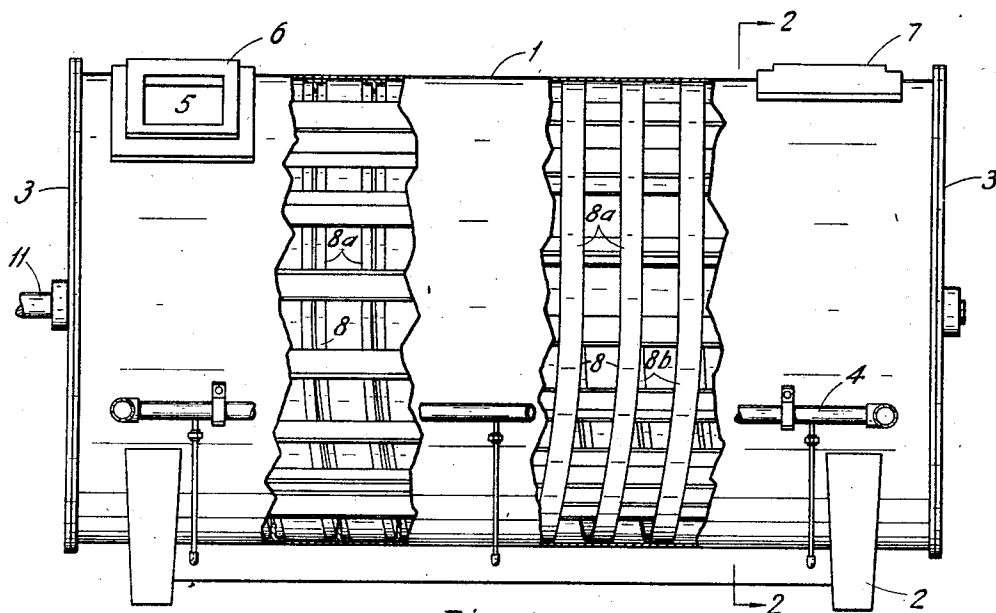


Fig. 1.

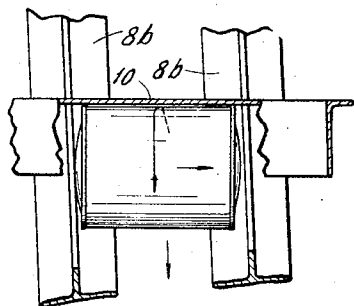


Fig. 3.

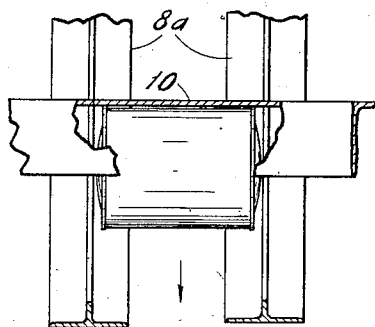


Fig. 4.

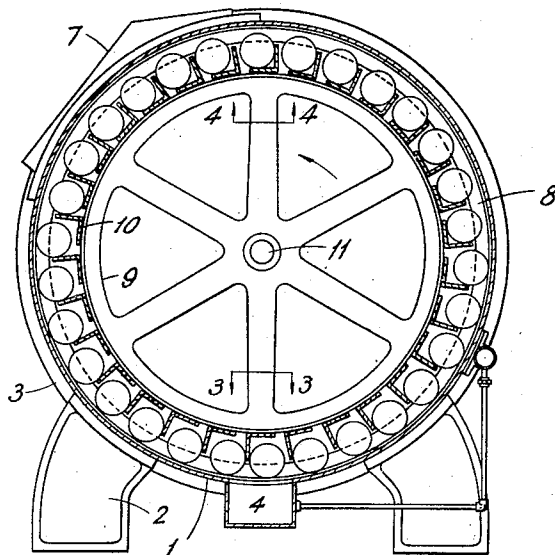


Fig. 2

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2 Sheets-Sheet 2

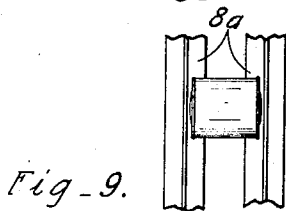
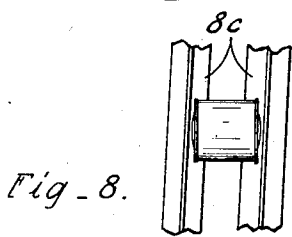
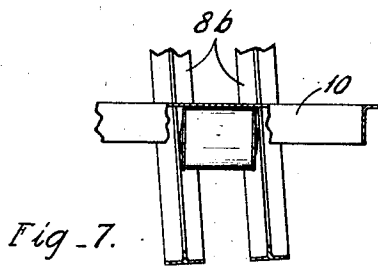
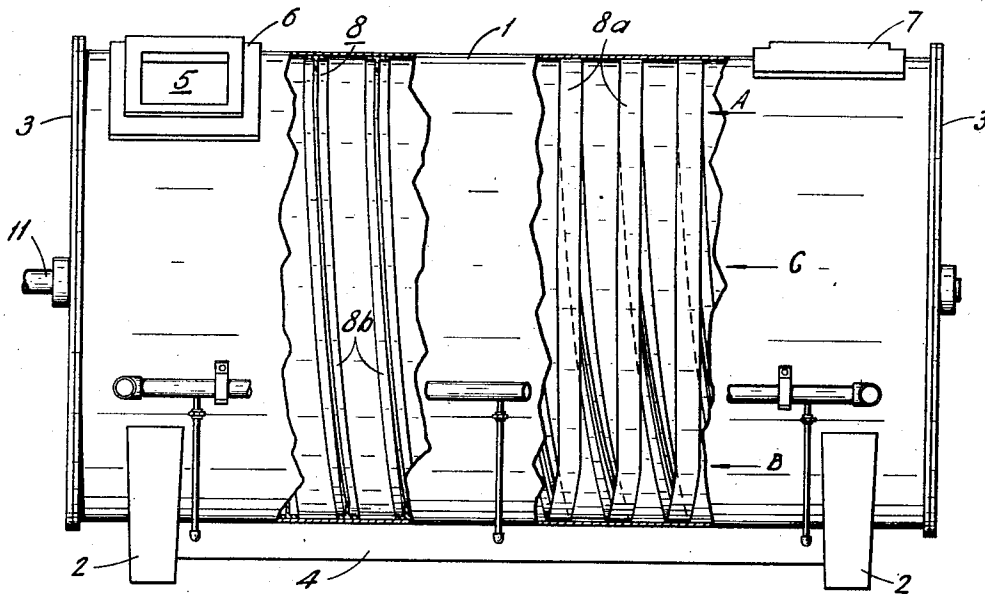


Fig. 5

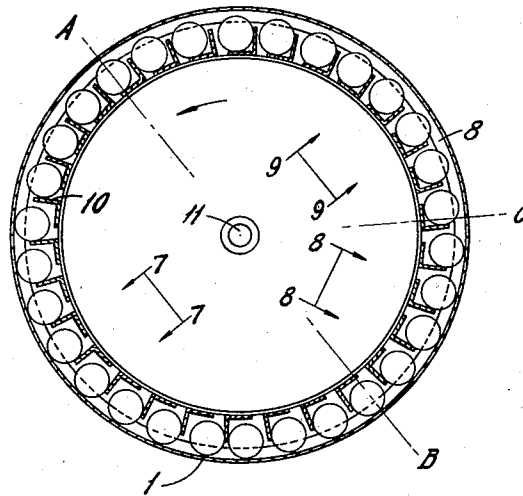


Fig. 6.

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2,211,801

CAN HANDLING MACHINE

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Application May 5, 1937, Serial No. 140,842

22 Claims. (Cl. 198—211)

The present invention relates in general to can handling machinery, and is more particularly concerned with the provision of a new and improved conveying mechanism of the so-called reel and spiral type such as commonly employed in the canning industry to convey cans through cookers, coolers, and similar processing equipment. This application is a continuation in part of my co-pending application, Serial No. 46,264, filed October 23, 1935, and is filed as a substitute therefor.

It is a primary object of the invention to provide a can conveying mechanism of the general type referred to, in which provision is made for minimizing or eliminating injuries to the cans such as have heretofore occurred in the operation of devices of this kind.

It is also an object to provide such a mechanism which is less susceptible to jamming, and requires less power to operate, than devices of similar type heretofore known.

Various other objects and advantages, as well as the several structural features of apparatus embodying the invention, will best be understood from the following detailed description of a concrete example taken in connection with the accompanying drawings wherein:

Fig. 1 is a side elevation of a pressure cooker embodying the invention, a portion of the shell being broken away at the right to illustrate the reel and can trackway in elevation, and a second portion of the shell, together with portions of the reel and can trackway, being broken away at the left to illustrate a vertical section through the axis of the machine. Several pusher bars hereinafter referred to, have been omitted for purposes of clarity;

Fig. 2 is a sectional view taken along the line 2—2 of Fig. 1 and illustrates the manner in which the cans are advanced by the reel;

Fig. 3 is an enlarged fragmentary view from line 3—3 of Fig. 2 with certain portions broken away to show a can in relation to the trackway and pusher bar; and

Fig. 4 is a similar view from line 4—4 of Fig. 2.

Fig. 5 is a side elevation, similar to Fig. 1 and similarly broken away, but illustrating a modified form of the invention. The entire reel assembly is omitted to show the trackway more clearly.

Fig. 6 is a diagrammatic transverse sectional view of the cooker illustrated in Fig. 5.

Fig. 7 is an enlarged fragmentary view from the line 7—7 in Fig. 6 with certain parts broken

away to show a can in relation to the trackway and a pusher bar.

Fig. 8 is a view similar to Fig. 7 with the pusher bar omitted, and is taken from the line 8—8 of Fig. 6.

Fig. 9 is a view similar to Fig. 8, taken from the line 9—9 of Fig. 6.

The cooker illustrated in Figs. 1-4 comprises a horizontally disposed cylindrical shell 1 supported on legs 2 and closed at its ends by heads 3 to form a treating chamber therewithin which may contain a body of heating liquid heated in any suitable manner as by steam introduced through a steam header 4. The cans to be treated may be introduced into the cooker through the usual port 5 surrounded by a base and adapter 6 for a turret valve of conventional construction (not shown), and discharged from the cooker after treatment through a similar valve apparatus at 7. The construction and operation of such valves is well known in the art, and forms no part of the present invention so that it is believed unnecessary to illustrate further details of their construction.

The mechanism for conveying the cans through the cooker includes a T-shaped guide rail 8 secured to the inner wall of the cooker shell 1 and extending therearound in a series of helix-like convolutions to form a helix-like canway extending from the can inlet to the can outlet. The cans are advanced along the can track by means of a rotatable reel of conventional construction arranged concentrically of the can track and made up of a plurality of spider rings 9 secured to a drive shaft 11 and carrying on their periphery a series of angle iron pusher bars 10 which extend longitudinally of the reel axis for propelling engagement with the cans introduced into the canway through the inlet port 5.

It will be understood that, in operation, the reel shaft 11 may be driven from any suitable source of power so as to rotate the reel, and a continuous procession of cans may be introduced through the inlet 5 which directs the cans into one end of the canway and into the channels between the reel bars 10. As the cans are advanced by the rotating reel, the canway guides them to the discharge valve through which they are finally discharged from the machine.

Referring now more particularly to Fig. 1, it is to be observed that the convolutions of the guide rail 8 are not truly helical, but extend in a series of alternately leading and non-leading sections, and this construction constitutes an important departure from the prior practice of em-

playing conventional helical canways having a continuous lead throughout their length.

As illustrated, the upper or overlying portions of the guide rail, 8a, extending above the level of the reel axis are plane curves and lie in planes normal to the reel axis. In other words, they have no lead. The lower or underlying portions of the guide rail 8b extending below the level of the reel axis are helically bent or warped to give them a helical lead.

The several important advantages of the modified helical construction just described will perhaps best be understood by reference to Fig. 2 which illustrates the manner in which the cans are advanced by the reel. In this figure it will be observed that as the cans on the ascending side of the reel are lifted above the level of the reel axis, they settle inwardly against the base flanges of the pusher bars 10 and out of peripheral engagement with the base flanges of the guide rail 8 which is necessarily spaced from the reel a distance somewhat greater than the can diameters so as to prevent dragging of the cans and consequent injury thereto. Thus the cans resting upon the upper surface of the reel are bodily conveyed without individual rotation on their own axes.

On the other hand, it is to be observed that the cans on the descending side of the reel roll outwardly away from the reel as they are lowered below the level of the reel axis, and rest against the base flanges of the guide rail 8. The cans are thereby caused to roll along the lower or underlying portions of the canway until they are again carried above the level of the reel axis on the ascending side of the reel.

I have discovered that the excessive wear on the can heads which has heretofore frequently resulted from the use of the reel and conventional helical canway, is directly attributable to the action of the helical can guide as the cans are bodily conveyed by the upper surface of the reel. It will be understood that when the sealed cans are subjected to heat treatment, the resulting expansion of the can contents causes the can heads to bulge outwardly more or less as illustrated in Figs. 3 and 4, depending upon the amount of heat applied, and the can heads thereby frictionally engage the guide rail as the latter guides the cans through the machine. This frictional engagement is illustrated in Fig. 3.

The resulting wear on the can heads is comparatively slight during the travel of the cans over the lower portions of the can path, this being due to their rolling motion whereby they offer a minimum of resistance to the endwise thrust of the guide. Moreover, the heating liquid which is customarily contained in the cooker also buoys up the cans to a certain extent, thereby further facilitating shifting of the cans.

During the travel of the cans over the upper portions of the can path, however, where they are bodily conveyed by the reel without being rolled, the frictional resistance of the reel against endwise movement of the cans is greatly increased, and this resistance is frequently further increased by the roughness of the pusher bars resulting from the effects of rust and corrosion which unavoidably occur in machinery of this character.

It will be seen, therefore, that where a guide rail of the conventional helical form is employed, that is to say, one having a continuous lead throughout its length, a considerable amount of friction takes place between the can heads and the guide rail during the periods when the cans

are conveyed over the upper section of the reel. As a result, the abrasive action of the guide on the can heads may score or wear away portions of the tin coating on the can heads and leave black marks or spots which may eventually rust. Such unsightly and weakened cans are not acceptable to the trade and represent a considerable loss to the canner.

Another serious difficulty is not infrequently met with in the operation of machines employing the conventional helical canways, when it is desired to handle cans of the flat type, that is to say, cans which are of relatively small height as compared with their diameters. Such cans, when resting on their sides are more easily tipped than the taller cans so that the endwise thrust exerted against them by the can guide as they are carried over the top of the reel, has a tendency to tip them and cause them to be wedged between the reel and guide and thereby become dented, otherwise deformed, or even crushed. Such tendency becomes even more pronounced, of course, where corrosion has roughened the can engaging surfaces of the reel.

I have found that the foregoing difficulties are effectively overcome by apparatus employing the modified helical canway of the present invention. It will be apparent that by restricting the lead of the can guide to the lower portions of its convolutions, the cans are subjected to the endwise thrust of the guide only during the periods when they are rolling. As illustrated in Fig. 4, no thrust is exerted against them during the upper portion of their travel where they are supported on the reel without being rolled, since the corresponding portions of the can guide are without lead.

As hereinabove noted, the resistance of the cans to endwise thrust is at a minimum during their periods of rolling movement, so that endwise shifting of the cans during these periods may be accomplished with a comparatively small degree of friction between the can heads and the guide rail. Consequently, by utilizing the form of canway contemplated by my invention, the only wear on the can heads is so negligible as to have no injurious effects. Moreover it will be apparent that can of the flat type may be handled with greater safety since there is little or no danger of tipping them, during their rolling movement, and thereby jamming the machine.

It will also be observed that less power is required for operation than where the conventional helical form of canway is employed due to the greater ease with which the endwise movement of the cans is accomplished.

The form of the invention illustrated in Figs. 5 to 9, inclusive, is generally similar to that described, but differs therefrom to provide certain added functions while substantially retaining the advantages of the described structure.

It has been found that on the descending side of the reel where the pusher bars are in effect moving away from under the cans, and the cans travel under the influence of gravity rather than being pushed, the leading sections 8b of the guide rail can be advantageously extended above the reel axis to begin approximately as indicated at A in Figs. 5 and 6, and to terminate at B, below the reel axis on the ascending side of the reel. Thus, the cans will begin their endwise travel approximately 45° before reaching the horizontal plane of the reel axis and because the cans are travelling under the influence of gravity no ex-

cessive wear of the can ends will occur as they are free for more or less shifting movement.

Also, it has been found that most of the small amount of wear present with the structure of Figs. 1 to 4, occurs in approximately the last 45° of travel before the cans arrive at the horizontal plane of the reel axis. To eliminate this remaining major source of wear the rail sections 8c (Figs. 5 and 6) of the guide rail extending from B to C are provided with a slight amount of reverse lead as compared with the lead from A to B, as illustrated in Fig. 8. This reverse lead is so selected with reference to the can length and the spacing between adjacent convolutions of the guide rail, that the active rail section 8c for a can moves away from the can, so as to leave the can positioned substantially centrally of and entirely free of both adjacent convolutions of the guide rail. Thus, when a can reaches position C it is entirely free of the guide rail, and will remain free during its bodily carriage by the reel past non-leading sections 8a of the rail.

From the above description, it will be noted that the location of the leading rail sections is so selected as to further minimize wear during endwise travel of the cans as well as to enable the elimination of substantially all wear during travel of the cans without endwise movement. This improved structure also serves to further lessen the amount of power required for operation.

Although I have described my invention as it may be utilized in a cooking apparatus, it will be appreciated that its usefulness is not confined thereto, but it may also be used in connection with other types of apparatus such as coolers, for example, or it may be used alone, simply as a conveyor. Furthermore, it will be understood that although in the form of canway first illustrated and described, the lead extends over substantially the lower halves of the canway convolutions, it could, and under proper circumstances might desirably be extended over more than half, or confined to less than half without sacrificing the advantages of the invention, as illustrated and described in connection with Figs. 5 to 9. In other forms of apparatus embodying my invention, the leading portions of the canway might desirably be relocated in other ways to meet varying conditions and to minimize wear under those conditions. I desire it to be understood therefore that the invention is not limited to the particular application or precise details of construction illustrated, but that various applications, modifications, and variations may be resorted to without departing from the spirit or scope of the invention, and I deem myself entitled to all such applications, modifications, and variations as come within the scope of the claims appended hereto.

Having now described my invention, and in what manner the same may be used, what I claim as new and desire to protect by Letters Patent is:

1. In combination with a can handling apparatus having a stationary surface and a conveyor cooperatively related thereto, wherein the cans are moved by alternately rolling the same on said surface while supported thereon and by bodily carriage without rolling on said surface, means engageable with the ends of the cans for shifting said cans endwise during their rolling movement only.

2. In an apparatus for handling canned goods, means forming a canway, an adjacent horizontally disposed rotatable can propelling reel adapted to carry cans over portions of the canway

surface and to roll said cans along the adjacent canway at other portions of said surface with said cans supported by said surface, said canway comprising a series of interrupted helical sections arranged for engagement with the propelled cans during their rolling movement only.

3. In an apparatus for handling canned goods, a horizontally disposed rotatable can propelling reel, means forming a canway arranged in adjacent cooperative relation with said reel for guiding the propelled cans, and having a series of helically trending sections extending part way around the reel, said reel being operable to bodily convey said cans during a part of their travel and to roll said cans along the helically trending sections of the canway with the cans supported thereby.

4. In an apparatus for handling canned goods, a horizontally disposed rotatable can propelling reel, means forming a canway arranged in adjacent cooperative relation with said reel for guiding the propelled cans, said canway having a series of helically trending sections adjacent the lower portion of the reel and extending part way only around the reel to support the cans when below the axis of said reel while moving them endwise along the reel.

5. In an apparatus for handling canned goods, means forming a horizontally extending helix-like canway having its convolutions formed to provide alternate leading and non-leading portions, and a rotatable can propelling reel coaxially arranged with respect to the said canway and operable to roll the cans along the leading portions of said canway and to bodily convey said cans along the non-leading portions of the canway.

6. In an apparatus for handling canned goods, a horizontally disposed rotatable can propelling reel, and means forming a helix-like canway surrounding said reel and having its convolutions formed to provide leading portions adjacent the lower portion of the reel and non-leading portions adjacent the upper portion of the reel.

7. In an apparatus for handling canned goods, a horizontally disposed rotatable can propelling reel, and a helix-like can guide surrounding said reel for engagement with propelled cans to shift said cans endwise longitudinally of the reel, the upper portions of the guide convolutions being substantially without lead whereby endwise movement of the cans is confined to the lower portions of their path of travel.

8. In combination, a horizontal cylindrical shell, a rotary conveyor provided with can propelling means arranged to receive cans therebetween for free movement between the shell and the conveyor both radially and axially thereof, and canway means in said shell including stationary canway portions having leading and non-leading sections, said leading sections having an axial trend so disposed with respect to said conveyor as to cause cans propelled thereby to rollingly engage the canway while moving therealong.

9. The combination with a horizontal cylindrical shell and a rotary conveyor provided with can propelling means arranged to receive cans therebetween, whereby cans in the upper portion of said shell are carried bodily by said conveyor and cans in the lower portion of said shell rollingly engage a stationary surface of said shell, of means for shifting said cans endwise during their rolling movement only.

10. The combination with a horizontal cylin-

drical shell and a rotary conveyor provided with can propelling means arranged to receive cans therebetween, whereby cans in the upper portion of said shell are carried bodily by said conveyor and cans in the lower portion of said shell rollingly engage a stationary surface of said shell, of canway means in said shell including stationary canway portions having an axial trend and arranged in said shell to shift said cans endwise during their rolling movement only.

11. The combination with a can conveying apparatus including a horizontal cylindrical shell wherein the cans are alternately rolled while supported by said shell and bodily conveyed without being rolled, of helix-like canway means disposed in said shell to effect endwise shifting of said cans during their rolling movement only.

12. In an apparatus for handling canned goods, a horizontally disposed rotatable can propelling reel, and a continuous helix-like can guide surrounding said reel and having alternate leading and non-leading sections therein, said leading sections effecting progression of the cans by engagement with the ends thereof.

13. In an apparatus for handling canned goods, a horizontally disposed rotary conveyor having can propelling means thereon, and means forming a helix-like canway surrounding said conveyor, said can propelling means and said canway means providing for free radial movement of cans therebetween whereby cans are alternately carried bodily by said can propelling means and rollingly engage a stationary surface of said canway means, and said canway means having an axial trend for a portion only of each convolution thereof for effecting endwise movement of cans by engagement with the ends thereof.

14. In an apparatus for handling canned goods, a horizontal shell, a horizontal can propelling reel rotatably mounted in said shell, pusher bars on said reel providing longitudinal can receiving troughs on said reel for bodily carrying cans supported thereby, and in which troughs the cans are free for both axial and radial movement relative to the reel, and a helix-like can guide in said shell around said reel to support the cans and limit radial movement thereof relative to the reel as the troughs are inverted during rotation of the reel, said guide having leading and non-leading sections to control the axial movement of said cans relative to the reel, said leading sections effecting endwise shifting of the cans by engagement with the ends thereof, and said non-leading sections being arranged in non-shifting relation to the cans during bodily carriage thereof by said reel.

15. In an apparatus for handling canned goods, a horizontal shell, a horizontal can propelling reel rotatably mounted in said shell, pusher means on said reel providing longitudinal can receiving troughs on said reel for bodily carrying cans supported thereby, and in which troughs the cans are free for both axial and radial movement relative to the reel, and means forming a helix-like canway in said shell around said reel to support the cans and limit radial movement thereof relative to the reel less as the troughs are inverted during rotation of the reel, said guide having leading and non-leading sections to control the axial movement of said cans relative to the reel, said leading sections effecting endwise shifting of the cans by engagement with the ends thereof and said non-leading sections being arranged in non-shifting relation to the cans during bodily carriage thereof by said reel.

16. In an apparatus for handling canned goods, a horizontal shell, a horizontal can propelling reel mounted in said shell, pusher bars on said reel providing longitudinal troughs on said reel in which the cans are free for both axial and radial movement relative to the reel, and a helix-like can guide in said shell around said reel to limit radial movement of the cans relative to the reel and to provide in each convolution of the canway a leading section for effecting endwise movement of the cans by engagement with the ends thereof, said leading section of each convolution extending from a location above the reel axis on the descending side of said reel to a location below the reel axis on the ascending side of said reel.

17. In an apparatus for handling canned goods, a horizontal shell, a horizontal can propelling reel mounted on said shell, pusher means on said reel providing longitudinal troughs on said reel in which the cans are free for both axial and radial movement relative to the reel, and a continuous helix-like can guide in said shell around said reel for limiting movement of cans radially of the reel and for controlling the endwise movement of cans along said troughs by engagement with the ends of the cans; each convolution of said can guide including a leading section having an axial trend in one direction for effecting endwise movement of the cans, a second leading section having an axial trend in the opposite direction of an amount to effect recession of the guide from the can whereby a can is positioned between and out of contact with adjacent convolutions, and a non-leading section extending from said second leading section to the can moving leading section of the next convolution.

18. In an apparatus for handling canned goods, a horizontal shell, a horizontal can propelling reel mounted in said shell, pusher means on said reel providing longitudinal troughs on said reel in which the cans are free for both axial and radial movement relative to the reel, and a continuous helix-like can guide in said shell around said reel for limiting radial movement of cans relative to the reel and for controlling the endwise movement of cans along said troughs by engagement with the ends of the cans; each convolution of said can guide including a leading section extending from a location above the reel axis on the descending side of the reel to a location below the reel axis on the ascending side of the reel and having an axial trend in one direction for effecting endwise movement of the cans, a second leading section extending from said first section to a location substantially in the plane of the reel axis on the ascending side of the reel and having an axial trend in the opposite direction of an amount to effect recession of the guide from the can whereby a can is positioned between and out of contact with adjacent convolutions, and a non-leading section extending from said second leading section to the can moving leading section of the next convolution of the can guide.

19. In an apparatus for handling canned goods, a horizontal shell, a horizontal can propelling reel mounted in said shell, pusher means on said reel providing longitudinal troughs on said reel in which the cans are free for both axial and radial movement relative to the reel, and a continuous helix-like can guide in said shell around said reel for limiting radial movement of cans relative to the reel and for controlling the endwise movement of cans along said troughs by engagement with the ends of the cans; each con-

5 volution of said can guide including a leading section extending from a location above the reel axis on the descending side of the reel to a location below the reel axis on the ascending side of the reel and having an axial trend for effecting end-
10 wise movement of the cans, and a non-leading section extending from said leading section to the leading section of the next convolution of the can guide.

15 20. In an apparatus for handling canned goods, a horizontally disposed rotatable can propelling reel, and means forming a helix-like canway surrounding said reel and having its convolutions formed to provide leading portions adjacent the lower portion of the reel and non-leading portions adjacent the upper portion of the reel, each leading portion having an axial trend in first one direction and then in the other, whereby to effect endwise movement of the cans and then
20 to leave the cans free of said canway as they enter a non-leading portion thereof.

21. In an apparatus for handling canned goods, a horizontally disposed rotatable can propelling reel, and means forming a continuous helix-like

canway surrounding said reel and having its convolutions formed to provide successive leading and non-leading portions, each leading portion having an axial trend in first one direction and then in the other, whereby to effect endwise movement of the cans and then to leave the cans free of said canway as they enter a non-leading portion thereof.

22. In combination, a horizontal cylindrical shell, canway means in said shell, a rotary conveyor provided with can propelling means arranged to receive cans therebetween for free movement between the canway means and the conveyor both radially and axially thereof, whereby the cans are alternately supported by the canway means and said conveyor upon rotation of the latter, said canway means having portions so disposed relative to said conveyor as to cause axial shifting of the cans supported by said canway and including other portions so positioned as to prevent axial shifting of the cans supported by said conveyor.

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