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STAR WHEEL TRANSFER MECHANISM FOR CANS OR THE LIKE

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FIG. 1

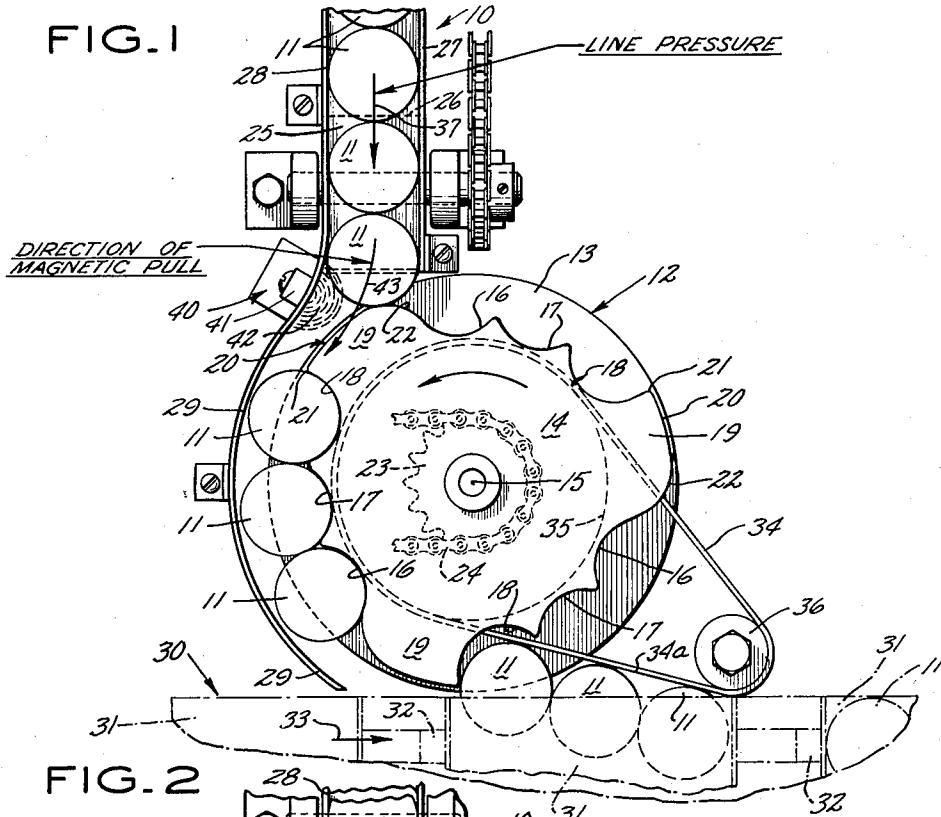
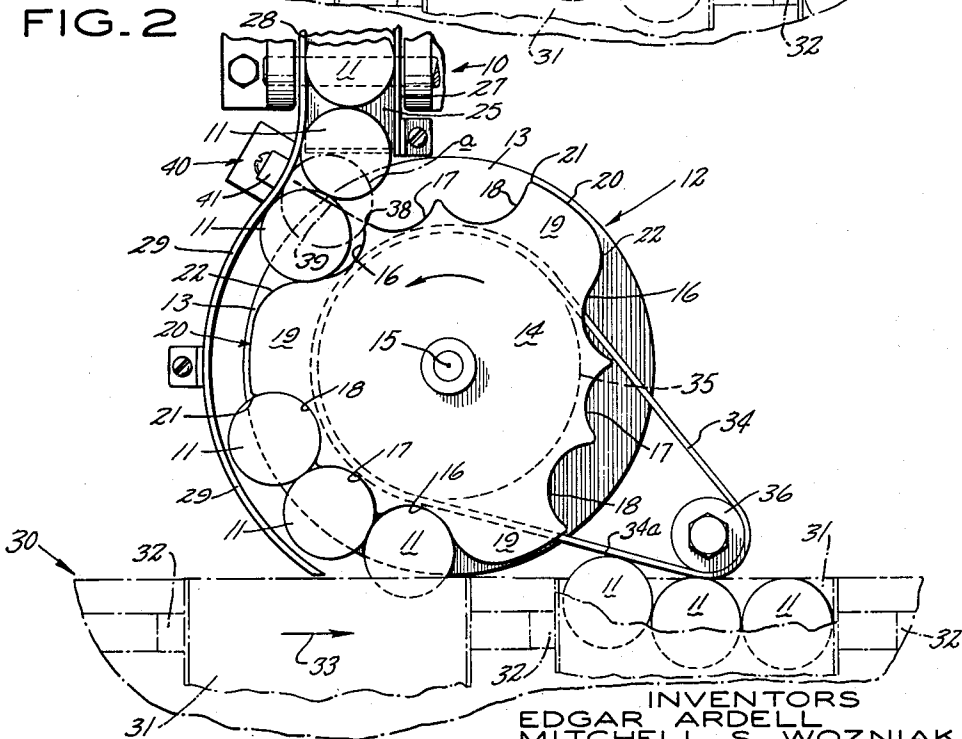


FIG. 2



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STAR WHEEL TRANSFER MECHANISM FOR CANS OR THE LIKE

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6 Claims. (Cl. 198—22)

This invention relates to improvements in star wheel transfer mechanisms for cans or the like and more particularly to a star wheel transfer mechanism of the type which comprises a star wheel mounted to rotate about a vertical axis and provided with angularly spaced pockets in its periphery, each intended to receive a can or like article, relatively stationary guide means for cans or the like cooperatively associated with the star wheel, a substantially horizontal infeed or supply conveyor for bringing a procession of cans or the like to a peripheral edge of the star wheel, and a second substantially horizontal conveyor or other receiving means to which cans or the like are to be transferred periodically by the operation of the star wheel.

A star wheel transfer mechanism of the character described inherently has the shortcoming that jamming of the star wheel is likely to occur in service, particularly if an attempt is made to operate the star wheel at a high speed. The tendency to jamming increases with the speed of rotation of the star wheel since inertia of the leading article of a procession that has been stopped at the periphery of the star wheel then is increasingly effective to prevent such article from entering the star wheel pocket for which intended on the resumption of forward movement of the article. Instead, such article may be caught between the relatively projecting edge of the trailing side wall of the pocket and the confronting portion of the relatively stationary guide structure of the star wheel mechanism and cause jamming of the mechanism. A star wheel mechanism of the character described therefore was not practical for use prior to the present invention to effect desirable transfer of cans or the like at the high speeds desirable for handling and conveying of such articles under modern service conditions.

The main object of the invention is to adapt a star wheel mechanism of the character described for use to transfer cans or the like satisfactorily at any speed within a wide range, including speeds considerably higher than could be attained prior to such adaptation.

A more specific object of the invention is to provide a star wheel mechanism of the character described with a simple, inexpensive and dependable means to exert a continuous pull on each successive leading article of a procession brought to the periphery of the star wheel and temporarily stopped there so that such article will be continuously constrained to move as required to enter the star wheel pocket for which it is intended when the rotation of the star wheel permits such entry.

To attain the foregoing and other objects of the invention, which hereinafter will be pointed out or will become apparent, the invention may provide a permanent magnet located at the junction of the infeed or supply container and the path along which cans or the like are to be moved by rotation of the star wheel so as to overcome the effect of inertia on each can or the like that has been temporarily stopped at the entrance to such path.

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A practical embodiment of the invention is shown in the accompanying drawings, in which,

Fig. 1 is a plan view of a star wheel transfer mechanism equipped with a permanent magnet in accordance with the invention, the star wheel component of such mechanism being provided with three angularly spaced series or groups of three adjacent peripheral pockets each and having relatively projecting peripheral abutment portions between adjacent pocket series or groups, the view showing the star wheel at a time in its cycle of rotation when one of its abutment portions is in contact with and blocking movement of the leading can of a procession on the infeed or supply conveyor; and

Fig. 2 is a view like Fig. 1 but showing conditions as they exist when the star wheel is at a slightly later stage in its cycle and showing also by dot-and-dash lines a can in the position which it would assume in the absence of the magnetic means provided by the present invention.

In the drawings, the numeral 10 generally designates an infeed or supply conveyor system by which cans 11 are brought in a single file order or procession to a transfer position at the peripheral edge of a star wheel, generally designated 12. As shown, the star wheel comprises a horizontal lower can supporting circular base member 13 overlaid by a can side contact main or body member 14, these two star wheel members being rotatable together about the axis of a vertical shaft 15. To that end they may be formed integral with each other or rigidly connected by both being connected to the shaft 15 or in any other suitable known manner.

The star wheel body member 14 is provided with three angularly spaced groups of adjacent peripheral pockets 16, 17 and 18, respectively, alternating with relatively projecting can movement stopping or abutment portions 19. The arrangement is such that except at its ends the peripheral surface of each abutment portion 19 of the star wheel body member 14 is arcuately curved as indicated at 20 with its axis of curvature the same as the axis of rotation of the star wheel as a whole. At one of its ends the arcuately curved peripheral surface 20 of the star wheel abutment portion 19 is merged by a sharp edge, indicated at 21 into the adjacent side wall of a star wheel pocket 18 and at its opposite end by a sloping surface 22 into the adjacent side wall of a pocket 16.

The slope 22 at one end of the peripheral surface 20 of each star wheel abutment 19 is at the trailing end thereof when the star wheel is rotated counterclockwise about the axis of the vertical shaft 15 as indicated by direction arrows in the drawings. The rotation of the star wheel may be effected in any suitable known way at the speed desired. The showing by broken lines in Fig. 1 of a sprocket 23 on shaft 15 and of a portion of a chain 24 for driving the sprocket is intended as a diagrammatic showing of any suitable known means to drive the star wheel about the vertical axis of the shaft 15.

The infeed or supply conveyor 10 may comprise a conveyor belt having a horizontal upper stretch 25 carrying a procession of the cans 111 and passing around a driven pulley or drum 26 adjacent to the periphery of the star wheel so that each successive leading can of the procession is brought in its turn by this upper stretch of the conveyor to a position where it will extend slightly over the edge of the supporting star wheel base member 13. Further movement of such leading can and of the oncoming pressure exerting cans of the procession will be stopped there temporarily if the peripheral surface 20 of an abutment portion 19 of the rotating star wheel is then in can-movement blocking position as shown in Fig. 1.

The cans on the upper stretch 25 of the conveyor 10, which may be driven continuously, will be guided in their movement to the star wheel by spaced guide rails

27 and 28, respectively. Guide rail 28, in the example shown, has an extension 29 of arcuate form extending along and at a uniformly spaced distance outwardly from the periphery of the star wheel at the same side of the axis of rotation of the star wheel as the arcuate path of movement of cans while they are being carried by pockets of the counterclockwise rotating star wheel as hereinafter further explained. The arrangement is such that the distance between the bottom of each of the pockets 16, 17 and 18 and the guide rail extension 29 when such pocket is in confronting relation to the guide rail extension is just enough greater than the diameter of a can 11 that has entered that pocket to permit such can to be carried in that pocket by the counterclockwise rotation of the star wheel in a path extending from the delivery end of the infeed container along the inner side of the guide rail 29 to and past the distal end thereof. At that point, the can may pass out of its pocket onto a suitable carrying away conveyor system or other receiving means, generally indicated at 30.

Any suitable article stripper means may be employed to assure transfer of articles from the pockets of the star wheel to the receiving means in a positive and dependable manner. In the example shown, the receiving means includes spaced cartons 31 moved by conducting means indicated at 32 in the direction of the arrow 33, each of these cartons being open at its end next to the star wheel. The stripper member shown is in the form of an endless belt 34 which is trained about a pulley or drum 35 that rotates with the star wheel about the axis of the shaft 15, this stripper belt being extended beyond the periphery of the star wheel toward the receiving means 30 and then passed around a second pulley or drum 36. The arrangement is such that one stretch 34a of the stripper belt 34 will eject articles 11 from the pockets 16, 17 and 18 in succession into the appropriately positioned traveling carton 31 of the receiving conveyor system.

As hereinbefore explained, the procession of articles 11 on the infeed conveyor will be halted each time the leading article of that procession is contacted by the peripheral surface 20 of an abutment portion 19 of the star wheel and the procession will remain stopped until the star wheel has rotated about its axis far enough to bring the sloping end surface 22 of that abutment to a position in front of the leading article to guide such article into the adjacent pocket 16 on resumption of forward movement thereof.

The conveyor belt 25 may be driven continuously and will slip underneath the stopped articles. Now, if the star wheel is rotating at a high speed, as at a speed sufficient to transfer 500 or more articles per minute from the infeed conveyor system 10 to the receiving conveyor system 30, inertia may delay the resumption of forward movement of the leading article that has been stopped at the periphery of the star wheel sufficiently to prevent entry of such article into its star wheel pocket. In other words, the line pressure of the oncoming articles in the direction indicated by the direction arrow 37, Fig. 1, may not be effective to force the leading article into its pocket 16 as that pocket moves past the adjacent end of the infeed conveyor. Instead, such article may arrive only at the dotted line position indicated at a in Fig. 2 where it will be jammed between the relatively projecting edge, indicated at 38 of the trailing side wall of the pocket 16 and the directly opposite portion of the guide rail 29. It will be noted that the contact of edge 38 with the adjacent side of the article 11 is in advance of a diametrical line, indicated at 39, extending through that article normal to the guide rail 29 at the point of contact of the latter with the opposite side of such article. The article therefore cannot get through between the guide rail and the rotating star wheel and jamming will occur.

To obviate this difficulty, the invention provides a magnet, designated 40 located in a fixed position, as by being

attached by fastening means 41 to the guide rail at the junction of the path of infeed movement of articles brought to the star wheel by conveyor belt 25 with the path of transfer movement of such articles part way around the axis of rotation of the star wheel. The field of magnetic force of this magnet is indicated by the dot-and-dash lines 42 in Fig. 1. The direction of pull of the magnet on the stopped article is indicated by the arrow 43. The magnetic pull on the article will supplement the line pressure thereon to prevent any lag of the article in its stopped position when resumption of its forward movement is permitted by rotation of the star wheel. Consequently, the article will move smoothly into the pocket 16, the next article will move into the pocket 17 and the third article in line will move into the pocket 18 before the next abutment of the star wheel contacts the fourth article of the procession and causes a further stoppage of the procession.

By the addition of the magnetic pull to supplement the line pressure on the articles brought to the star wheel, the range of speed of operation of the star wheel transfer mechanism has been substantially increased and the tendency of such mechanism to jam has been overcome.

A suitable known form of dead plate may be provided between the periphery of the star wheel and the adjacent end of the infeed conveyor if deemed necessary or desirable as is known practice in the art relating to transfer mechanisms of the character described.

It of course will be understood that the details of construction and operation of the star wheel transfer mechanism and associate conveyor systems may vary widely from those shown and described. The star wheel may be formed to take articles periodically one at a time or in groups other than groups of three as in the case of the illustrative example. The magnetic means may be of any suitable known type and the articles transferred may be conventional cans or any other suitable articles having at least a portion thereof subject to magnetic pull.

Many modifications of and changes in the illustrative embodiment of the invention shown in the drawings and herein particularly described will now be obvious to those skilled in the art and we therefore do not wish to be limited to the details of such embodiment.

We claim:

1. In a transfer mechanism for cans and the like, a star wheel mounted to rotate about a vertical axis, said star wheel having a plurality of angularly spaced peripheral abutment portions and a pocket in its periphery at the trailing end of each such abutment portion when the star wheel is rotating in one direction about said vertical axis, said pocket being adapted to at least partially receive a can to be transferred and to support said can therein for transport by the rotating star wheel, conveyor means operatively associated with said star wheel to move cans to be transferred to the periphery of the star wheel in a continuous procession moving along a substantially horizontal path having an open end at the periphery of the star wheel close enough thereto for stoppage temporarily of the procession by the contact of any of the abutment portions of the star wheel with a leading can of the procession in said open end of said path and to permit resumption of forward movement of said leading can when the abutment portion has passed out of contact therewith, and a magnet located adjacent to and at one side of said open end of the path in position to exert a magnetic pull on said leading can, tending to pull it around the axis of rotation of the star wheel in the direction of said rotation.

2. In a transfer mechanism for cans and the like, the combination specified by claim 1 and, in addition, guide rail means extending in a fixed position from one side of the open end of said path part way around the periphery of the rotating star wheel, said guide rail means being spaced outwardly from said periphery a distance sufficient to permit each can from entering a pocket of said star wheel to be moved by the rotation of said star wheel along

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the inner surface of said guide rail means and insufficient to permit such can to pass by line pressure between an abutment portion of the star wheel and the guide rail means.

3. In a transfer mechanism for cans and the like, the combination specified by claim 2, and in addition, a can receiving conveyor means located adjacent the periphery of the star wheel at the end of said guide rail means remote from the first said conveyor means, and means operatively associated with said star wheel to strip cans from the pockets of the rotating star wheel and to deliver them to said can receiving conveyor means.

4. In a transfer mechanism for cans and the like, the combination specified by claim 2 wherein said star wheel has a plurality of pockets in its periphery between each two adjacent abutment portions of such star wheel.

5. In a transfer mechanism for cans and the like, a star wheel mounted to rotate about a vertical axis, said star wheel having a plurality of angularly spaced peripheral abutment portions and a pocket in its periphery at the trailing end of each such abutment portion when the star wheel is rotating in one direction about said vertical axis, said pocket being adapted to at least partially receive a can to be transferred and to support said can therein for transport by the rotating star wheel, an infeed conveyor belt having a continuously moving substantially horizontal upper stretch on which a procession of said cans may stand freely and be moved thereby to present the leading can of the procession in a position at the periphery of said star wheel to contact with any of said abutment portions of said star wheel then passing in front of said procession, such contact being effective temporarily to halt the forward movement of the procession and the upper stretch of said conveyor belt being adapted to slip under the cans of the procession thereon when the movement of the procession has been temporarily halted, thereby subjecting the leading can to line pressure, stationary guide rail means extending part way around the periphery of the star wheel from one side of the upper stretch of the infeed conveyor at the end of the latter adjacent to the star wheel, said guide rail means being spaced outwardly from the periphery of the star wheel a distance sufficient

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to permit movement along a path extending along the inner surface of said guide rail means of cans transported by the rotating star wheel in pockets thereof and insufficient to permit movement of a can along said path between the guide rail means and any of the peripheral abutment portions of the star wheel, and magnetic means located adjacent to the end of said upper stretch of the infeed conveyor at the side of the latter next to the guide rail means and in position to exert a continuous pull on each leading can of a procession that has been temporarily halted at the periphery of the star wheel in the direction of rotation of the star wheel.

6. In a transfer mechanism for cans and the like, a star wheel mounted to turn about a vertical axis and formed with angularly spaced peripheral abutment portions and with can receiving pockets in its periphery between adjacent abutment portions, a continuously operated infeed conveyor for cans having a substantially horizontal upper stretch for bringing the cans to be transferred to the periphery of the star wheel in a single file, a pair of guide rails respectively extending along opposite sides of said upper stretch to the end of the latter adjacent to the star wheel, an arcuately curved guide rail joined at one end to the adjacent end of one of said first named guide rails and extending part way around the periphery of the star wheel in spaced relation therewith so as to define a transfer path for cans brought to the star wheel pockets by said upper stretch of the infeed conveyor, means to rotate said star wheel about its axis so that it turns past the adjacent end of said upper stretch in the direction of said arcuately curved guide rail, and magnet means located adjacent to the juncture of the path of movement of cans by said infeed conveyor with the transfer path for cans and arranged to exert a magnetic pull in the direction of the adjacent end of said transfer path on each can brought to the periphery of the star wheel by said infeed conveyor.

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