Oct. 28, 1969 F. KAMILA 3,474,896

OVERHEAD PADDLE TRANSPORT CAM FOR BAG LOADING MACHINE

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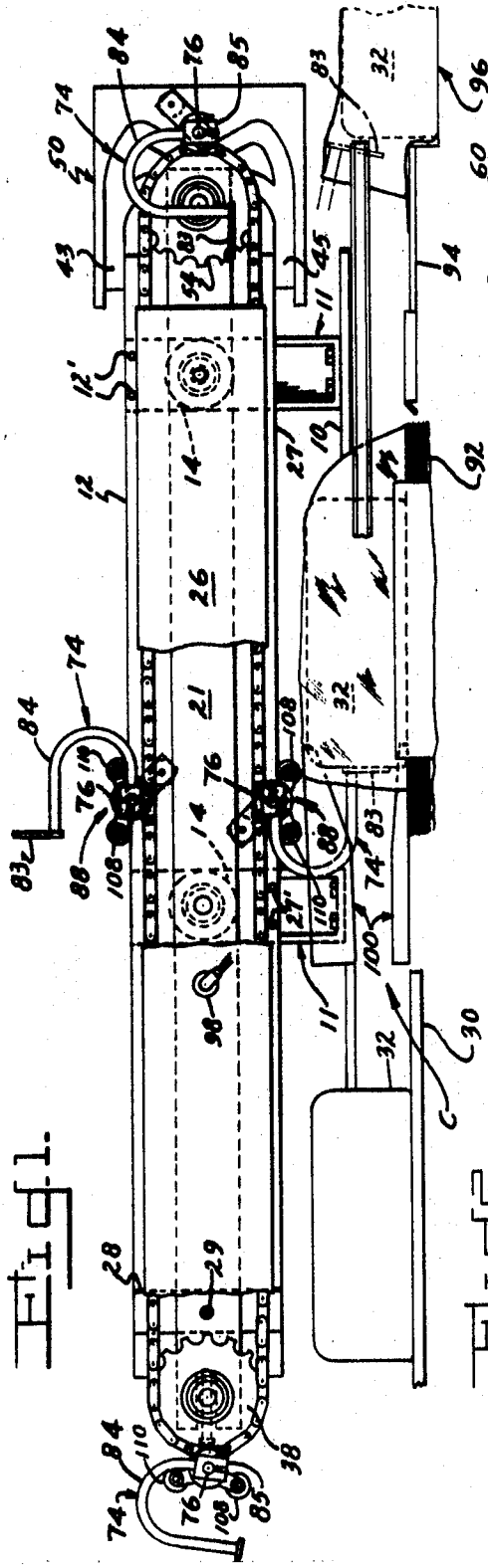

Fig. 1.

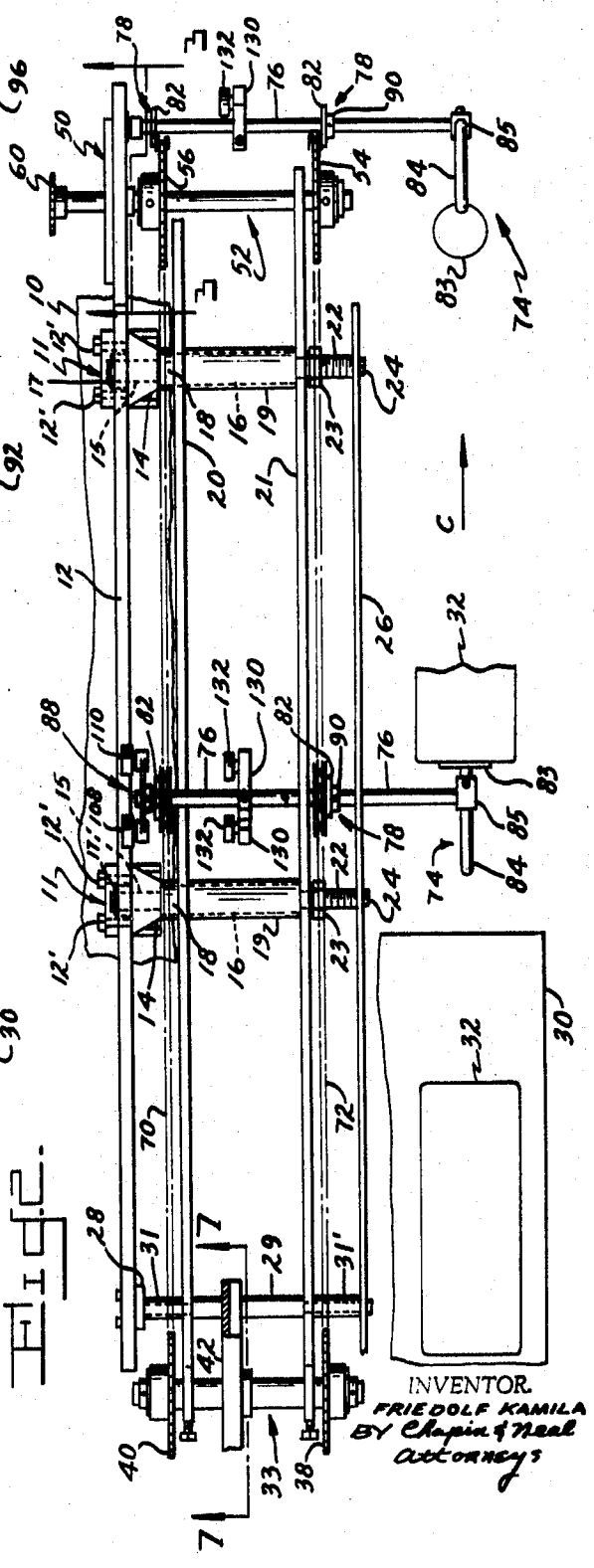

Fig. 2.

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Fig. 3.

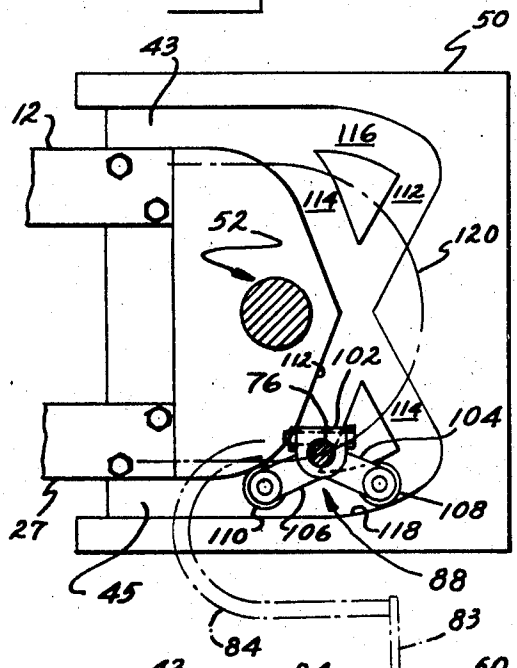
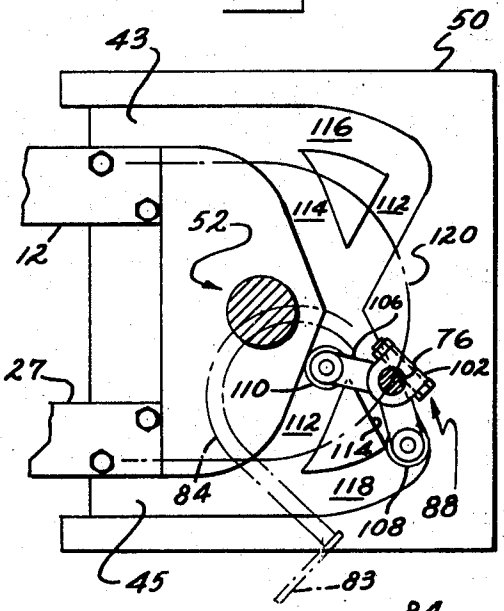


Fig. 4.



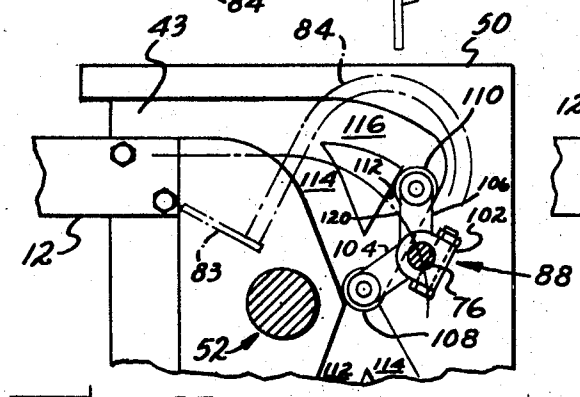


Fig. 5.

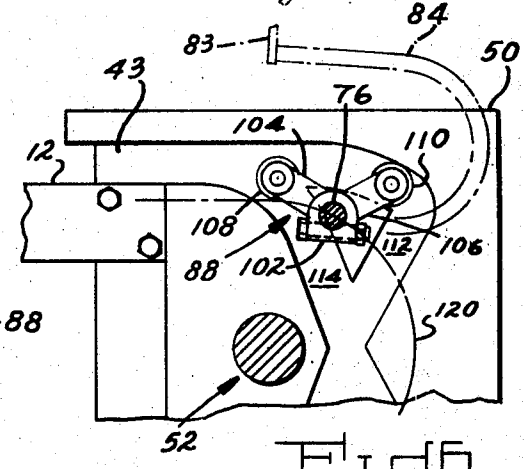


Fig. 6.

Fig. 7.

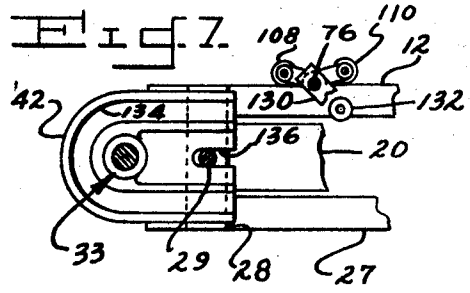
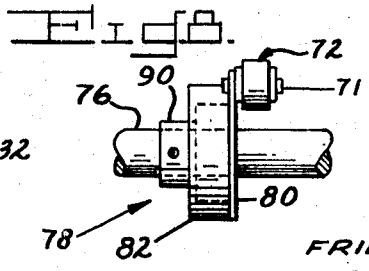


Fig. 8.



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3,474,896

OVERHEAD PADDLE TRANSPORT CAM FOR BAG LOADING MACHINE

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Int. Cl. B65g 19/02, 19/26
U.S. Cl. 198—170 8 Claims

ABSTRACT OF THE DISCLOSURE

An overhead transport for bag loading machines comprising a gooseneck stem and pusher paddle pivotally carried on an endless conveyor and having a bell-crank cam follower holding the paddle downwardly directed along a lower run to push articles into the open mouth of a bag and deposit a loaded bag at a discharge station, and cam tracking means swinging said paddle in a reverse arc of 180° in passing from the lower run to an upper run and to position the paddle outwardly along said upper run.

BACKGROUND

This invention relates to an overhead transport apparatus for bag loading machines of the type adapted to push an article as a loaf of bread into the open mouth of a bag and deposit the loaded bag at a discharge station where it may be taken off by apparatus for closing and tying the mouth of the bag.

Many prior commercial bag loading machines for articles such as loaves of bread have used a reciprocating pusher to advance the articles into the bag. More recently machines have been designed with an endless overhead conveyor having paddles at spaced intervals for a continuous motion transport capable of higher speeds of operation. In one such machine paddles are suspended for travel along an article loading channel by a gooseneck shaped hanger fixed to the end of a cross shaft carried on an endless conveyor and having a lower operating run and an upper return run. On its lower run the hanger is held on the conveyor so that the pusher paddle contacts the back end of the article, pushes it past bag mouth-spreader elements into an open end of a bag and through to the closed end thereof, whereupon the loaded bag is stripped from the top of a stack of bags and carried to a discharge platform. As the pusher completes its lower "loading" run the gooseneck hanger is swung backwardly and withdraws the paddle from the article to clear the open end of the bag. The hanger and paddle are then carried upwardly around the end of the conveyor path while continuing to hang in depending relation from the cross shaft as the paddle is brought back along its upper or return run.

The present invention is designed to provide an improved transport apparatus which will more effectively control the disposition of the hanger and paddle member on the completion of an operating pass through the loading channel and back along the return run of the endless conveyor. More specifically the invention includes an endless conveyor comprising a pair of laterally spaced chains traveling in an endless path and from which a pusher carriage shaft is pivotally hung. The shaft carries a gooseneck hanger and paddle and is guided by cam mechanism for positioning the paddle in an outwardly extending relation relative to the conveyor chains through the entire cycle except for travel thereof from lower to upper run. During the reversal of the conveyor path in passing from the lower to the upper runs the cam mechanism rotatively drives the carriage shaft for reversely

swinging the gooseneck and pusher paddle through an arc of 180°. The paddle is thus withdrawn from a loaded bag deposited at the discharge station; is lifted upwardly to be faced in the direction of return travel; and is disposed in an outwardly extended relation from the chain conveyor away from any interference with other parts of the machine. On return to the opposite or infeed end of the endless conveyor, further cam means are provided for the paddle to maintain the extended relation as the gooseneck is brought around into its lower run where it may again pick up an article for advancing through the bag loading operation as described.

Specific objects and advantages of the apparatus as herein disclosed will be apparent from the following description of an embodiment of the invention as shown by the accompanying drawings, in which:

FIG. 1 is a front elevation with portions cut away of an overhead transport apparatus embodying the invention as in a bread bagging machine;

FIG. 2 is a top plan view of FIG. 1 with parts omitted;

FIGS. 3, 4, 5 and 6 are detail views on an enlarged scale, as on line 3—3 of FIG. 2 showing the arrangement of grooves in a face cam and the movement of the bell-crank follower device therein for reversely driving a paddle assembly in its travel from lower to upper conveyor runs after completion of a loading operation;

FIG. 7 is a view on line 7—7 of FIG. 2 showing a face cam for directing the paddle assembly at the opposite or infeed end of the conveyor in its travel from upper to lower runs; and

FIG. 8 is a side elevation showing one of the bearing bracket mountings for hanging a paddle pusher assembly on a conveyor chain.

Referring to FIGS. 1 and 2, a transport apparatus assembly is shown as mounted on a platform frame plate **10**. The plate **10** is a part of a supporting framework (not shown) which holds the plate in elevated position adjacent the product bagging channel indicated by the arrow C. Fixed on plate **10** are a pair of vertical transport mounting brackets at **11**. At the top of the brackets is supported a horizontal rail member **12** providing a linear tracking guide along its upper edge for positioning paddle assemblies on an upper return run as will be described. Member **12** is attached to brackets **11** as by screws shown at **12'**.

Below cam track member **12** on each bracket **11** is a cone-shaped boss **14**. A shouldered end **15** (FIG. 2) of a support rod **16** passes through the boss, a nut **17** threaded on the end **15** anchoring the rod against the boss. Outwardly adjacent boss **14** a short spacer **18** and a long spacer **19** on rod **16** hold a bar or supporting plate **20** between them. Spaced forwardly of plate **20** and held against the outer end of spacer **19** and shouldered end of rod **16** is a companion supporting plate **21**. A threaded outer end **22** of rod **16** is provided with a nut at **23** to secure the plate **21** against the spacer **19**. Against the tips of the outer ends **22** tapped screws **24** serve to fasten a front cover plate **26**.

Below the boss **14** and also supported against the face of brackets **11** is a lower guide rail member **27** fixed thereto as by screws **27'** (FIG. 1). As will be described rail member **27** positions the paddle assemblies along a lower run for advancing an article through the bagging channel C.

The rails **12** and **27** and frame members **20**, **21** and **26** extend as to the left in FIGS. 1 and 2 and are suspended in an elevated condition adjacent a product infeed position, here schematically represented by a platform surface **30** on which articles, such as loaves of bread **32**, are received. At this infeed end of the framework the vertical spacing between track rails **12** and **27** is sup-

ported by a vertical strap **28** fixed to the rails. Between the rails and anchored to the strap (FIG. 2) is a shouldered horizontal spacer rod at **29** extending forwardly and anchored to front cover plate **26**. Rod **29** is shouldered against the inner faces of plates **20** and **21**, the reduced ends thereof being fitted with spacer sleeves. Spacer sleeve **31** is held between strap **28** and plate **20** and spacer **31'** lies between cover **26** and plate **21**.

Support plates **20** and **21**, as shown, serve to support at this infeed end of the frame assembly an axle assembly indicated generally by numeral **33** on which chain sprockets **38** and **40** are carried. Also carried on the axle assembly **33** and supported by spacer rod **29** as will be later described in connection with FIG. 7, is a grooved flat plate cam **42** for guiding the paddle assemblies from the upper to lower run at this end.

At the other end of the frame, cam guide rail **12** is fitted into the assembly of a plate cam indicated generally by numeral **50** (FIG. 1). The connection of guide **12** and cam **50** is at the entrance end of guide **12** which merges with an exit groove at **43** of the grooved arrangement of cam **50**. Fitted in the lower section of the cam **50** is the cam rail member **27**. The edge of rail **27** merges with an entrance groove at **45** of the cam **50**.

Journalled in cam plate **50** and in the end portion of supporting plate member **21** (FIG. 2) is an axle assembly, generally indicated at **52**. On the axle are mounted a pair of sprockets **54** and **56** at this end of the framework. Axle **52** has a drive shaft extension passing through cam **50** and fixed at its outer end a drive sprocket **60**. Sprocket **60** may be chain driven from any suitable power drive.

Around the rearwardly located sprockets **40** and **56** is trained a roller chain **70**. Around the forward sprockets **38** and **54** is a roller chain **72**. The chains form an endless conveyor on which are carried a plurality of pusher paddle assembles generally designated by numeral **74**. Four such paddle assemblies are shown in the embodiment of FIGS. 1 and 2.

The paddle assemblies carried by the chain conveyor means each comprise a pivot shaft mounted crosswise on the chains. A gooseneck hanger stem with a pusher paddle extends angularly from the shaft at its extended forward end for hanging downwardly in its travel through the loading channel C. A cam follower is fixed on the opposite rear end of the shaft for engaging tracking means and positioning the gooseneck during the chain conveyor cycle.

The pivot shaft of the pusher assembly is at **76** and is carried by ball bearing brackets **78** fastened on the chains at opposed positions for the crosswise disposition of the shaft. As best indicated by FIG. 8 each bearing bracket **78** includes a plate **80** anchored on the ends of an adjacent pair of pivot pins for the chain rollers, one such pin being shown at **71**. Plate **80** extends outwardly of a chain **70** or **72** and against the outer face thereof is fixed an outer ball bearing block **82**. Shaft **76** (FIG. 2) extends through an opposed pair of such bearings of the chains **70** and **72**.

At its forward outer end the shaft is fitted with a gooseneck hanger stem **84** carrying paddle **83**, the stem being secured to shaft **76** as by a clamping block **85**. At the other rearward end adjacent the ball bearing mount **78** of chain **70**, shaft **76** is fitted with a bell crank cam follower **88**. Referring to FIG. 8 a collared inner member **90** of the bearing is fixed on shaft **76** and prevents axial shifting of the shaft **76** in the bearing mounts.

The bell crank cam follower **88** determines the position of the gooseneck and paddle during travel of the chain conveyor. Briefly, along the lower run the follower engages the lower rail **27** and holds the gooseneck forwardly positioned to engage the product (such as the loaf of bread **32**) at the infeed station **30**, push it into the loading channel where the loaf is received into the open mouth of the top bag of a stack and then be advanced over a plate **94** and onto a discharge station **96** at the end of the lower run. An air jet at **98** is shown as a means for initially opening the mouth of the bag and upper and lower

spreader members are indicated at **100** to hold the mouth of the bag open as it receives the loaf. These elements and mechanism for actuating the spreaders are familiar to those skilled in the art and are not shown herein in further detail. Likewise as will be recognized in the art the loaded bag when deposited at the discharge station may then be picked up by any suitable conveyor system (not shown) for passage to conventional closing and tying mechanism to complete the packaging of the loaf.

As the conveyor chains reverse direction in passing around sprockets **54** and **56** the shaft **76** (see FIG. 1) is rotated to withdraw the paddle **83** from contact with the product and from the open mouth of the bag. The paddle is lifted upwardly in a reverse arc of 180° as the shaft **76** is carried around the sprockets and enters the upper run. The follower then engages rail member **12** along the upper run to hold the gooseneck and paddle in an upwardly extended position relative to the conveyor.

The rotation of shaft **76** and the lifting of the gooseneck and paddle into upright position along the upper run is accomplished by the action of the bell crank cam follower **88** as shown by FIGS. 3–6, the outer end of the gooseneck and paddle being shown in phantom line. The fulcrum of the bell crank follower is centered on the end of shaft **76** by the fixed clamping block **102**. The angled arms **104** and **106** of the crank are fitted at their ends with cam follower rolls **108** and **110**. As will be noted (see also FIG. 1) the arms are angled outwardly of the conveyor chain for engagement of the rolls along the cam rails **12** and **27**.

Arm **104** with roll **108** is in a leading relationship and arm **106** with roll **110** is in a trailing relationship as the shaft **76** is brought past the end of rail **27** of the lower conveyor run and the rolls pass into the entrance **45** of the grooved arrangement of cam **50**.

As seen from FIGS. 3 and 4, cam **50** is provided with crossed grooves **112** and **114**, these grooves being connected at the top and bottom thereof. At the top an upper arcuate connecting groove **116** leads into the cam **50** exit groove portion at **43**. At the bottom an arcuate connecting groove **118** is joined to the entrance groove portion at **45**.

The pattern thus defined by the grooves is in the form of a figure eight and connects the upper and lower track rails **12** and **27**. It will also be noted that at the outer corners of the figure eight, the grooves **116** and **112** and grooves **114** and **118**, are joined in an acute angular relationship.

The path of shaft **76** as carried by the bearing mounts outwardly of the conveyor chains is indicated by the line **120**. This path describes an arc of 180° lying outside the intersection of grooves **112, 114** and crosses the lower and upper portions of the crossed grooves and inwardly of the outer corners thereof.

With this relationship of path **120** to the figure eight pattern it will be seen from FIG. 3 that the leading roll **108** enters connector groove **118** while the shaft **76** is beginning its arcuate rise. As shaft **76** proceeds along the arc of the line **120** the trailing roll **110** is lifted into the lower end of cross groove **112**. By the displacement of roll **110** in an upward direction in groove **112** shaft **76** is rotated (clockwise as seen from the FIG. 3 and FIG. 4 positions). It thus commences to swing the gooseneck rearwardly and upwardly at the end of the lower runs. The long outer leg of the gooseneck may be noted as being generally parallel to a line joining the centers of rolls **108** and **110** and thus begins to turn when the cam rolls begin to shift from an in-line condition. In FIG. 1 the forwardmost position of paddle **83** is shown in phantom lines after depositing a loaded bag at the discharge station **96**. From this position it is withdrawn from contact with the loaf of bread and from the open mouth of the bag.

From a comparison of FIG. 3 and FIG. 4 it will further be appreciated that as the roll **108** enters the lower angled outer corner between groove **118** and the lower end of cross groove **114**, the further rise of shaft **76** causes a pivoting movement of the crank arms about roll **108** and

thus an accelerated travel of the trailing roll **110** in groove **112**. The gooseneck arm follows this same movement.

In proceeding from the position of FIG. 4 to that of FIG. 5, shaft **76** passes the 90° position of the full arc of path **120** and movement of the roll **108** in the lower section of groove **114** causes roll **110**, which is then in a leading relation, to cross over the intersection and into the upper portion of the cross groove **112**. Then as shaft **76** is further raised in path **120**, roll **110** becomes pocketed in the upper acutely angled corner between grooves **116** and **112**. This results in a pivotal movement of the bell crank on roll **110** and an acceleration of the roll **108** to the top of cross groove **114**. This will be appreciated from a comparison of the FIG. 5 and FIG. 6 positions. The leading relationship of roll **108** is thus restored by this second reversal of the position of the rolls. During this second reversal, shaft **76** is further rotated and thereby completes a full 180° reverse movement of the gooseneck and paddle. From the position of FIG. 6 the extended relation of the gooseneck is fixed for passage into the exit groove at **43** and passage along the linear edge of the upper cam rail **12**.

At the other end of the conveyor run (FIG. 1) the relationship of the gooseneck and paddle on the conveyor chains preferably remains unchanged. Here the gooseneck may follow the arcuate path of the sprockets **38** and **40**. For this purpose the plate cam **42** previously mentioned (FIG. 7) is provided for engaging a cam follower fixed on shaft **76** between the conveyor chains **70** and **72**. As shown by FIG. 7 a cam arm **130** is fixed on shaft **76** and carries an offset roll **132** at the end thereof. Cam **42** has a slot **136** provided in the edge thereof receiving the spacer rod **29** and is supported by axle **33** and rod **29** so as to receive follower roll **132** in a grooved track **134** formed therein with a simple 180° loop. As the bell crank follower of a pusher paddle carriage reaches the end portion of the upper cam rail **12**, roll **132** engages the track **134**. Then as the bell crank leaves rail **112**, roll **132** guides the shaft **76** and gooseneck and paddle around the sprockets as indicated in FIG. 1. Thus the paddle is in position to contact an article as the loaf **32** at the infeed station **30** for passage through the bagging channel as described.

What is claimed is:

1. In an overhead transport apparatus for bag loading machines of the type having an endless conveyor carrying article pusher means at spaced intervals in a path of travel having upper and lower runs, each said pusher means having a paddle suspended on the lower run to engage an article in a bag loading path, insert the same into a bag, and deposit the loaded bag at a discharge station;

a pusher carriage and cam guiding means to hold the paddle outwardly extended from said conveyor along said upper and lower runs and pivoting said paddle in a reversely directed swing of substantially 180° as the pusher means is carried from the lower to upper runs, said means comprising

a shaft pivoted cross-wise on said conveyor,

a stem extending therefrom with a pusher paddle at its outer end,

a bell-crank cam follower having its fulcrum fixed on said cross shaft and follower rolls at the ends of the arms of said bell crank,

linear tracking means guiding said follower rolls along upper and lower conveyor runs and holding said paddle facing in the direction of travel,

and grooved plate cam means at the end of said lower run connecting said lower and upper tracking means and provided with interconnected grooves receiving said bell-crank follower rolls, upward movement of said conveyor cross shaft carrying said rolls through said interconnecting grooves and doubly reversing the leading and trailing relationship thereof, said rolls rotatively driving said cross shaft and imparting to said paddle the said reversely directed swing thereof.

2. The structure of claim **1** in which said stem extending from the cross shaft is of gooseneck form, and the grooves of said cam are crossed grooves and upper and lower grooves communicating with said upper and lower tracking means and connecting the ends of the crossed grooves.

3. The structure of claim **2** in which the connections of said upper and lower grooves with the outer ends of the crossed grooves form an acute angular relationship.

4. The structure of claim **3** in which the path of conveyor travel carries the fulcrum of the cross shaft over the surface of said grooved plate cam in an arcuate path across the lower and upper portions of said crossed grooves and outwardly of the intersection of the latter.

5. The structure of claim **4** in which the arms of the bell crank follower are of equal length, said gooseneck has a long arm terminating in said paddle, and a line joining the centers of said follower rolls is parallel to the said long arm of the gooseneck.

6. The structure of claim **5** in which said endless conveyor comprises parallel chains trained over pairs of opposed front and rear sprockets defining the ends of the conveyor runs, and sets of bearing brackets are oppositely mounted on said chains to receive the cross shaft of each pusher means for rotation therein.

7. The structure of claim **6** in which each cross shaft extends forwardly of said spaced chains, said gooseneck stem is fixed on the forward end of the shaft at right angles thereto, said bell crank is fixed on the other end of the cross shaft adjacent a mounting bracket of the rearward chain, and said tracking means and grooved plate cam are positioned rearwardly adjacent the path of the rearward chain, said plate cam also having the axle of the sprockets at that end of the conveyor supported therein.

8. The structure of claim **7** in which an arm with a cam follower roll at the end thereof is fixed on each cross shaft between said chains, and a plate cam is supported at the opposite end of said conveyor having a groove defining a path around the axis of the sprockets at that end to receive said follower roll and guide said pusher from the upper to lower linear tracking means.

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RICHARD E. AEGERTER, Primary Examiner

U.S. Cl. X.R.

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