ARTICULATED STRAP CHUTE AND GUIDE MEANS THEREFOR

Inventor: Donald R. Tremper, Mount Prospect, Ill.
Assignee: Signode Corporation, Glenview, Ill.
Filed: Dec. 11, 1973
Appl. No.: 423,700

U.S. Cl. .................................................. 100/25; 100/25
Int. Cl. .................................................. B65B 13/04
Field of Search ........................................ 100/25, 26, 2, 2:

References Cited
UNIVERSITY STATES PATENTS

7 Claims, 9 Drawing Figures

A normally retracted sectional articulated strap chute capable of being projected endwise and horizontally from a storage and guide channel through a pallet void for the purpose of directing a length of strapping endwise through the pallet void during the creation of a strap loop about an article disposed on the pallet. The storage channel, in the main, extends vertically for floor space conservation purposes but is provided with a short horizontal leg which is in register with the pallet void and from which the articulated strap chute is projected. The sectional strap chute, when considered as a whole, is flexible in one direction to enable it to follow the contour of the storage channel but is incapable of being flexed in the other direction so that such portions thereof as project from the storage channel are self supporting within the pallet void. Pneumatic means including a cable cylinder are employed for projecting and retracting the articulated strap chute.
The improved articulated strap chute and guide means comprising the present invention has been designed for use primarily as a pallet void feeding adjunct for a strap feeding mechanism in order that strapping which is fed endwise from the feeding mechanism will enter the strap chute and be conducted through the pallet void during the creation of a strap loop about a palletized article, the loop being subsequently tensioned and thus shrunk about the article.

Heretofore, in order to feed a length of strapping through a pallet void it has been the practice to employ a linearly straight rigid horizontal strap chute which is capable of being projected endwise between a retracted position in the vicinity of a strapping station and a projected position wherein it passes completely through a pallet void which is associated with a palletized article undergoing strapping at the strapping station. In its retracted position, such strap chute clears the pallet void to enable the pallet and strapped article to be removed from the strapping station and a fresh palletized article to be brought into the strapping station for a subsequent strapping operation. However, since the strap chute is linearly straight and rigid, and moreover is of an extent at least equal to the transverse width of the pallet void, when it is in its withdrawn or retracted position it consumes considerable floor space and it is thus necessary to establish the strapping station at a region which is remote from an adjacent obstruction such as a wall surface or a nearby machine or other piece of floor mounted equipment. In the case of an areaway such as an aisle where pedestrian or vehicular traffic is prevalent, if the strapping station is to be located in the vicinity thereof, it is necessary that the path of projection of the strap chute be directed parallel to the areaway or, otherwise, that the strapping station be removed from the areaway by at least the length of the chute so that the latter will not traverse the areaway when the chute is retracted.

The present invention is designed to overcome the above noted limitation that is attendant upon the construction and use of present day retractable pallet void feeding chutes and, toward this end, the invention contemplates the provision of a novel articulated chute and a guide means therefor, the chute being comprised of a series of individual chute sections which are hingedly connected together in end-to-end fashion, together with guide means for such chute wherein the chute, when in its retracted position, extends largely vertically in a stored position alongside the strapping station so that the latter may be positioned close to a wall surface, an adjacent piece of equipment, or an areaway such as an aisle or the like, in which latter case the chute offers no obstruction to passing traffic. The provision of a retractable articulated strap chute and guide means such as has briefly been outlined above constitutes the principal object of the present invention.

A further and important object of the invention is to provide such an articulated sectional strap chute which, when considered as a whole, is unidirectionally flexible, which is to say that it is capable of flexing in one direction in order that it may follow the path provided for it by the guide means during retraction thereof and thus effect the transition from its operative horizontally projected position to its inoperative vertical stored position, but is incapable of flexing in the opposite direction so that it is self-supporting in cantilever when in its horizontal projected position.

An additional limitation that is attendant upon the construction and use of conventional retractable rigid strap chutes resides in the fact that complete projection of such chutes, together with their associated yieldable strap gates which retain the strapping within the chute is required in order to bring the proximate end of the chute into register with the discharge end of whatever strap feeding mechanism is employed for the introduction of the strapping into the chute. This complete projection of the chute must be resorted to regardless of the size of the article undergoing strapping. Thus, the design of any given strapping installation must necessarily be predicated upon the use of a rigid strap chute which is of sufficient extent to accommodate the largest size article which is to be strapped so that when such chute is retracted it consumes a large floor space, even when the article undergoing strapping is relatively small. The present invention obviates this difficulty completely inasmuch as regardless of the size of the article undergoing strapping practically no floor space is required for the retracted and stored strap chute.

Moreover, where relatively small articles are undergoing strapping, it is not necessary to completely project the articulated chute, only such portion of the chute as will fulfill the requirements of the pallet void need be projected, the remainder of the chute staying in its vertical stored position and means being provided whereby the strap issuing from the feeding mechanism may enter the projected portion of the strap chute. By such an arrangement, over-projection of the strap chute beyond the pallet void is avoided so that the operator is not hampered in his movements by the projection of unwanted portions of the strap chute.

In carrying out this latter advantageous feature of the invention, it is contemplated that each chute section is capable of functioning as the proximate section of that portion of the chute which is projected beyond the guide means, that each chute section be provided with its own individual strap-confining but releasable gate mechanism, and that such individual gate mechanism shall have strap-receiving facilities whereby the strapping issuing from the feeding mechanism may enter such gate section for subsequent passage through the remaining projected sections of the strap chute.

Yet another advantageous feature of the present invention resides in the provision of novel power means for projecting and retracting the articulated sectional strap chute, such means assuming the form of a cable cylinder which is pneumatically operable under the control of a reversible manually operable valve, together with adjustable hydraulic damping means whereby the speed of the cable, and consequently of the strap chute, may be regulated for smooth, safe and relatively silent projection and retraction of the strap chute.

The provision of an articulated strap chute and guide means which is relatively simple in its construction and which may therefore be manufactured at a low cost, one which is comprised of a minimum number of moving parts and which, therefore, is unlikely to get out of order; one which is rugged and durable and which therefore will withstand rough usage; one in which the control devices for actuating the same, as well as for actuating the strap feeding mechanism with which it is associated, are disposed in the immediate vicinity of the
operator on one side of the strapping station so that the operator does not require an assistant; and one which, otherwise is well adapted to perform the services required of it, are further desirable features which have been borne in mind in the production and development of the present invention.

In the accompanying two sheets of drawings forming a part of this specification, one illustrative embodiment of the invention has been shown.

In these drawings:

FIG. 1 is a perspective view, somewhat schematic in its representation, of a conventional strap feeding mechanism, showing the same operatively associated with a strapping installation at a strapping station, and showing the improved articulated strap chute and guide means of the present invention effectively applied thereto;

FIG. 2 is an enlarged sectional view taken on the line 2—2 of FIG. 4 and in the direction of the arrows;

FIG. 3 is an enlarged fragmentary side elevational view of a portion of the structure shown in FIG. 1, but showing the strap chute proper in its retracted position, certain parts being broken away in the interests of clarity;

FIG. 4 is a fragmentary side elevational view similar to FIG. 3, showing the strap chute in its projected position;

FIG. 5 is a further enlarged side elevational view of one of a series of combined chute and gate sections which are employed in connection with the invention, together with fragmentary portions of adjacent chute sections;

FIG. 6 is a top plan view of the structure shown in FIG. 5;

FIG. 7 is an enlarged end view of the structure shown in FIG. 8;

FIG. 8 is an enlarged sectional view taken on the line 8—8 of FIG. 5 and in the direction of the arrows; and

FIG. 9 is a pneumatic circuit diagram of the chute control mechanism by means of which the strap guiding chute is actuated.

Referring now to the drawings in detail, and in particular to FIG. 1, the strap chute and guide means of the present invention is shown as being operatively disposed at a strapping station S where it is illustrated as being effectively applied to a more or less conventional strap feeding mechanism 12 by means of which a length of strapping material issuing from a strapping dispenser (not shown) is caused to at least partially encircle a palletized article A preparatory to creation of a strapping loop which is subsequently shrunk upon the article, tensioned about the article, the overlapping end of the loop united by the application thereto of a seal, and the thus established band of strapping severed from the source of strapping material.

The improved strap chute and guide means of the present invention has been designed primarily, but not necessarily, for use as a pallet void feeding adjunct for use in connection with a wide variety of power feeding mechanisms of the general type exemplified by the herein disclosed strap feeding mechanism 12 and its function is to afford a retractible guide chute for strapping which, when projected, extends completely through the usual pallet void beneath a pallet platform and which, when retracted, is stored in an out-of-the-way position where it consumes practically no floor space.

The disclosure of FIG. 1 is representative of an actual experimental installation wherein a series of anti-friction rolls 14 are employed to bring successive article-supporting pallets such as that shown at 16 into position at the strapping station S. It will be understood that in a commercial installation the palletized articles may be conducted to and from the strapping station by means of a suitable intermittently operable conveyor or a series of live rolls as is customary in the art.

As previously stated, the power feeding mechanism 12 which is shown somewhat schematically herein as an exemplary environment for the present invention, and which in the interests of brevity will hereinafter be referred to simply as the strap feeder, is conventional and no claim is made herein to any novelty associated with the same, the novelty of the present invention residing rather in the articulated strap chute and guide means 10 and the manner in which it is actuated. The particular power actuated strap feeder 12 disclosed in FIG. 1 is of the general type which is manufactured and sold by Signode Corporation of Glenview, Illinois under the designation PSF-2 POWER STRAP FEEDER and which is illustrated and described in detail in a service manual published in July 1971 and entitled "Signode Model PSF-2 Power Strap Feeder." A similar mechanism is shown and described in U.S. Pat. No. 3,041,961, granted on July 3, 1962 and entitled "Strap Feeding and Guiding Device." Accordingly, only a brief description of such power feeding mechanism will be made herein, such description setting forth the relationship which exists between the present strap guiding chute mechanism 10 and the power feeding mechanism 12. For a more complete understanding of the nature and operation of the strap feeder 12, reference may be had to the aforementioned U.S. Pat. No. 3,041,961, the entire disclosure of which, insofar as it is consistent with the present disclosure, is hereby incorporated in and made a part of this application by reference thereto.

Still referring to FIG. 1, the strap feeder 12 involves in its general organization an upright column 20 which is disposed alongside the strapping station S and from the upper end of which there extends a horizontal support bracket 22 which overlies the strapping station and the outer end of which carries a strap feeding head 24. A vertical strap chute section 26 extends alongside the upright column 20 while a horizontal strap chute section 28 extends alongside the support bracket 22, the two chute sections 26 and 28 being connected by means of an upper intermediate curved strap chute section 30. The vertical intermediate chute sections are provided with spring biased strap gates 32 which retain the strapping within the chute confines but which are capable of yielding to release the strapping when the same is pulled laterally as is conventional in the art.

The strapping ST which issues from the dispenser passes over a proximate pulley 34 and a distal pulley 36 and the free end region of the strapping is adapted to hang loosely as shown in dotted lines in FIG. 1 and indicated at ST1 where it is accessible to an operator who is stationed in front of the article A at the strapping station. The strap feeding head 24 is provided with a pair of power driven feed or pinch rolls 40 by means of which the strapping is fed rearwardly and endwise through the chute sections 28, 30 and 32 successively and in the order named, these feed rolls becoming effective automatically at such time as the free end of the
strapping is passed through a funnel-like feeder frame 42. The strapping is thus projecting horizontally across the upper side of the article and downwardly along the rear side of the article, thus establishing approximately one-half of the article-encircling loop. Thereafter, and as will be described in detail subsequently, the strap cooperates with the present strap guiding chute mechanism 10 and is projected horizontally and forwardly through the pallet void 44 which is provided in the pallet 16 where it is accessible as indicated at ST2 to the operator at the front side of the strapping station S. As soon as such free end of the strapping is available to the operator, he will pull the length of strapping ST which extends between the pulley 36 and the pinch rolls 40 downwardly as indicated at ST3 to withdraw the strapping from the feeder frame 42, the chute section 28, and at least partially from the chute section 26 as indicated at ST3, after which he will draw the free end region ST2 of the strapping upwardly and create the usual strap overlap in the vicinity of the region where sealing operations are to be effected, thus forming a strapping loop about the article. Finally, the operator will effect the sealing operation in any suitable manner as for example by utilizing a conventional strapping tool such as the illustrated tool 50 to tension the strapping and shrink the loop about the article, apply a metal seal to the loop overlap, crimp the seal upon the overlap, and sever the tensioned loop from the source of strapping. The particular strapping tool 50 may be of any suitable type which is capable of performing the desired tensioning and sealing functions. One such tool which has been found particularly useful in connection with the strap feeding mechanism 12 is manufactured by Signode Corporation and is of the general type shown and described in U.S. Pat. No. 3,329,178, granted on July 4, 1967 and entitled “Strapping Tool.” This tool is illustrated as being suitably suspended from a convenience cable 52 carried from an overhead superstructure 54, the tool being effectively balanced by suitable counterweight means (not shown) contained within the confines of the column assembly 20.

Considering now the strap guiding chute assembly 10 of the present invention, and still referring to FIG. 1, this assembly, and also the strap feeding assembly 12, is supported on a generally T-shaped base frame 60, the terminal ends of which are provided with foot pads 62. A sub-base 64 mounted on the rear end of the base frame 60 serves to support thereon a generally L-shaped chute guide channel 66 having a horizontal lower leg 68 and a vertical leg 70, the two legs communicating with each other through an arcuate or curved chute section 71. Slidably disposed within the guide channel 64 for endwise movement therein is an articulated strap chute proper 72 which constitutes one of the principal features of the present invention. This chute is designated in its entirety by the bracket in FIG. 1 and is comprised of a series of individual chute sections 74 (see also FIGS. 4 to 7 inclusive) which are hingedly connected together in end-to-end fashion.

The vertical leg 70 of the guide channel 66 extends upwardly alongside the strap chute 26 of the strap feeder 12 rearwardly thereof, while the lower horizontal leg 68 closely underlies the curved strap chute section 32 and terminates a short distance forwardly thereof (see also FIGS. 3 and 4). The articulated strap chute 72 is capable of sliding movement within the guide channel 66 between the fully retracted position wherein it is shown in FIG. 3 and the fully projected position wherein it is shown in FIGS. 1 and 4. In its fully retracted position, the entire chute 72 is wholly disposed within the confines of the channel 66 while in its fully projected position substantially all of the chute is disposed forwardly of the horizontal leg 68 of the channel 66 and projects completely through the pallet void 44 where the strapping material which issues from the forward end of the chute is accessible to the operator for loop-forming purposes in a manner that will be set forth presently. It is to be noted at this point that because the vertical leg 70 of the channel 66 extends upwardly alongside the rear region of the strapping station, only an extremely small amount of floor space is required to accommodate storage, so to speak, of the articulated strap chute 72 when it is in its retracted position and withdrawn from the pallet void 44, the present strap chute 70 and its guide channel being thus distinguished from that class of retractable pallet void chutes which are rigid and linearly straight and define a horizontal storage space for the retracted chute when the latter is not in use. Such chutes require that the strapping station S be appreciably removed from a nearby wall surface or other obstruction whereas the present articulated chute will permit positioning of the strapping station in close proximity to such wall surface or obstruction.

Referring now to FIGS. 4 to 8 inclusive, the various chute and gate sections 74 are identical in construction, each section embodying an elongated rectangular block-like body 80 having facilities at its opposite ends whereby it may be hingedly connected to the next adjacent block-like bodies in the series of chute sections. Accordingly, the rear end of each section is provided with a pair of laterally and outwardly offset attachment ears 82 which are bridged by a transverse hinge pin 84 while the forward end of the next adjacent rearward block-like body 80 projects between the two ears 82 and receives the hinge pin 84 therethrough as best seen in FIGS. 6 and 7. Anti-friction follower rollers 85 are carried on the outer edges of the hinge pins 84 and travel in guide tracks provided on the side portions of the guide channel 66.

According to the present invention, and as best shown in FIGS. 1 and 5, the strap chute 72 when considered as a whole is of a flexible nature and is capable of flexing in one direction only, which is to say that as the chute is progressively projected forwardly from the extreme forward end of the chute guide channel 66, it is self-supporting in cantilever and remains inherently horizontal so that it may be projected completely through the pallet void 44 without sagging. However, as the chute is retracted into the guide channel 66 as shown in FIG. 4, it is capable of flexing in one direction so that it may progressively pass from the horizontal leg 68 to the vertical leg 70 through the curved chute section 71.

In order to thus render the strap chute 72 unidirectionally flexible, abutment means are provided between the opposed ends of each pair of adjacent block-like bodies 80. Accordingly, the forward end of each body 80 is provided with a transverse abutment pin 86 therethrough, the opposite projecting end regions of such pins being designed for engagement with the end edges 88 of the offset attachment ears 82 to limit the reverse bending, so to speak, of the strap chute to an angle of...
somewhat in the manner that a folding jack knife blade is limited against reverse bending relative to the handle.

Still referring to FIGS. 1, 4 and 5, it will be observed that when the articulated strap chute is in its fully projected position so that all of the chute sections 74 are in horizontal end-to-end alignment, the upper surfaces 90 of the various block-like bodies 80 establish a substantially continuous smooth track surface over which the strapping ST (FIGS. 7 and 8) slidings passes as it is fed through the chute 66 under the impelling influence of the pinch rolls 40. In order to releasely maintain the strapping ST in accurate register with the path which is provided for it across the upper surfaces of the block bodies 80, each chute section 74 is provided with a chute gate which is comprised of a pair of complementary gate sections 92 having flat body portions or side plates 94 (FIG. 8) which fit against the sides of the body 80, and internal gate flanges 96 which overlie the upper surface 90 of the body and, in combination therewith, provide a guide channel for the strapping material ST.

As is customary in connection with conventional strap gate structures, the gate sections 92 are yieldable under the cummin influence of the strapping when the latter is pulled inwardly during tensioning of the strapping loop about the article. Accordingly, the gate sections 92 are yieldingly maintained in the full line positions in which they are shown in FIG. 8 under the influence of two pairs of compression springs 98 which seat in cups 100 which, in turn, seat loosely within bores 102 on opposite sides of the body 80 near the ends thereof. Tension bolts 104 project through the cups 100 and body 80 and bear at their opposite ends against the bolt heads 106 and nuts 108 which are threadedly received on the bolt shanks, thus yieldingly biasing the cups 100 inwardly toward each other and at the same time biasing the two gate sections 92 inwardly to maintain the gate flanges 96 in their strap-confining positions. The rear surface 90 of each block-like body 80 is relieved on a slight angular bias to afford an inclined ramp surface 110 (FIGS. 5 and 7) to facilitate passage of the leading end of the strapping ST into and through the gate section from a preceding gate section. For the same reason, the trailing end portions of the gate flanges 96 are formed upwardly as indicated at 112 in FIGS. 5 and 6 and provide guide surfaces which direct the strapping into the chute section.

In order to facilitate release of the strapping ST when the latter is pulled inwardly of the strapping station, i.e. upwardly as viewed in FIGS. 1, 3 and 4, by either manipulation on the part of the operator or by power tensioning of the strapping loop as will be described in detail presently, the forward ends of the gate flanges 96 are provided with upturned fingers 114 (FIGS. 5 and 6) having rounded forward ends.

Referring now to FIGS. 1, 3 and 4 wherein the means for projecting and retracting the articulated strap chute 72 is best illustrated, projection of the chute 72 forwardly out of the gate guide channel 66 and retraction thereon into such channel is effected pneumatically under the control of a manually operable control valve CV (see also FIG. 9) which preferably is disposed at a region where it is readily accessible to the operator on the front side of the strapping station S. The valve CV is a reversible directional valve and its function is to effectively apply air pressure to the opposite ends of a cylinder 120 having a hydraulically dampened piston 122 therein. The cylinder 120 is of elongated construction, extends vertically and is secured by upper and lower brackets 124 and 125 to the vertical leg 70 of the chute guide 66. A first cable 126 (FIG. 9) has one end thereof secured to the piston 122, passes upwardly through the upper end of the cylinder and then around a pulley 128, after which it passes downwardly alongside of the cylinder and has its other end attached to a bracket 130 which is secured to the uppermost link of a series of six draw links 131 which are slidable within the chute guide 66, the lowermost draw link being secured to the rearmost strap chute section 74 in a manner that will be made clear presently. A second cable 132 has one end attached to the bracket 130, passes downwardly alongside of the cylinder 120, makes a reentrant bend around a second pulley 134 and has its other end secured to the piston 122. It will be apparent that as the piston 122 moves upwardly within the cylinder 120, the cable 132 will draw the bracket 130 and links 131 downwardly to project the strap chute 72 from the chute guide 166 and, conversely, as the piston 122 moves downwardly in the cylinder 120, the cable 126 will draw the bracket 130 and draw links 131 upwardly to retract the strap chute. The extreme upper and lower positions of the bracket are determined by the provision of upper and lower abutment bars 136 and 138 respectively, such bars being suitably mounted on the brackets 124 and 125.

The various draw links 131 are in the form of solid bodies which are similar to the block-like bodies 80 associated with the chute sections 74 except for the fact that no strap gates are associated with such links so that the spring and cup receiving bores 102 are omitted. The attachment ear and roller arrangement 82, 85 whereby adjacent draw links are connected together remains the same as heretofore described in connection with the chute sections 74. However, the uppermost draw link which is designated at 131A is devoid of attachment ears 82 while the lowermost draw link which is designated at 131B is provided with an arcuate cam surface 133 FIGS. 3 and 4) which, when the strap chute 72 is fully projected, assumes a position beneath the curved strap chute section 33 of the strap feeding mechanism 12 so as to provide an inclined ramp portion which guides the strapping issuing therefrom into the first or adjacent chute section 74 of the articulated chute assembly 72 as clearly shown in FIG. 4.

Referring now to FIGS. 1 and 9, the upper bracket 124 serves to support a fluid reservoir 140 which is connected by a fluid line 142 to the upper end of the cylinder 120. A restriction valve RV is interposed within the fluid line 142 and serves a purpose that will be made clear subsequently. A fixed quantity of a suitable hydraulic fluid 144 (FIG. 9) is disposed within the cylinder 120 and reservoir 140 and is adapted to be transferred, at least in part, from the former to the latter and vice versa, the transfer taking place at a predetermined controlled rate under the influence of the setting of the restriction valve RV. The valve RV thus constitutes a damping means for the piston 122 in the cylinder 120.

It is to be noted at this point that the control valve CV is shown in FIG. 1 as being disposed at the rear side of the strapping station S and in the vicinity of the reservoir 140 where it is connected to the reservoir 140 by a fluid line 146 and to the lower end of the cylinder 120.
by a fluid line 148. Obviously such control valve may be disposed at any desired location relative to the strapping station, the illustrated position being resorted to merely for convenience of disclosure. In actual practice it is contemplated that the control valve CV will be mounted at the front side of the strapping station S as shown in dotted lines in Fig. 1 where it may conveniently be suspended from the strap feeder 24. The control valve CV is provided with a fluid inlet 150 and a fluid outlet 152. Various valves are available for use in connection with the cylinder 120 and fluid reservoir 140, one such valve which satisfies the desired requirements being manufactured and sold by Racine Hydraulics and Machinery Inc. of Racine, Wisconsin, under the designation "Directional Control, Lever Operated, Detent Positioned Model No. OD-NEF-16."

In the operation of the present strap chute and guide arrangement during the strapping of a given palletized article at the strapping station S, as soon as such article has been brought into strapping position, the operator at the front side of the strapping station will initially manipulate the control valve CV, thus causing air to flow through the valve and fluid line 148 (Figs. 1 and 9) to the lower end of the cylinder 120, thus driving the piston 122 upwardly. Such upward movement of the piston 122 will force the fluid 144 within the cylinder through the fluid line 142 and regulating valve RV and into the reservoir 140 and, at the same time, draw the cable section 132 around the pulley 134 so as to pull the bracket 130 downwardly and thus project the entire link assembly including the draw links 131 and chute sections 74 downwardly. As the link assembly thus moves downwardly, the various chute sections 74 move around the curved chute section 71 and become projected forwardly from the forward end of the guide channel 66 as shown in Figs. 1 and 4. At such time as the bracket 130 engages the abutment 138 (Figs. 4 and 9) complete projection of the chute 72 will have been completed and the turned ends 112 of the gate flanges 96 associated with the proximate chute section 74 will be in position to receive the incoming strap issuing from the strap feeder 12. At this time, the operator will grasp the length ST1 of strapping which depends from the pulley 36 (Fig. 1) and insert the same in the feeder frame 42 and thus into effective engagement with the pinch rolls 40 which will immediately be energized by reason of automatically operable control mechanism associated with the strap feeder 12 and which constitutes no part of the present invention. The strapping will therefore be fed by the pinch rolls 40 through the strap chutes sections 28, 30 and 26 successively and in the order named and will then enter the articulated strap chute 72 which, as previously described, is self-supporting and in position for such reception of the strapping. At such time as a predetermined length of the strapping ST2 at the leading end region thereof is projected from the leading chute section 74, the aforementioned control mechanism will cause cessation of the strap feed. The operator will then pull the length of strapping which exists between the pulley 36 and the pinch rolls 40 downwardly as indicated at ST3 and cause the length ST2 and ST3 to overlap in the usual manner of article strapping, after which he will apply the strapping tool 50 to the overlapped regions to tension the strap loop which at that time encircles the article A, effect a seal between the strap overlap, and sever the excess strapping from the strapping source. Thereafter the operator will manipulate the control valve CV in such a manner as to reverse its position and cause fluid to pass through the line 146 and enter the reservoir 140, whereupon fluid in the reservoir will be forced through the line 142 and restriction valve RV and into the upper end of the cylinder 120. Such introduction of fluid into the cylinder 120 will drive the piston 122 downwardly so as to cause the cable section 126 to pull the bracket 130 upwardly and thus retract the entire link assembly 131, 74 into the guide channel 66 and thus move the articulated strap chute 72 to its stored out-of-the-way position so that the articulated palletized article A may be removed from the strapping station S and a fresh palletized article substituted therefor.

It will be observed from an inspection of Fig. 1 that at such time as the operator pulls the strapping ST3 from between the pulley 36 and pinch rolls 40, the tension which he exerts on such strapping will cause the gates 32 associated with the chute sections 28 and 30, and certain of the gates associated with the chute section 16, to release the strapping. Thereafter, during tensioning of the strapping by the strapping tool 50, the remainder of these gates 32 will release the strapping while, additionally, the gate sections 92 of the articulated chute 72 will release the strapping, the thus freed strapping loop then becoming shrunk concentrically upon the article A.

Under certain circumstances, the operator may find it desirable to partially retract the articulated chute 72 into the guide channel 66 before he effects the strapping operation in order that he may have freedom of movement at the front side of the strapping station, in which case he may manipulate the control valve CV momentarily until the forward end of the articulated chute 72 recedes to an out-of-the-way position just inside the pallet void 44, after which the strapping operation may proceed as previously described.

It has been previously stated that it is within the concept of the present invention to cause the strapping ST issuing from the strap feeder 12 to enter the articulated chute at some intermediate point in between adjacent chute sections 74. When this expedient is resorted to, it will be understood that the automatic control mechanism associated with the feeder will make provision for over-riding the control valve CV in such a manner that strap chute feeding operations will terminate at such time as the rear end of any selected chute section 74 will come to rest in register with the curved strap chute section 33 of the strap feeder 12.

The invention is not to be limited to the exact arrangement of parts shown in the accompanying drawings or described in this specification as various changes in the details of construction may be resorted to without departing from the spirit of the invention. For example, although the invention has been disclosed herein as a pallet void feeding adjacent or accessory to a strap feeder such as the feeder 12, it is within the purview of the invention to employ the articulated strap chute 72 for guiding a length of strapping across a strapping station beneath an article undergoing strapping regardless of whether the article be supported on a pallet or otherwise. Therefore, only insofar as the invention has particularly been pointed out in the accompanying claims is the same to be limited.

I claim:

1. A
1. In a strapping installation of the character described, in combination, means defining a strapping station, a flexible strap chute for guiding a length of strapping endwise and across the strapping station and beneath an article disposed at said station, a guide channel for said chute and within which the latter is slidable endwise between a retracted position wherein the chute is disposed substantially wholly within the confines of the channel and a projected position wherein at least a major portion of the chute is projected forwardly from the channel, said channel embodying a relatively short horizontal distal section the forward end of which is disposed below the level of the article and a relatively long proximate vertical storage section which extends upwardly alongside the article and in close proximity thereto, internal tracks coextensive with said guide channel, said chute being unidirectionally flexible so that it may follow the contour of the guide channel during retraction thereinto and projection therefrom and so that the projected portion thereof is self-supporting in cantilever, said strap chute being of an articulated nature and consisting of a series of relatively short chute bodies hingedly connected together in end-to-end fashion and having cooperating abutments on the opposed ends of each adjacent pair of chute bodies, said abutments being effective when in engagement with each other to maintain such adjacent pair of chute bodies in linear alignment, said chute bodies being provided with antifriction guide members thereon which are slidable in said tracks, guide means disposed between said channel and article for directing said length of strapping endwise into the proximate end of a projected portion of the chute, and means for selectively projecting and retracting said chute.

2. In a strapping installation, the combination set forth in claim 1, wherein each chute body is provided with an individual releasable strap-confining gate including strap retaining gate flanges movable between a retaining position wherein they overlie the chute body and a releasing position, said flanges in their retaining position cooperating with the chute body to define a path for the strap along the chute body, and meansyieldingly biasing said gate flanges to their retaining position, said flanges being so shaped and dimensioned that upward pulling of the strapping will effect automatic movement of the flanges to their releasing position.

3. In a strapping installation, the combination set forth in claim 2, wherein the body portions of the chute sections present coplanar horizontal upper surfaces when the chute is fully projected, and the body portion of the rear proximate chute section is formed with an inclined strap deflecting ramp portion which moves into register with said strap directing guide means when the chute is fully projected so as to guide the strapping into such chute section.

4. In a strapping installation, the combination set forth in claim 2, wherein the opposed ends of the gate flanges are spaced from each other when the chute is fully projected so as to define strap receiving entrance voids which, when in register with said guide means due to partial projection of the chute, are capable of receiving the strapping endwise from such guide means.

5. In a strapping installation, the combination set forth in claim 1, wherein said means for selectively projecting and retracting said chute comprises a vertically disposed cable cylinder disposed alongside the vertical storage section of the guide channel and having a piston which is effectively connected to the proximate chute section, and valve means for selectively applying motive fluid to the opposite ends of said cylinder.

6. In a strapping installation, the combination set forth in claim 5, wherein said cable cylinder is of the pneumatically operable type, a hydraulic fluid reservoir is operatively connected by a fluid line to one end of the cylinder and a quantity of hydraulic fluid is normally disposed within said letter end of the cylinder for selective flow between the reservoir and cylinder through a restriction which is disposed within said fluid line.

7. In a strapping installation, the combination set forth in claim 1, wherein each chute body is of block-like form and has laterally and outwardly projecting attachment ears at one end thereof which straddle the opposed end of a next adjacent body, a hinge pin projects transversely through said ears and opposed end, and said cooperating abutments are defined by the rear edges of the attachment ears and lateral projections on said opposed end.

* * * * *