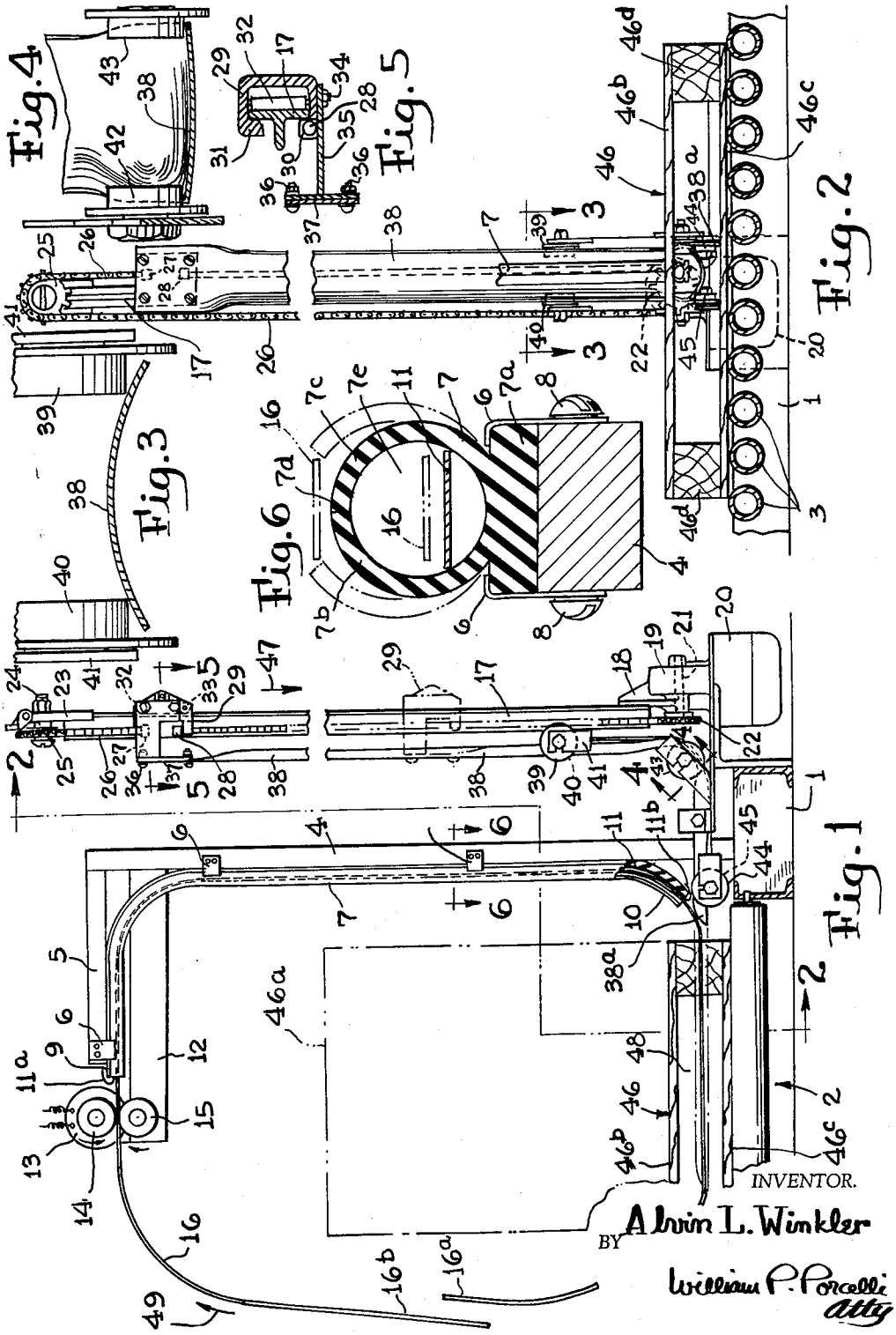
May 23, 1961 A. L. WINKLER 2,985,098

STRAP GUIDE

Filed May 9, 1960



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United States Patent Office 2,985,098 Patented May 23, 1961

2,985,098

STRAP GUIDE

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Filed May 9, 1960, Ser. No. 27,556

12 Claims. (Cl. 100—25)

This invention relates to the art of strap guide tracks and particularly to one which enhances the use of a conventional type track wherein a length of strapping is guided around an object to be strapped prior to tensioning of the strap on the object and connecting together the ends of the strap length.

When strapping objects at the present time, it is common to secure the object or load by means of the straps to an underlying support pallet which provides a convenient means on which the object can be supported during subsequent handling, storage and shipment. On certain type pallets where the pallet consists of a platform supported by post type legs or longitudinal runners, little difficulty is encountered in properly encircling the straps around the pallet to secure it to the load or object which it supports. However, when a double faced pallet is used, viz., one which consists of two parallel faces or sheets spaced apart by means of spacers or legs, it is desirable that the straps extend in the space between the two faces of the pallet so that the upper face only is actually strapped to the object. The obvious way of threading the straps through this space is manually by passing the leading strap end from one side of the pallet to the other. This is a time consuming operation and does not lend itself to high enough production to keep abreast of the swiftness of the ordinary high speed assembly line.

It is, therefore, the principal object of this invention to provide an improved strap guide track having novel retractable means which can be extended into the space between the two faces of a double faced pallet where the means provides a guide for facilitating the passage of a strap length endwise through the space so that a strap can be quickly and easily encircled around an object supported on the pallet.

In order to accomplish this object, it is another object to provide a novel type retractable guide which can be first inserted into the space of the pallet when the strap is to be encircled on the object, and then retracted after encircling of the strap has been completed.

The form of the retractable means of this invention is a metal slat which is bowed into a transverse concavo-convex cross section to first provide rigidity for proper support of a strap and secondly provide a trough into which the strap can be properly guided. Also, for space conservation, the metal slat is suspended vertically in its initial position and is of such a nature that it is guided in its travel around a right angle bend which causes it to change from a vertical direction to a horizontal direction in order to properly be guided into the space between the pallet faces during the strap encircling operation.

It is another object to provide a retractable guide as described which is powered by reversible means so that it can be either extended or retracted as required.

Other objects and advantages of the invention should become apparent upon reference to the accompanying drawings, in which

Fig. 1 shows a partially cut away and partial sectional side elevation of strapping apparatus embodying the invention.

Fig. 2 shows a section of the apparatus of Fig. 1 as viewed along the line 2—2 of Fig. 1.

Fig. 3 shows a sectional view along the line 3—3 of Fig. 2 and particularly shows the concavo-convex shape of the guide beams as well as its marginal guides.

Fig. 4 shows a sectional view approximately along the line 4—4 of Fig. 1 and particularly shows the retractable guide and its roller guides in the region where the retractable guide is bent at a corner for the purpose of changing its direction of travel.

Fig. 5 shows a sectional view along the line 5—5 of Fig. 1 and particularly shows the retractable guide support means and how it is guided vertically relative to the frame of the apparatus, and

Fig. 6 shows a sectional view along the line 6—6 of Fig. 1 and particularly shows the cross sectional shape of the form of strap guide tube used with the invention.

The particular embodiment of the invention as shown is mounted on a frame 1 which ordinarily rests on the floor where the invention is to be used. The frame 1 is provided with a conveyor 2 consisting of a plurality of spaced parallel positioned rollers 3 journaled to the frame 1. These rollers 3 are freely journaled so that an object can be rolled across their upper surfaces with a minimum of effort. Secured to the rear of the rollers in a vertical direction from the frame 1 is an upright member 4 whose upper end is provided with a horizontal arm 5 extending in cantilever from it and directly over the region of the conveyor rollers 3. Secured by means of L-shaped clips 6 on either side of the upright member 4 and the horizontal member 5 is a flexible strap guide tube 7. The clips are held in place on the members 4 and 5 by means of screws 8 as best shown in Fig. 6. The guide tube 7 terminates at its upper end 9 slightly beyond the end of the horizontal member 5 while its lower end 10 terminates approximately slightly above the level of the rollers 3 and in the vicinity of their rear ends.

The guide tube 7 is preferably manufactured from flexible plastic or rubber and can be extruded into the cross sectional shape shown in Fig. 6. Although this plastic tube type guide is shown, there are many other ways of manufacturing guide tubes to perform the same general function and the particular structure shown forms no part of the invention per se, as hereinafter claimed.

Since plastic or rubber ordinarily is soft enough that it can create a snag problem with the leading end of a strap fed through a guide tube made from it, a backing strip 11 of stainless steel or other smooth metal is positioned through the tube for its entire length. Its ends 11*a* and 11*b* are curled around the ends 9 and 10 of the tube in order to retain it positioned in the tube.

Extending parallel to the horizontal arm 5 is another arm 12 which is also supported in cantilever from the upright member 4. It is supplied with a motor 13 having a feed wheel 14 mounted on its shaft. Directly below the feed wheel 14 is an idler wheel 15 mounted on another shaft. The idler wheel 15 is positioned closely enough to the feed wheel 14 so that when strap 16 is positioned between the two wheels 14 and 15 and the feed wheel 14 is rotated, the strap 16 is caused to move longitudinally between the wheels in a direction dependent upon the direction of rotation of the feed wheel 14. The idler wheel 15 is necessarily free wheeling in either direction. For convenience, the idler wheel 15 can be made retractable away from the feed wheel 14 to permit easy removal of the strap 16 when necessary but this forms no part of the invention.

The guide tube 7 is provided with an enlarged vase 7*a*

which is the portion held by the clips 6. Attached to the base portion 7a are two flexible arms 7b and 7c which in their normal positions abut at their ends along a line of contact 7d. In these positions, the arms 7b and 7c form a circle having a longitudinal circular opening 7e extending entirely through the guide tube 7 from one end to the other. When the guide tube is used for guiding strap around an object, the strap 16 is passed entirely through the guide tube 7. When it is necessary to remove the strap from the guide tube 7 the strap is pulled away from the guide tube and the pulling force causes the strap 16 to cam against the arms 7b and 7c and spread them apart to the positions as indicated in phantom lines in Fig. 6 where an opening large enough for the strap 16 to be removed is created. After the strap is removed, the natural resiliency of the arms 7b and 7c causes them to return to their initial positions. Since the arms 7b and 7c are flexible for their entire length, the strap 16 can be stripped from the tube 7 progressively from end to end.

Also secured to the frame 1 is a T-shaped vertical track 17 whose lower end is secured to a projection 18 of the housing which contains a gear reducer 19. Secured to the lower end of the gear reducer 19 is a motor 20 which is used to drive the gear reducer mechanism. The gear reducer is provided with a shaft 21 which has an outer end secured to a chain sprocket 22 which is rotated with the shaft 21 as the motor is actuated. At the upper end of the T-shaped track 17 is a bracket 23 which is provided with a threaded shaft 24 on which is rotatably mounted another chain sprocket 25.

Encircled about both of the chain sprockets 22 and 25 is a length of chain 26 whose two ends 27 and 28 are secured to a bracket 29 so that the chain including the bracket 29 forms a closed loop encircled about the sprockets 22 and 25.

As shown in Fig. 5, the bracket 29 is shaped with two inwardly extending tongues 30 and 31 which engage the front face of the back wall of the T-shaped track 17. Two rollers 32 and 33 are journaled in the walls of the bracket 29 and are positioned to engage the rear surface of the back wall of the T-shaped track 17. In this manner the bracket is positioned in a fixed transverse position by the tongues 30 and 31 and the rollers 32 and 33, but the fit of the bracket 29 is loose enough on the track 17 that it may be moved longitudinally relative to it.

At the side of the bracket 29 is connected by means of screws 34 a T-shaped bracket 35 which has secured to its free end by means of screws 36 the upper end 37 of the retractable strap guide 38. This upper end 37 is flattened to conform to the flat shape of the bracket 35 but, immediately below the bracket, the guide is provided with a concavo-convex shape in cross section. This strap guide 38 extends vertically downwardly past two flanged guide rolls 39 and 40 which guide the rear surface of the guide as viewed in Fig. 3. These guide rolls 39 and 40 are journaled in brackets 41 secured to the T-shaped track 17. After passing by the guide rolls 39 and 40 the strap guide 38 extends around two other guide rolls 42 and 43 which guide the strap guide 38 through a bend to change the direction of the strap guide from the vertical to the horizontal. The relative shapes and positions of these guide rolls 42 and 43 are best shown in Fig. 4. After emerging from the region of the guide rolls 42 and 43, the guide track 38 is guided at its lower surface by means of two more guide rolls 44 and 45 which are identical to the guide rolls 39 and 40. These guide rolls 44 and 45 are journaled in suitable brackets to the frame 1.

In operation, when it is desired to strap an object or load onto a double faced pallet 46, the motor 20 is energized in a direction which causes the chain sprocket 22 to be rotated in a direction to lower the bracket 29 in a direction indicated by the arrow 47 in Fig. 1. This causes the retractable strap guide 38 to be lowered vertically and this in turn causes its forward end 38a to be extended horizontally. With the pallet 46 properly positioned on the conveyor rollers 3 with its load 46a resting upon it, the leading end 38a of the strap guide extends into the space 48 between the two parallel faces 46b and 46c of the pallet 46. With the legs or spacers 46d positioned at the four corners of the pallet, they provide no interference for obstructing movement of the strap guide 38. After the leading end 38a of the strap guide is passed entirely through the opening 48 of the pallet, the motor 20 is de-energized to arrest the movement of the strap guide 38. Then, a length of strap is fed in the direction of the arrow 49 between the feed rolls 14 and 15, into the end 9 of the strap guide tube 7, entirely through it, and out through the exit end 10 where it contacts the upper surface of the strap guide 38 which guides it from the rear side of the pallet through the space 48 of the pallet and out the front side of the pallet. The leading strap end 16a then projects approximately as shown in Fig. 1 in a position parallel to the supply end 16b of the strap.

With the strap ends 16a and 16b so positioned, they are moved relative to each other in such a way that the strap loop formed by the strap 16 is withdrawn from the strap guide tube 7 in a manner as previously described. Upon withdrawal of the strap 16, it is tensioned by conventional hand or powered tools and the two overlapping strap ends 16a and 16b are then secured together to provide an encircling taut binder loop of strap securing the load 46a to the pallet 46.

After this has been accomplished, the motor 20 is energized to rotate in an opposite direction and cause the bracket 29 to be elevated vertically to cause the leading end 38a of the guide track 38 to be rotated clear of the opening 48 in the pallet 46. The strapped pallet is then ready for removal to another station where it is ordinarily stored or made ready for shipment.

Although no stop mechanism is shown to limit the travel of the bracket 29 with consequent travel limitations of the strap guide track 38, stops can be provided. Also, even though only one form of strap guide tube 7 has been shown, the strap guide track 38 can be used with other types of strap guide tubes or even without any and still perform in an efficient manner.

It is apparent that the strap guide 38 flattens from its ordinary concavo-convex shape to a flatter shape as indicated in Fig. 4 as it bends around the guide rollers 42 and 43. Also, it is apparent that the strap guide 38 returns to its original concavo-convex shape along its straight portions after the strap guide passes around the bend. This means that the strip material from which the strap guide is made must be resilient as well as flexible. It has been found that a spring temper steel of fifteen-thousandths thickness works very well for this purpose where the width of the strap guide is approximately four inches and the depth of the arc of the concavo-convex shape is approximately one inch. The steel is preferably of a stainless type in order to eliminate the rusting problem without requiring plating, which is not too practical on a metal strip subject to the flexure of this particular strap guide. The particular transverse shape of this particular strap guide is also sufficient to impart enough rigidity to the strap guide that it is self-supporting in cantilever as required when it is inserted through the opening 48 of a pallet 46.

Although only a single embodiment of the invention has been shown and described, it should be understood that the invention can be made in many different ways without departing from the true scope of the invention as defined by the appended claims.

I claim:

1. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable sheet metal strap guide, and means for extending the

retractable strap guide through the horizontal opening of the pallet where it can guide a strap fed endwise through the opening, said strap guide being of concavo-convex cross-section to impart rigidity to it so that it is self-supporting in cantilever.

2. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable sheet metal strap guide, and means for extending said guide through the horizontal opening of the pallet where it can guide a strap fed endwise through the opening, said strap guide being of concavo-convex cross-section to impart rigidity to it so that it is self-supporting in cantilever and its concave side facing upward as a trough for guiding and supporting said strap.

3. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable sheet metal strap guide, means for both retracting and extending the retractable strap guide through the horizontal opening of the pallet, the guide being of concavo-convex cross-section to impart rigidity to it and its concave side facing upward as a trough for guiding a strap fed endwise over it when the guide is in its extended position, the sheet metal from which the strap guide is made being flexible enough to allow the guide to be bent to follow a non-rectilinear path as the guide is extended and retracted, the sheet metal of the guide also being resilient enough to cause the guide to retain its concavo-convex cross-section along its straight path portions.

4. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable sheet metal strap guide, drive means for both retracting and extending the retractable strap guide through the horizontal opening of the pallet, the guide being of concavo-convex cross-section to impart rigidity to it and its concave side facing upward as a trough for guiding a strap fed endwise over it when the guide is in its extended position, the sheet metal from which the strap guide is made being flexible enough to allow the guide to be bent into a non-rectilinear path as the guide is extended and retracted, the sheet metal of the guide also being resilient enough to cause the guide to retain its concavo-convex cross-section during its straight path portions, said drive means having a sprocket driven chain secured to one end of said strap guide.

5. The combination in strapping apparatus, of horizontal support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable sheet metal strap guide, drive means for both retracting and extending the retractable strap guide through the horizontal opening of the pallet, said strap guide being flexible so that it can be bent longitudinally into a non-rectilinear shape, guide means for guiding the strap guide through an L-shaped path with its leading end extending horizontally and its rear end extending vertically, said drive means being connected to said rear end, actuation of the drive means in one direction causing said rear end to be lowered and said leading end to be extended into the region of the opening in the pallet, and actuation of the drive means in the opposite direction causing said rear end to be elevated and said leading end to be retracted from the region of the opening in the pallet.

6. The combination of claim 5 characterized by, said strap guide being of concavo-convex cross-section to impart rigidity to it sufficient to make its leading end self-supporting when it is positioned through the opening in the pallet.

7. The combination of claim 5 characterized by, said strap guide being of concavo-convex cross-section to impart rigidity to it sufficient to make its leading end self-supporting when it is positioned through the opening in the pallet, said strap guide also being resilient enough to allow it to flatten in cross-section where bent and to return to its concavo-convex cross-section along its straight path portions.

8. The combination of claim 5 characterized by, said strap guide being of concavo-convex cross-section to impart rigidity to it sufficient to make its leading end self-supporting when it is positioned through the opening in the pallet, the concave side of the leading end facing upward as a trough for supporting and guiding a strap fed over it.

9. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable strap guide, and means for extending the retractable strap guide through the horizontal opening of the pallet where it can guide a strap fed endwise through the opening, said strap guide being of concavo-convex cross-section to impart rigidity to it so that it is self-supporting in cantilever.

10. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable strap guide, and means for extending said guide through the horizontal opening of the pallet where it can guide a strap fed endwise through the opening, said strap guide being of concavo-convex cross-section to impart rigidity to it so that it is self-supporting in cantilever and its concave side facing upward as a trough for guiding and supporting said strap.

11. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable strap guide, means for both retracting and extending the retractable strap guide through the horizontal opening of the pallet, the guide being of concavo-convex cross-section to impart rigidity to it and its concave side facing upward as a trough for guiding a strap fed endwise over it when the guide is in its extended position, the material from which the strap guide is made being flexible enough to allow the guide to be bent to follow a non-rectilinear path as the guide is extended and retracted, the material of the guide also being resilient enough to cause the guide to retain its concavo-convex cross-section along its straight path portions.

12. The combination in strapping apparatus, or horizontal support means for supporting a pallet of a type having a horizontal opening extending through it, a retractable strap guide, drive means for both retracting and extending the retractable strap guide through the horizontal opening of the pallet, said strap guide being flexible so that it can be bent longitudinally into a non-rectilinear shape, guide means for guiding the strap guide through an L-shaped path with its leading end extending horizontally and its rear end extending vertically, said drive means being connected to said rear end, actuation of the drive means in one direction causing said rear end to be lowered and said leading end to be extended into the region of the opening in the pallet, and actuation of the drive means in the opposite direction causing said rear end to be elevated and said leading end to be retracted from the region of the opening in the pallet.

No references cited.