Oct. 26, 1965 W. E. COLLINS ETAL 3,213,781

STRAP GUIDE

Filed Oct. 23, 1959 6 Sheets-Sheet 1

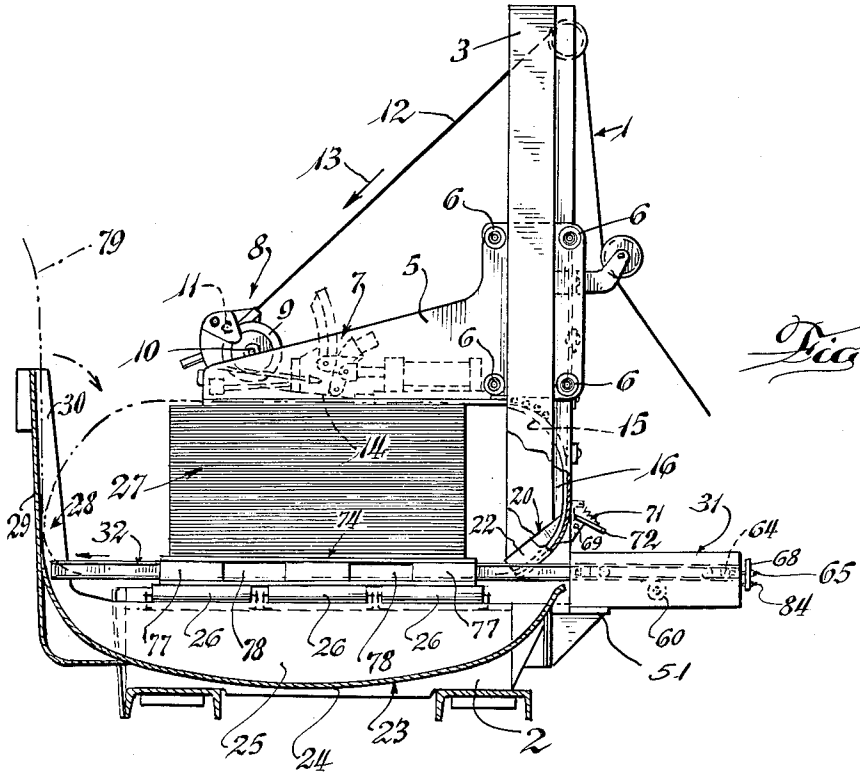


Fig. 2.

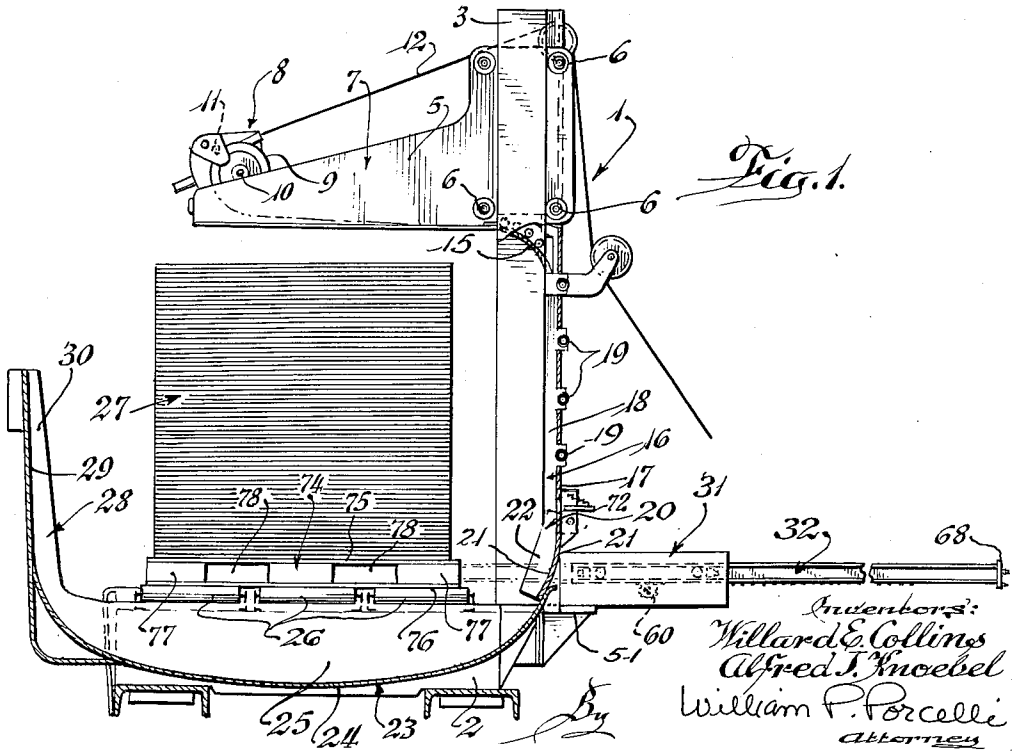


Fig. 1.

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STRAP GUIDE

Filed Oct. 23, 1959 6 Sheets-Sheet 2

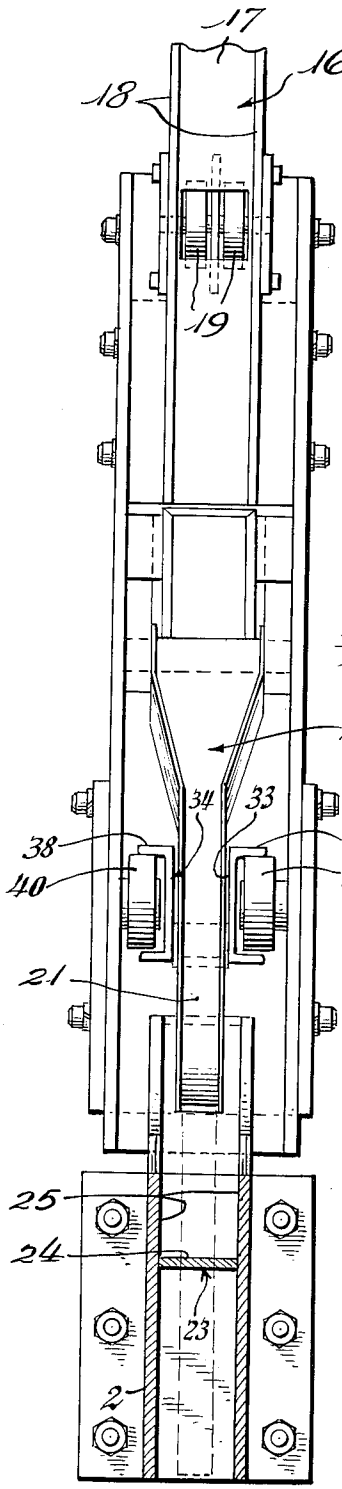



Fig. 3.

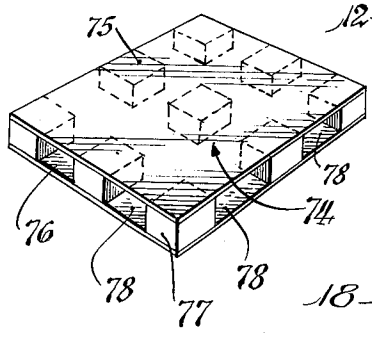



Fig. 7.




Fig. 6.

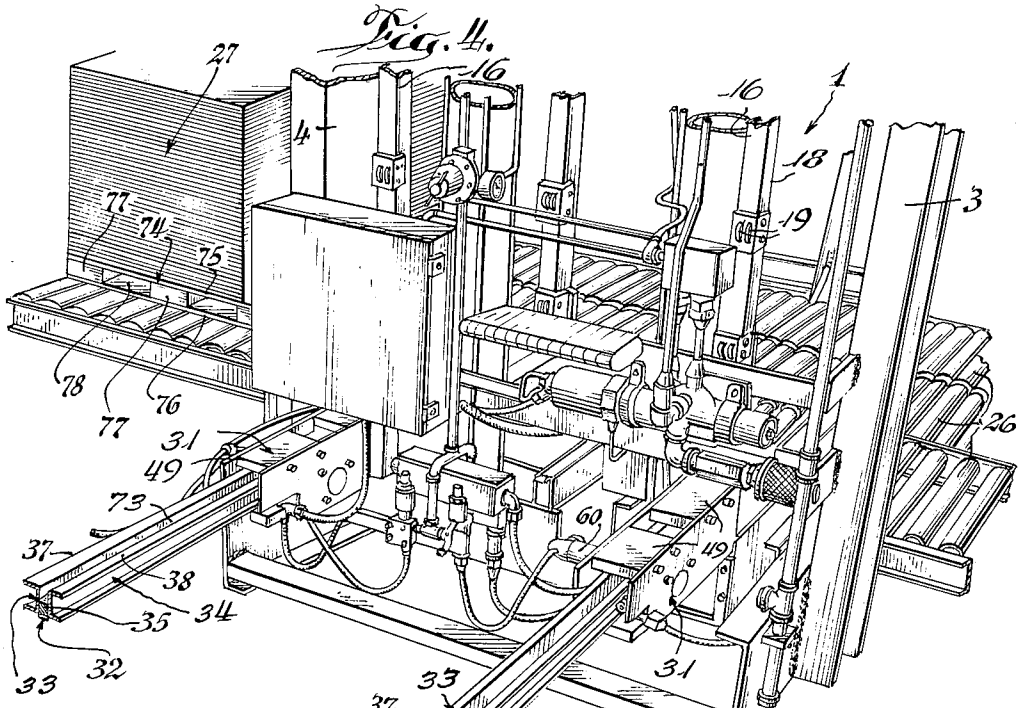
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STRAP GUIDE

Filed Oct. 23, 1959 6 Sheets-Sheet 3

Fig. 4.



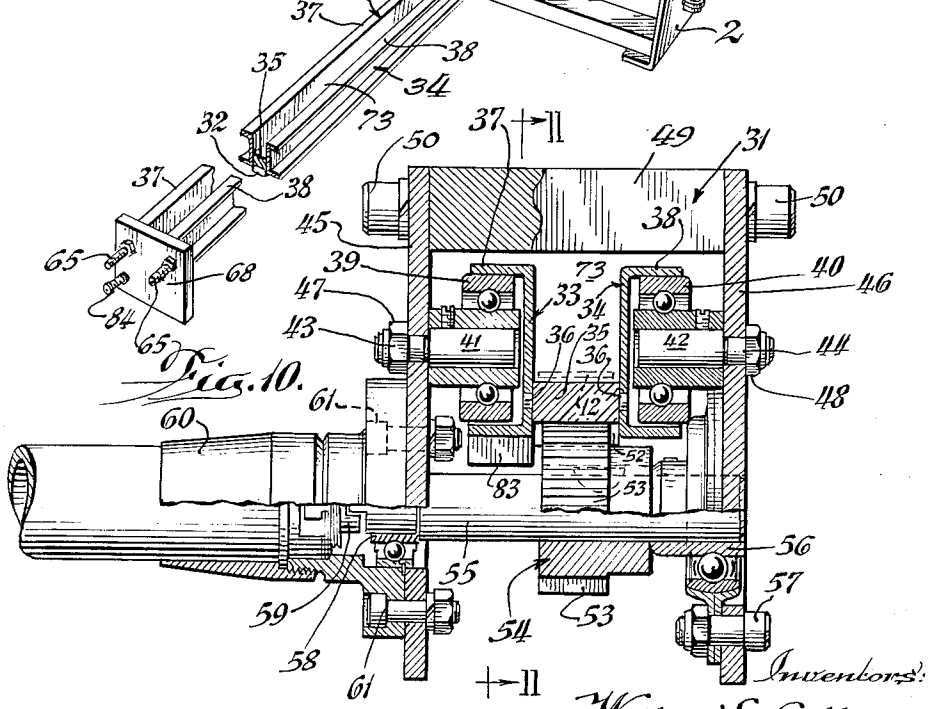




Fig. 10.

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Filed Oct. 23, 1959 6 Sheets-Sheet 4

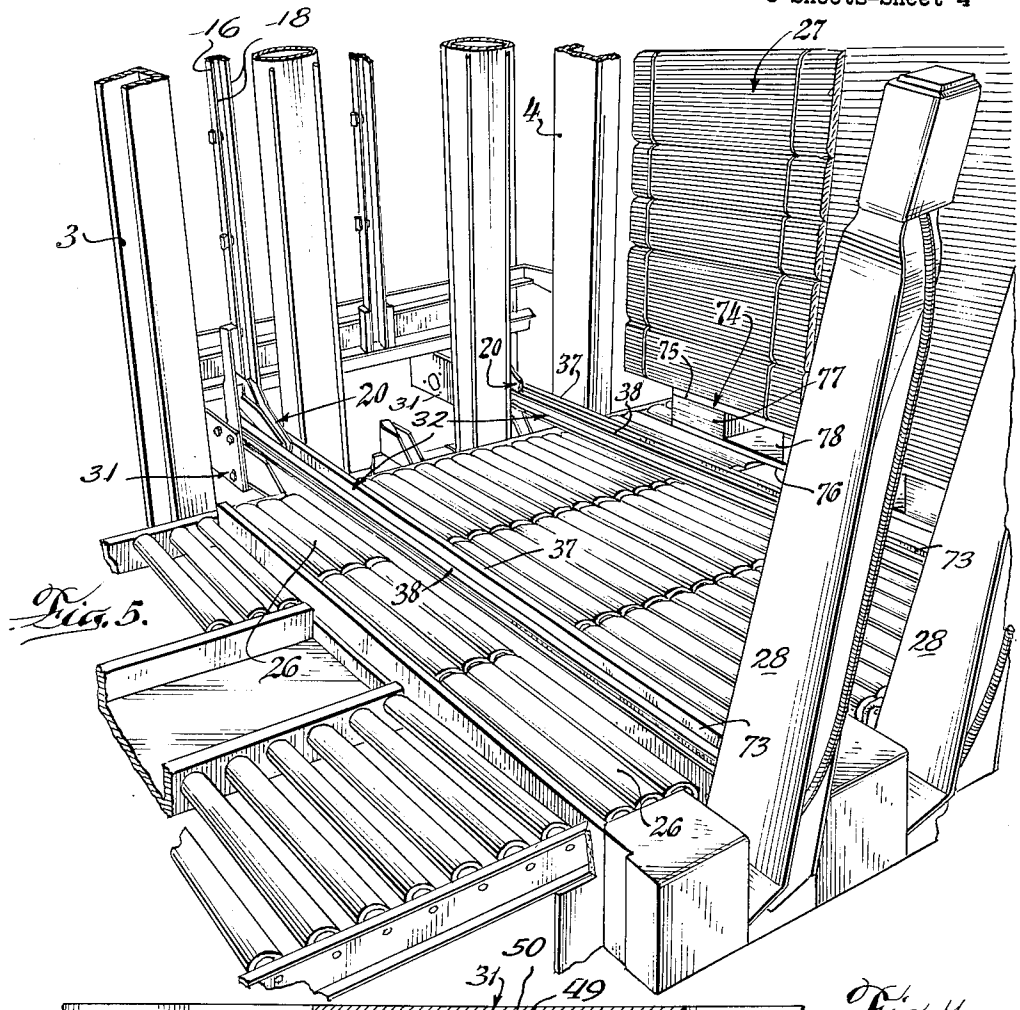



Fig. 5.

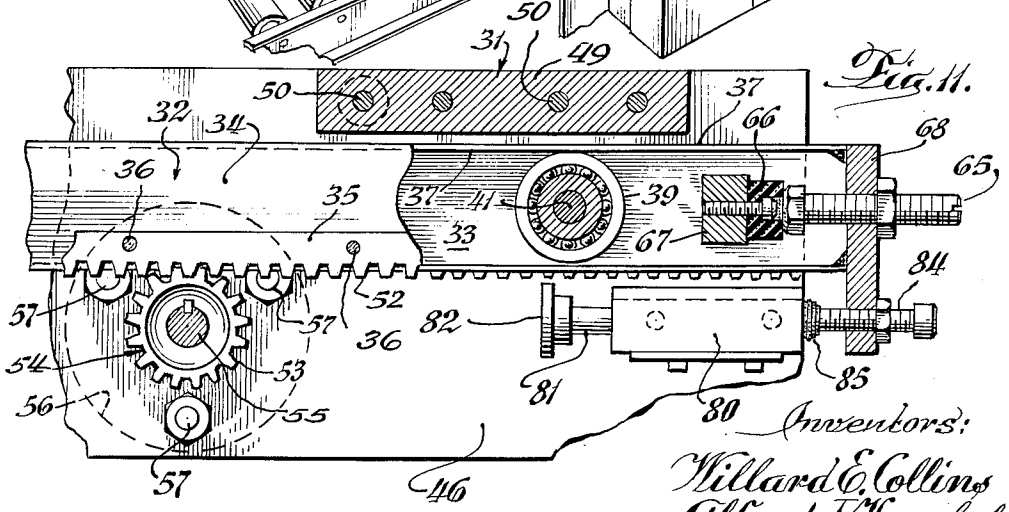



Fig. 11.

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Filed Oct. 23, 1959 6 Sheets-Sheet 5

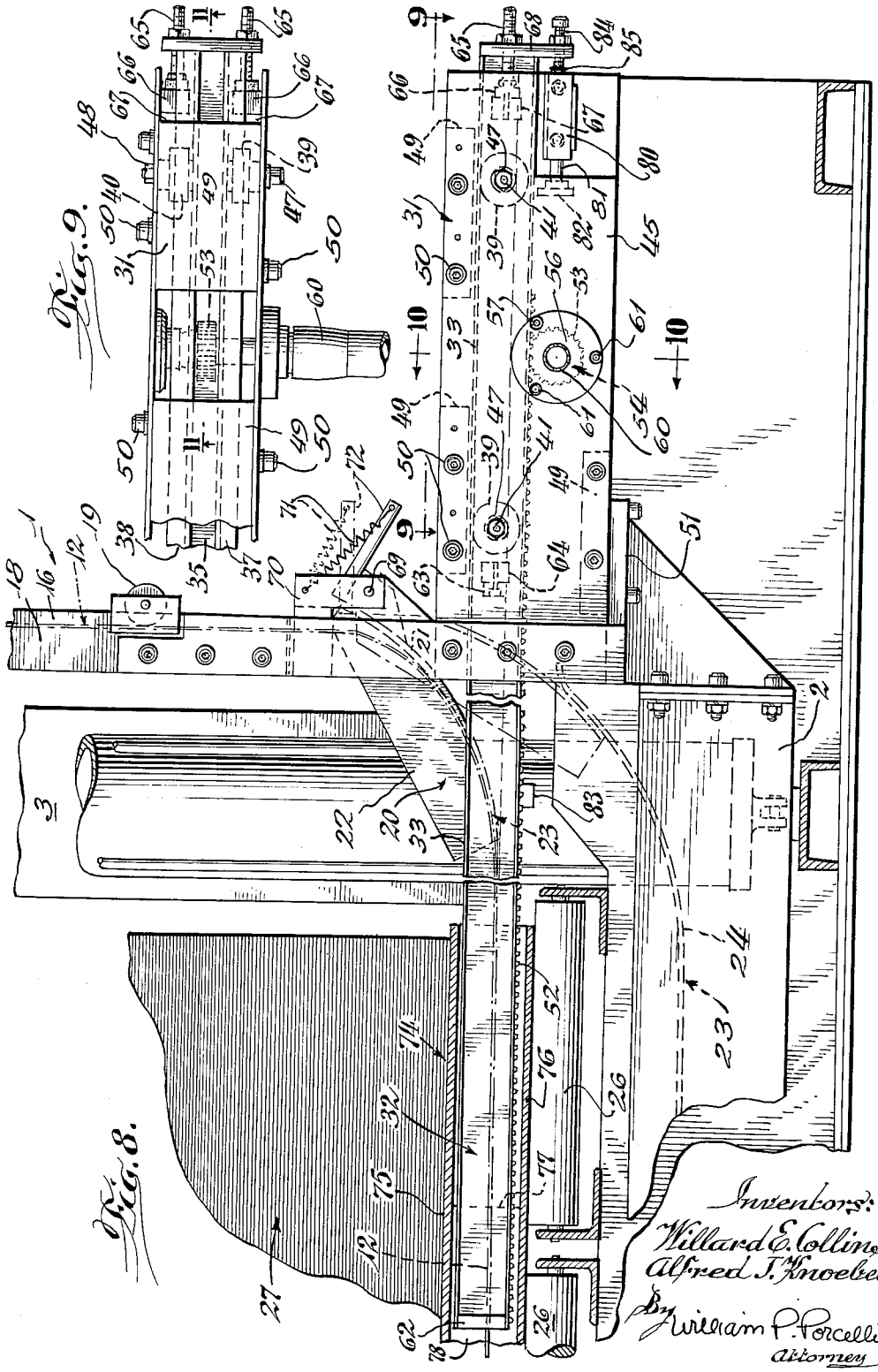


Fig. 9.

Fig. 8.

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Oct. 26, 1965 W. E. COLLINS ETAL 3,213,781

STRAP GUIDE

Filed Oct. 23, 1959 6 Sheets-Sheet 6

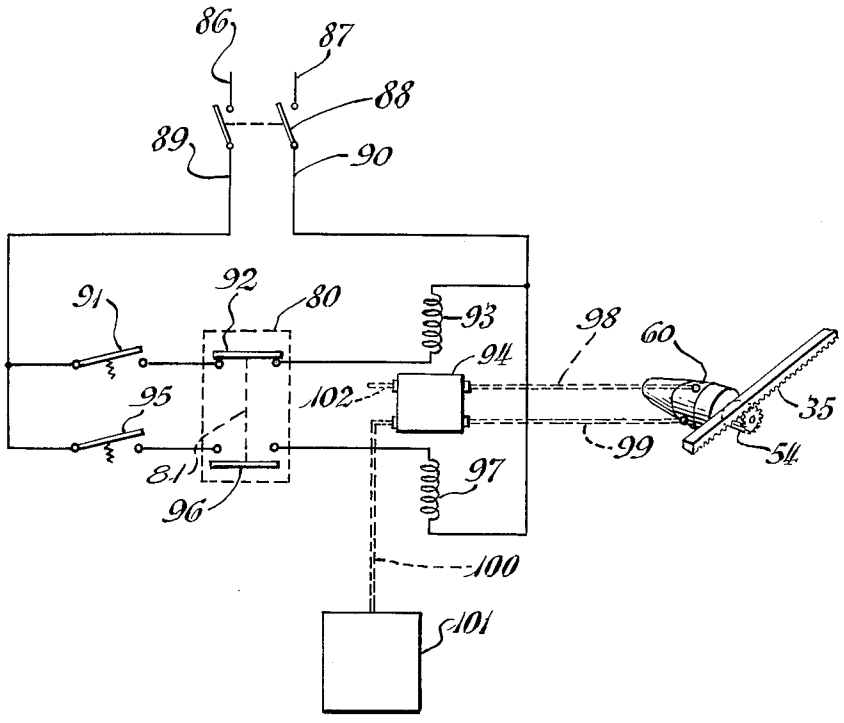



Fig. 12.

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United States Patent Office 3,213,781 Patented Oct. 26, 1965



3,213,781

# STRAP GUIDE

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Filed Oct. 23, 1959, Ser. No. 848,376
7 Claims. (Cl. 100—26)

This invention relates to the art of strapping and particularly to applying metal straps to bundles or loads which are supported by skids or pallets.

Many different types and constructions of pallets have been used for supporting bundles or loads. One type which have come into prominent use is the two faced pallet which consists of upper and lower parallel decks spaced vertically from each other by legs or supports which are transversely spaced from each other to provide passages between them for the reception of the forks of fork lift trucks when the pallet loads are transported about.

When strapping these pallets to the supported loads, it is desirable to pass the binding strap lengths through the concealed passages between the legs of a pallet so that the strap lengths can be drawn up tight against the upper deck of the pallet rather than around the lower deck where the straps would be subject to snagging and injury.

Feeding of the strap lengths through the pallet passages presents some difficulty when no guide means is used to insure the proper direction of the straps through the passages.

It is the principal object of this invention to provide retractable guide means which is temporarily inserted in the passages of the pallet for properly guiding the strap lengths through the passages between the pallet decks so that each strap length can be encircled into a loop about the pallet load with the strap length secured against the upper deck of the pallet.

It is another object of the invention to provide such a retractable guide means which is driven by means of a pinion and rack, both for inserting the guide means in the passages at a time when the strap lengths are fed and for retracting the guide means clear of the passages after the strapping is completed so that the strapped pallet load can be removed from the strapping station.

It is another object of the invention to provide such a retractable guide means which is adapted for hand feeding of the strap or which can be applied to a strapping machine of a semi-automatic or fully automatic type.

It is another object of the invention to provide such a retractable strap guide which can be adapted to existing strapping machines so that machines which are ordinarily capable of strapping bundles or loads of other types can also be used to properly strap skid loads using two faced pallets as mentioned.

Other objects and advantages of the invention should be apparent by referring to the accompanying drawings in which:

FIG. 1 shows a side elevation of a strapping machine in partial section embodying the retractable strap guide means of this invention with the guide means shown retracted and with other parts of the machine as they appear at the beginning of a strapping cycle;

FIG. 2 shows a similar view to FIG. 1 except that the guide means is shown extended and other portions of the machine are shown in their positions for reception of a length of binding strap;

FIG. 3 shows a perspective view of a typical double faced pallet of a type advantageously strapped to a load by the improved means of this invention;

FIG. 4 shows a perspective view of a portion of the rear of the machine shown in FIGS. 1 and 2;



FIG. 5 shows a perspective view of the front portion of the machine shown in FIGS. 1 and 2;

FIG. 6 shows an enlarged scale portion of the machine adjacent the lower mid-portion of FIG. 1;

FIG. 7 shows a sectional view along the line 7—7 of FIG. 6;

FIG. 8 shows a sectional view similar to FIG. 6 but with more of the parts shown and some in different positions;

FIG. 9 shows a top plan view of a portion of the machine as viewed along the line 9—9 of FIG. 8;

FIG. 10 is a partial sectional view along the line 10—10 of FIG. 8 and particularly shows the engagement of the rack and pinion associated with the invention;

FIG. 11 shows a partial sectional view along line 11—11 of FIG. 9; and

FIG. 12 shows a schematic diagram of the electrical and pneumatic control means for the pneumatic motor used for actuation of the rack.

As shown in FIGS. 1, 2, 4 and 5, a machine 1 in which the invention is embodied consists of a frame 2 which is provided with vertical stanchions 3 and 4 extending upwardly from it. These vertical stanchions support a movable frame 5 which is movable vertically relative to the stanchions 3 and 4 and guided thereon by means of suitable rollers 6 secured to the movable frame 5. The movable frame 5 supports strapping accessories 7 which are used to tension a strap loop encircled about a palletized load and thereafter secure together the overlapping strap ends of the loop. This movable frame also supports strap feed means 8, each unit of which consists of a motor having a feed wheel 9 secured to its shaft 10 which rotates in conjunction with an idler wheel 11 to feed strap 12 in the direction of the arrow 13. The movable frame member 5 is also provided with a channel 14 which extends longitudinally for its length and provides guide means for the strap which is fed to it by means of feed means 8. The inner end of the movable frame is provided with a guide 15 which guides the strap from the channel 14 to another guide 16 extending vertically of the machine. The guide 16 has a back wall 17 and parallel side walls 18 which form a channel for enclosing the strap on three sides. Magnetic rollers 19 are provided along the guide 16 to releasably retain a strap in the guide 16. At the lower end of the guide 16 is a pivoted gate 20 which is of a channel shape composed of a bottom wall 21 and two side walls 22. This gate 20 directs the strap from the guide 16 to a lower guide 23 which is also provided with an channel shape composed of a bottom wall 24 and two parallel side walls 25. The bottom guide 23 is mounted at a level below the level of rollers 26 which form a conveyor means across which a palletized load 27 can be moved. The lower guide 23 extends forward to where it joins a front vertical strap guide 28 having a channel shape composed of a bottom wall 29 and two side walls 30. Except for the gate 20, a machine of this same specific type, as so far explained, is shown and described in U.S. Patent Number 2,831,422 issued April 22, 1958 to Donald E. Black et al.

As especially shown in FIGS. 1 and 2, the movable frame member 5 is provided with two channels 14 for strap guiding which lead into corresponding guides 16 which in turn lead into two corresponding bottom guides 23 and front guides 28 to provide two complete strap guides for encircling two straps simultaneously about a palletized load. The patent referred to shows three such strap guide tracks, but it should be understood that as many as are needed can be included and this does not materially affect this invention.

Getting to the essence of this invention, the rear end of the machine 1 is provided with a frame 31 which

carries a reciprocating strap guide 32. This strap guide 32 can be reciprocated between the two positions shown in FIGS. 1 and 2.

As best indicated in FIGS. 7, 8, 9, 10 and 11, the reciprocating guide 32 consists of two longitudinally extending parallel channels 33 and 34 which are joined to a rack 35 extending between them by means of studs 36 extending into openings in the channels 33 and 34. Each of the channels are supported at their upper flanges 37 and 38 on ball bearings 39 and 40 which are journalled on shafts 41 and 42. There are two bearings spaced from each other for the support of channel 33 and two space bearings 40 for the support of channel 34. The shafts 41 and 42 have reduced threaded ends 43 and 44 which extend through openings in side plates 45 and 46 and are provided with nuts 47 and 48 to hold them positioned. The side plates 45 and 46 constitute portions of the frame member 31. These side plates 45 and 46 are secured together in spaced parallel relationship to each other by means of three spacer blocks 49 which are secured in place by means of screws 50, FIG. 8. This frame member 31 is supported on a bracket 51 which is bolted to it and to the main frame 2 of the machine 1.

On the under surface of the rack 35 are gear teeth 52 which are engaged with the gear teeth 53 of a pinion 54 which is secured in a fixed position on a shaft 55. The shaft 55 is journalled at its outer end in a bearing 56 secured to the side plate 46 by means of bolts 57. Its inner end is secured in a bearing 58 where it engages the drive shaft 59 of an air operated motor 60 which is secured to the side plate 45 by means of bolts 61. When the shaft 59 of air motor 60 is caused to rotate, the pinion 54 moves the rack 35 longitudinally, the direction of rotation of the pinion 54 determining the direction of travel of the rack 35.

There are as many frames 31 and reciprocating guides 32 and their related parts as there are complete strap guides on the machine 1.

The forward end of the reciprocating strap guide 32 is provided with a plate 62 (FIG. 8) which is used to arrest the retracting motion of the guide 32 when it is moved toward the right as viewed in FIG. 6. Stoppage of the guide 32 occurs when the plate 62 strikes rubber bumpers 63 secured to blocks 64 fastened to the inner walls of the side plates 45 and 46. Extension of each guide 32 is limited by means of stop screws 65 which strike rubber bumpers 66 secured to block 67 which are fastened to the inner walls of the side plates 45 and 46. The screws 65 are adjustable in a block 68 at the inner end of each guide 32 to vary the length of travel of the guide 32.

When the guide 32 is in its retracted position, as viewed in FIG. 6, the gate 20 bridges between the strap guide 16 and the guide 23 so that the strap 12 fed through the guide follows a path as indicated in FIG. 6. The gate 20 is pivoted on a pinion 69 which is mounted in a bracket 70 secured to the frame of the machine. A coil spring 71 is connected between the bracket 70 and an arm 72 secured to the gate 20. When the guide 32 is extended, its leading end adjacent the blocks 62 contacts the bottom wall 21 of the gate 20 and pivots the gate on the pivot pin 69 to a position as shown in bold outline in FIG. 8. In this position, the gate acts as a guide to guide the strap 12 from the guide 16 to the channel shaped opening 73 formed in the guide 32 by the walls of the channels 33 and 34 and the rack 35. The strap then follows a path through this channel shaped opening or passage 73 across to the front vertical guide portion 28 as viewed in FIG. 2, thus by-passing the guide 23 entirely.

The type of skid with which this invention can be used most advantageously is shown in FIG. 3. This skid 74 consists of an upper deck 75 and a lower deck 76 spaced from each other in parallel relationship by means of separators 77 placed at nine different locations on the



skid. These separators or supports 77 are spaced from each other laterally to provide openings 78 into which the fork of a fork lift truck can be inserted when it is desired to move the pallet about. With this type of pallet it is desirable and often required that the binding straps securing the pallet to a load supported by it be encircled about the under surface of the top deck 75 of the pallet rather than about the lower deck 76 where the straps would be subject to snagging and damage. Consequently, the reciprocating guide 32 is used to guide the straps into proper positions about the top deck 75 of the pallet.

As especially indicated in FIGS. 2 and 8, the guide 32, when it is extended, is inserted between the top deck 75 and the lower deck 76 of the pallet 74. When so inserted, the strap 12 guided around the strap guide portions of the machine is initially led into the openings 78 provided in the pallet as best shown in FIG. 8. After the strap 12 is completely encircled about the package as indicated by the location of the strap at 79 in FIG. 2, the guide 32 is retracted clear of the pallet and the strap is then shrunk onto the palletized load 27 supported by the pallet where it is formed into a closed strap loop about the palletized load and then the overlapping strap ends of the loop of strap are secured together by the strapping means 7 to complete the strapping job. There is a separate strap means 7 for each set of complete strap guides.

The purpose of providing the gate 20 is to permit the machine to be used for palletizing the double face pallet as described with the use of the reciprocating guide 32 and also to permit the machine 1 to be used with the guide portion 23 where strapping between two faces of a pallet is not required which is the ordinary manner of operation of the machine as described in said U.S. Patent Number 2,831,422, previously referred to.

Although, as indicated by the relative positions of parts in FIGS. 1 and 2, the movable frame 5 is used to compress the load 27, it is not necessary that this type of a machine be used. It can just as well be a fixed guide without a movable compression member such as the movable frame 5. The only reason for showing the machine which is shown is for purposes of describing an embodiment which has actually been put into use.

As indicated in FIGS. 8, 10 and 11 a switch 80 is mounted to the side wall 46 of the frame member 31. The switch 80 is provided with a plunger 81 which can be made to reciprocate longitudinally of the switch 80. At one end of the plunger 81 is a flange 82 which is contacted by a stop 83 secured to the lower end of the channel 33. This stop 83 strikes the flange 82 when the guide 32 is retracted. When it is struck in this manner the plunger 81 moves to the right as viewed in FIG. 11 to position the contacts of the switch 80 in a first position. When the guide 32 is extended, an adjustable screw 84 contacts the other end 85 of the plunger 81 to move the plunger to the left as viewed in FIG. 11 and change the switch contacts to a second position.

The electrical operation of this switch 80 in relationship to the other electrical and pneumatic portions of the machine are shown in FIG. 12. In that figure, line voltage is supplied between conductors 86 and 87 which lead to a master switch 88 which, when closed, supplies line voltage between conductors 89 annd 90. In one branch circuit leading from conductor 89 is a normally opened switch 91 in series with switch contact 92 of the switch 80 and solenoid 93 of a solenoid operated valve 94 which is connected to conductor 90 to complete the branch circuit. Another branch circuit consists of a connection from conductor 89 to a switch 95 in series with contact 96 of the switch 80 and solenoid 97 of the solenoid operated valve 94 which in turn is connected to the conductor 90 to complete the branch circuit. The switches 91 and 95 are normally open, must be manually depressed to close them and are spring returned to cause

them to open upon manual release. The contacts 92 and 96 of the switch 80 which is the switch shown in FIGS. 8 and 11 are physically joined by the plunger 81 which, in one position closes the contact 92 and opens the contact 96 and, in a second position opens contact 92 and closes the contact 96.

The air motor 60 which is used to drive the pinion 54 which actuates the rack 35 is provided with two air conduits 98 and 99 which connect to the valve 94. Another air conduit 100 leads from a pressurized air source 101 to the valve 94 which is also provided with an exhaust outlet 102.

In operation, the master switch 88 is closed so as to supply line voltage to the conductors 89 and 90. With the strap guide 32 retracted to its position as shown in FIG. 1, the plunger 81 of the switch 80 is in a retracted position because the stop 83 is in contact with flange 82 to hold the plunger 81 in its retracted position. When in its retracted position the switch contact 92 is closed and the switch contact 96 is opened. When it is desired to extend the strap guide 32 from its position as shown in FIG. 1 to its position as shown in FIG. 2 the switch 91 is manually closed and this energizes the solenoid 93 to operate the valve 94 and direct high pressure air from the air pressure source through the conductor 100, the valve 94 and the air conduit 99 to the air motor 60. This causes rotation of the pinion 54 in a counter-clockwise direction as viewed in FIG. 1 to cause the rack 35 and the strap guide 32 to extend to the left. This movement continues as long as the switch 91 is held closed and until the screw 65 strikes the rubber bumper 66. At this point, the guide 32 is arrested in its motion even though the switch 91 is held closed because the air motor 60 is of a type which will stall out. This is characteristic of such an air motor. When the screw 65 strikes the rubber bumper 66, the screw 84 also strikes the end 85 of the plunger 81 which changes the positions of the contacts of the switch 80 so that contact 96 is closed and contact 92 is opened.

When it is desired to retract the strap guide 32, the switch 95 is manually depressed and this causes the solenoid 97 to be energized through the closed contact 96. This energization of the solenoid 97 changes the position of the valve 94 so that air under pressure is admitted to the air motor 60 through the air conduit 98. This causes the air motor to be reversed in a direction which causes rotation of the pinion 54 in a clockwise direction as viewed in FIG. 1 so that the guide 32 is again retracted from the position as shown in FIG. 2 to the position as shown in FIG. 1. The valve is arranged in such a way that if air under pressure is being admitted to either of the air conduits 98 and 99, air is exhausted through the other conduit and through the exhaust 102 provided in the valve 94.

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 appending claims.

We claim:

1. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, guide means through which a strap can be fed endwise around the pallet, said guide means extending below the support means for ordinarily guiding the strap below the level of the support means as it is fed around the pallet, a retractable guide positioned at a level above that of said support means, and means for extending the retractable guide relative to the guide means proper to intersect the guide means at said level above that of the support means and thereby preferentially guide the strap through said opening in the pallet rather than through the guide means below the pallet, said guide means being provided with a gate at the level of the retractable guide, said gate being opened by movement of the retractable guide as it is extended to act as a strap guide at the intersection between the guide means and the retractable guide.

2. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, guide means through which a strap can be fed endwise around the pallet, said guide means extending below the support means for ordinarily guiding the strap below the level of the support means as it is fed around the pallet, a retractable guide with a toothed rack secured to it, said retractable guide being positioned at a level above that of said support means, a toothed pinion engaged with said rack, and power means for rotating said pinion to propel said rack and cause said retractable guide to extend and intersect the guide means at said level above that of the support means and thereby preferentially guide the strap through said opening in the pallet rather than through the guide means below the pallet, said guide means being provided with a gate at the level of the retractable guide, said gate being opened by movement of the retractable guide as it is extended to act as a strap guide at the intersection between the guide means and the retractable guide.

3. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, guide means through which a strap can be fed endwise around the pallet including a retractable guide which can be longitudinally extended in movement relative to the guide means proper to a stationary position extending over and across the support means at a level corresponding to the level of said opening in said pallet, in which position the retractable guide transversely intersects said guide means proper to receive the strap fed endwise through said guide means and guide the strap in continued endwise movement relative to the stationary retractable guide and through said opening in the pallet, a pinion, said retractable guide having a rack provided with teeth engaged by said pinion which can be rotated to extend and retract said guide relative to said guide means proper and over and across said support means for the pallet.

4. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, guide means extending in a continuous path around the support means, said guide means including a lower guide means portion below the level of the support means for allowing a strap fed endwise through the guide means to be guided below the support means and thereby below a pallet supported thereon, a retractable guide which can be extended relative to said guide means proper to transversely intersect said guide means at a level above said lower guide means portion and said support means and extend over and across the support means where said retractable guide can intercept a strap fed endwise through said guide means and guide the strap through said opening in the pallet as the strap moves endwise relative to the retractable guide at said level above said support means, rather than through said lower guide means portion below the level of the pallet, and means for extending and retracting said retractable guide.

5. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, guide means through which a strap can be fed endwise around the pallet including a retractable guide which can be longitudinally extended in movement relative to the guide means proper to a stationary position extending over and across the support means at a level corresponding to the level of said opening in said pallet, in which position the retractable guide transversely intersects said guide means proper to receive the strap fed endwise through said guide means and guide the strap in continued endwise movement relative to the stationary retractable guide and through said opening in the

pallet, a first stop means for limiting the extension of the retractable guide and a second stop means for limiting the retraction of the retractable guide, power means for causing the retractable guide to be extended and retracted, and electrical switching means for causing reversal of the power means for causing the power means to alternately extend and retract the retractable guide.

6. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, guide means extending in a continuous path around the support means, said guide means including a lower guide means portion below the level of the support means for allowing a strap fed endwise through the guide means to be guided below the support means and thereby below a pallet supported thereon, a retractable guide which can be extended relative to said guide means proper to transversely intersect said guide means at a level above said lower guide means portion and said support means and extend over and across the support means where said retractable guide can intercept a strap fed endwise through said guide means and guide the strap through said opening in the pallet as the strap moves endwise relative to the retractable guide at said level above said support means, rather than through said lower guide means portion below the level of the pallet, power means for causing the retractable guide to be extended and retracted relative to the strap guide proper, and switching means for causing reversal of the power means for causing the power means to alternately extend and retract the retractable guide.



7. The combination in strapping apparatus, of support means for supporting a pallet of a type having a horizontal opening extending through it, guide means through which a strap can be fed endwise around the pallet including a retractable guide which can be longitudinally extended in movement relative to the guide means proper to a stationary position extending over and across the support means at a level corresponding to the level of said opening in said pallet, in which position the retractable guide transversely intersects said guide means proper to receive the strap fed endwise through said guide means and guide the strap in continued endwise movement relative to the stationary retractable guide and through said opening in the pallet, and means for extending and retracting said retractable guide.

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