Nov. 1, 1960 R. E. RENARD 2,958,248

SLITTER-TRIMMER FOR SHEET MATERIAL INCLUDING PIVOTED FEED TABLE MEANS

Filed April 1, 1957 4 Sheets-Sheet 1

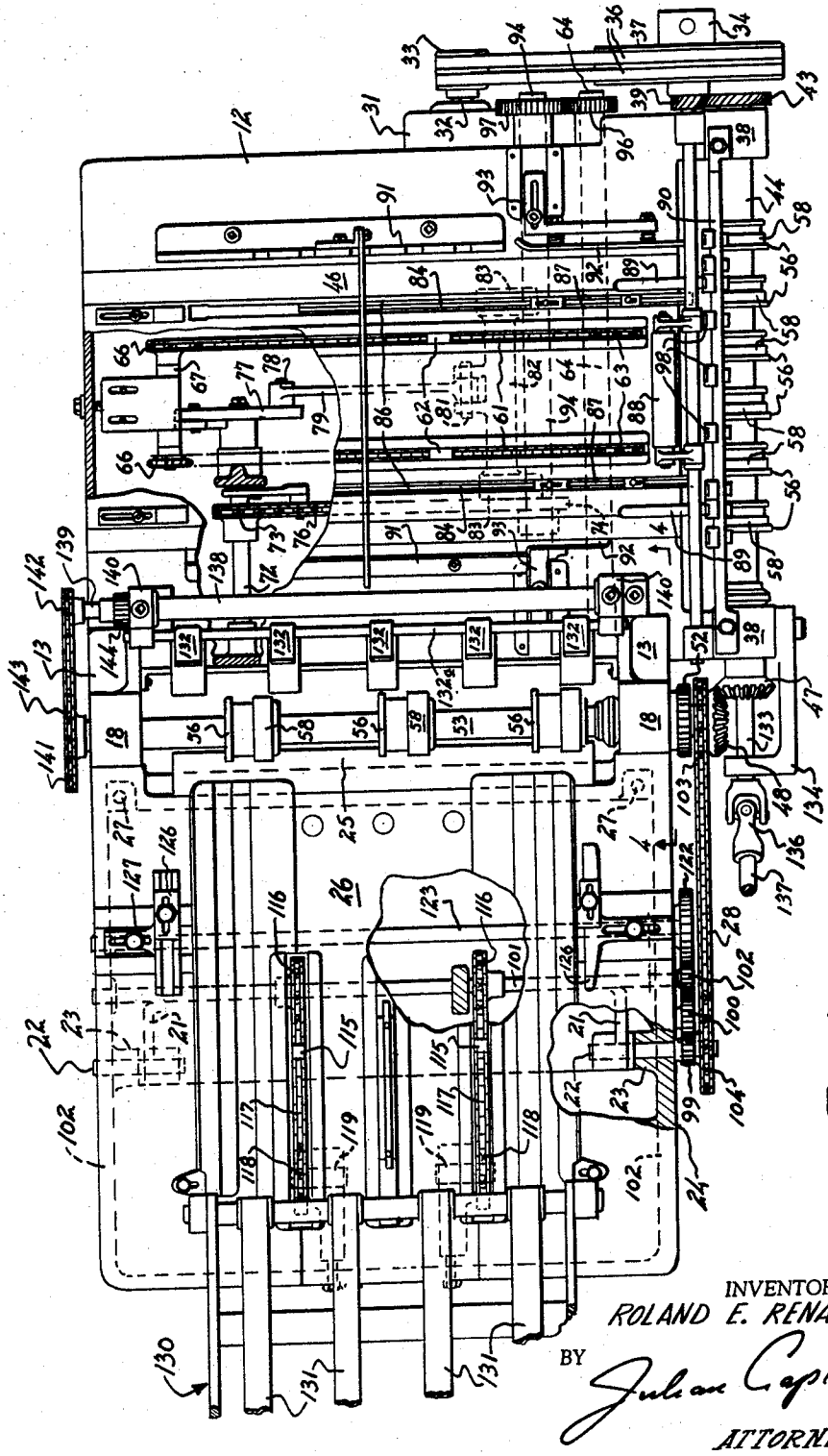


FIG. 1

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SLITTER-TRIMMER FOR SHEET MATERIAL INCLUDING PIVOTED FEED TABLE MEANS

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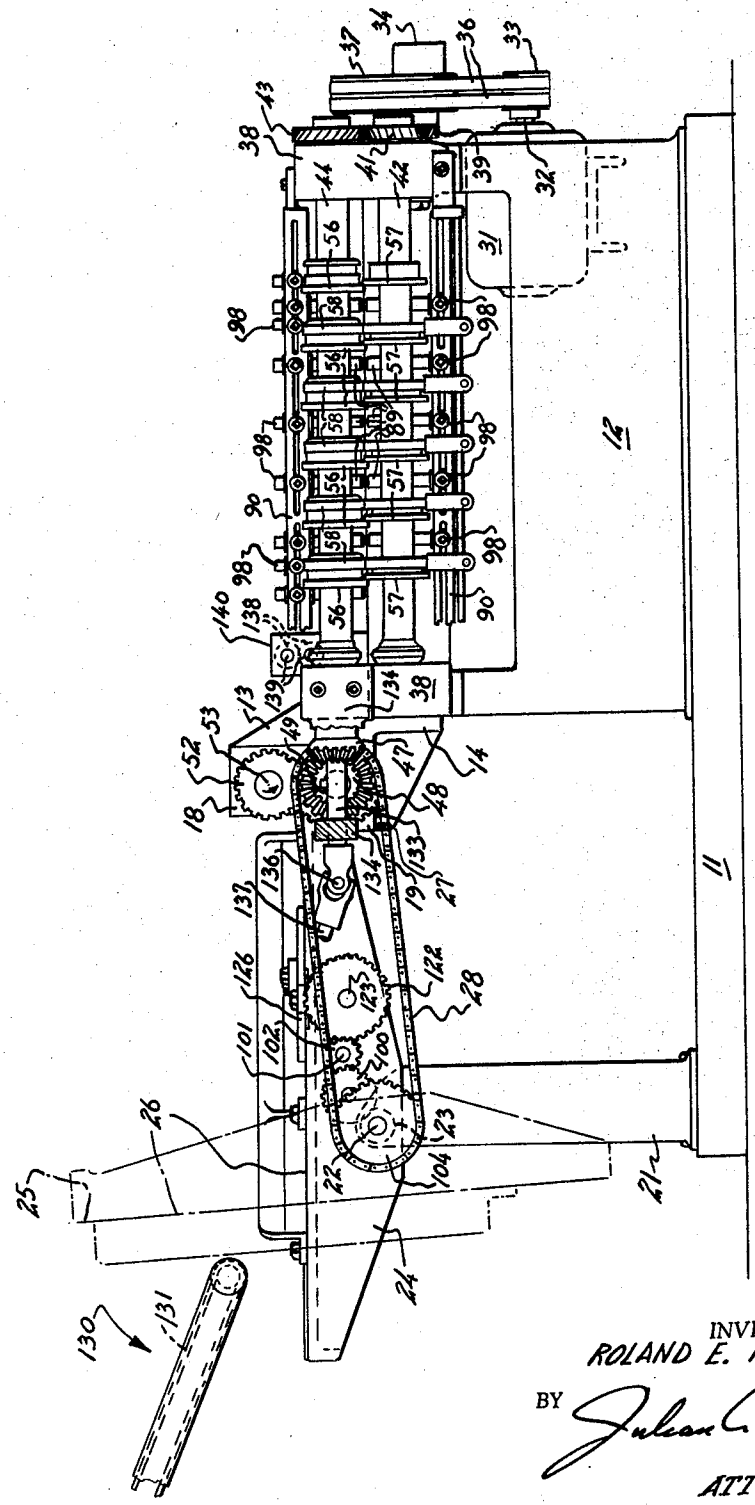


FIG. 2

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SLITTER-TRIMMER FOR SHEET MATERIAL INCLUDING PIVOTED FEED TABLE MEANS

Filed April 1, 1957 4 Sheets-Sheet 3

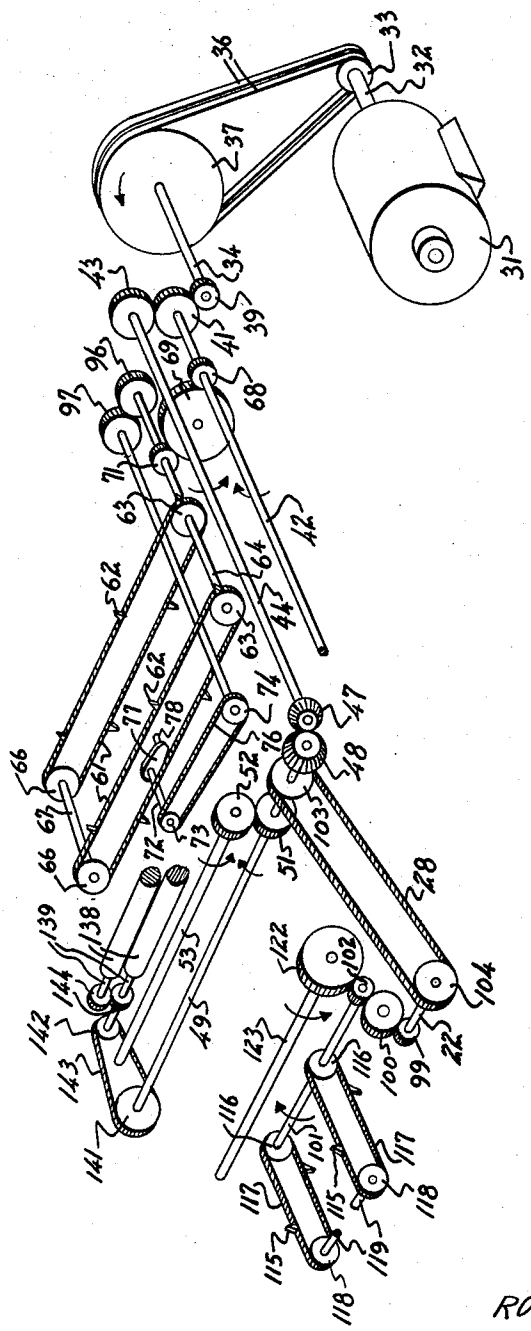


FIG. 3

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SLITTER-TRIMMER FOR SHEET MATERIAL INCLUDING PIVOTED FEED TABLE MEANS

Filed April 1, 1957 4 Sheets-Sheet 4

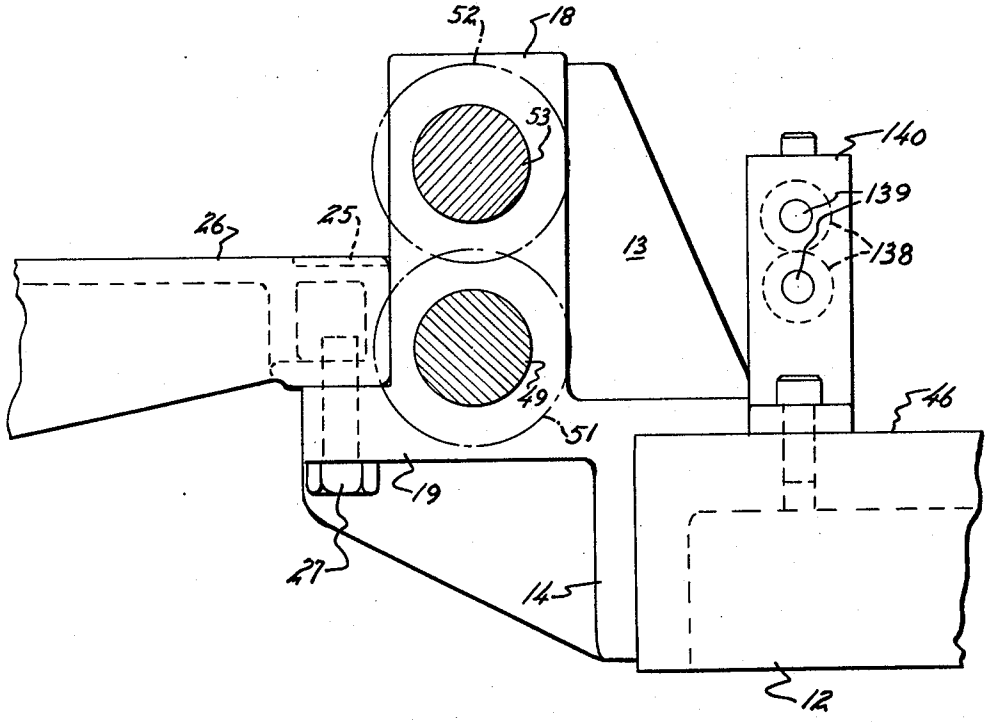


FIG. 4

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SLITTER-TRIMMER FOR SHEET MATERIAL INCLUDING PIVOTED FEED TABLE MEANS

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10 Claims. (Cl. 83—407)

This invention relates to a new and improved slitter-trimmer of the type wherein sheets of tinplate or the like are slit longitudinally and then transversely into body blanks of the precise size for manufacture into can bodies.

In conventional slitter-trimmers, a sheet of tinplate is fed into the machine from a feeding machine, the sheets being deposited on a horizontally disposed feed table which is denominated the "first operation" feed table. The sheets are moved by conveying means longitudinally of the first operation feed table and are then slit and trimmed by the first operation rollers rotatably mounted on the first operation feed table into long strips and discharged from the rollers onto the "second operation" feed table. Conveying means on the second operation table move transversely to the direction of movement on the first operation table. At the end of the second operation table are second operation rollers rotatably mounted on the second operation feed table which slit the strips into blanks of proper dimension.

Normal usage of the machine causes wear of the slitting rollers and hence it is necessary to grind or sharpen the rollers at intervals. Removal of the rollers for sharpening is unsatisfactory and hence it is necessary to grind the rollers in place. Access to the first operation rollers for grinding and adjustment purposes is difficult unless provision is made for moving the parts in some manner to provide space for a workman to get into position in proximity to the shafts of the first operation rollers. The present invention relates to a construction to accomplish that result.

The present invention is distinguishable from similar machines in that the first operation table is mounted for pivotal movement about a horixontal axis transverse to the direction of movement of the sheets on said first operation table, which axis is spaced approximately midway between the ends of the table. The first operation table may be pivoted to approximately vertical position by elevating the portion thereof proximate the first operation rollers and a clear space provided for a workman to enter the machine for sharpening and adjustment of the first operation rollers. It will be understood that the first operation rollers remain stationary when the first operation table is elevated.

One principal object and advantage of the present invention is the construction of the machine in such manner as to provide a wider space for access of the mechanic during the sharpening and adjustment operations.

Another advantage of the invention is that very little work is required to prepare the machine for pivotal movement of the first operation table. By locating the pivotal axis in the manner indicated and by proper weight distribution, the force required to lift the table is relatively insignificant. Retiming of the machine after sharpening is likewise eliminated, thus facilitating maintenance.

It is necessary that the slitter-trimmer be located in close proximity to a sheet feeder, which sheet feeder commonly is manufactured with feedout belts or feeder

mechanisms extending downwardly toward the first operation table. Pivotal movement of the first operation table in accordance with this invention does not cause interference with the feedout belts and further there is no limitation on the extent of space provided for the workman necessitated by the proximity of the feeder machine.

A further advantage of the present invention is the fact that it is possible by the construction of this invention to shorten the distance which the strips must travel by inertia after they leave the first operation feed rolls. In conventional practice the strips are moved transversely into position on the second operation table by the inertia of their movement longitudinally of the first operation table and through the first operation rolls and extended by mechanically driven feed-out rolls. Shortening the distance which the strips must travel insures proper positioning on the second operation feed table, as well as eliminating some of the feed-out mechanism.

Inherent in the operation of machines of this type is a considerable amount of vibration by reason of the use of feed cranks, chains and the like. The mounting of both the first operation cutter rollers and the second operation cutter rollers on a rigid table overcomes the undesirable effects of the vibration of the machine.

Another advantage of the invention is the fact that the gears which drive the first operation cutter shaft from the second operation cutter shaft are always engaged and need not be separated, thus insuring both proper meshing and less repair and maintenance. In other machines of this general type it is necessary to provide telescoping drive shafts to permit the shafts to operate while the machine is separated for sharpening, or to separate the beveled gears above referred to. The present invention eliminates the necessity of such construction.

Still another feature of the invention is the increase in safety for the mechanic by reason of the fact that it is not necessary to climb over moving chains, and that greater working space is provided. In addition, there is no danger of injury to the workman or to the machine in the event that tools are placed on the first operation table. As a matter of fact, the first operation table being in vertical position eliminates the temptation to place tools thereon.

Other objects of the present invention will become apparent upon reading the following specification and referring to the accompanying drawings in which similar characters of reference represent corresponding parts in each of the several views.

In the drawings:

Fig. 1 is a top plan of a slitter-trimmer machine constructed in accordance with this invention with some of the parts removed for the sake of simplicity of description;

Fig. 2 is a side elevation of the structure of Fig. 1 showing the first operation table in solid lines in working position and in dot and dash lines in lifted position;

Fig. 3 is a schematic perspective view of the drive of the machine; and

Fig. 4 is a fragmentary vertical sectional view taken substantially along line 4—4 of Fig. 1.

In the accompanying drawings and in the following description a number of the parts of the slitter-trimmer have been omitted in that a full illustration and description of the complicated mechanisms which are incorporated in such machines is unnecessary to an understanding of the present invention and is well understood by those skilled in the art to which the invention pertains.

A base **11** for the machine is provided on which is mounted a substantially rectangular main subframe **12** which supports most of the heavy parts of the machine. First operation roll mounting end plates **18** are rigidly fastened to one side of subframe **12** by brackets **13**,

14 so that plates 18 and frame 12 may be considered a unitary structure. A horizontally projecting ledge 19 along one side forms a rest for first operation table 26 when in operative position.

Spaced from subframe 12 is a pedestal 21 resting upon and mounted on base 11. Pedestal 21 receives horizontal stub pivot shafts 22 on opposite sides of the machine which are received in bearing 23 on the sides of first operation table 26. First operation table 26 is a heavy, substantially rectangular casting which is normally horizontally disposed and is supported by shafts 22 and by ledge 19 and is held in horizontal position by means of bolts 27 screwed through bridging plate 25 on its inner end into ledge 19. The important function of the mounting of the machine which has heretofore been described is to permit the first operation table 26 to be swung from the horizontal position illustrated in full lines in Fig. 2 to a substantially vertical position, as illustrated in dot and dash lines in Fig. 2, the stub shafts 22 acting as the pivots for such movement. The distribution of weight of the first operation table 26 on either side of pivots 22 permits lifting of the table with reduced effort. When table 26 is fully lifted, as shown in dot and dash lines in Fig. 2, weight distribution is such that the table remains in repose in tilted position.

When thus tilted there is ample room between pedestal 21 and subframe 12 to provide access for a workman to perform the grinding and adjusting operations on the first operation rollers.

Turning now to the drive of the machine, an electric motor 31 or other prime mover is mounted on main subframe 12, motor shaft 32 being provided with pulley 33 which drives shaft 34 by means of belt 36 and pulley 37. Shaft 34 is journalled in end bearing plates 38 and carries pinion 39 meshing with gear 41 on one end of lower roller shaft 42, which gear 41 in turn meshes with gear 43 on the end of upper roller shaft 44. Roller shafts 42 and 44 are journalled in second operation end bearing plates 38 extending longitudinally on opposite sides of second operation feed table 46. The end of shaft 44 opposite gear 43 carries a bevel gear 47 which meshes with mitre gear 48 on one end of lower first operation roller shaft 49. Shaft 49 likewise carries gear 51 which meshes with gear 52 on an end of upper first operation roller shaft 53. Shafts 49 and 53 extend transversely of subframe 12 and are journalled in end bearing plates 18.

An important feature of this invention is the rigid permanent mounting of the four principal shafts 42, 44, 49 and 53 along one end and one side of second operation feed table 46. As has been stated, one of the objects of the invention is to provide a construction making it unnecessary to remove shafts 49 and 53 from their permanent location.

The slitting mechanism mounted on shafts 42, 44, 49, 53 is adjustable in position, depending on the dimensions of the blanks to be cut from the sheets of tinplate fed into the machine. Essentially there is provided a plurality of upper cutter rollers 56 on upper shaft 44 or 53 and a corresponding plurality of lower cutter rollers 57 on the lower shaft, the cutter rollers 56 and 57 being offset from each other to accomplish a shearing action. In addition, each cutter roller 56, 57 has associated with it a feed roll 58, 59 which is in engagement with the roller on the mating shaft and functions to grip and feed the material as the shafts revolve and draw the material through cutter rollers 56—57, one feed roll 58 being preferably formed of rubber.

Mounted longitudinally of second operation feed table 46 is a pair of second operation feed chains 61 having spaced lugs 62. Chains 61 pass over drive sprockets 63 mounted on sprocket drive shaft 64 and also over idler sprockets 66 on idler shaft 67. Drive shaft 64 is driven from shaft 42 by means of pinion 68, idler 69 and gear 71. At the rear of the machine is a crank shaft 72

which is driven from shaft 94 by means of sprockets 73—74 and chain 76. Shaft 94 is driven from shaft 64 by gears 96 and 97. Crank shaft 72 carries a crank disk 77 bearing a crank pin 78 which is attached to one end of connecting rod 79, the opposite end of which is connected by means of pin 81 to crosshead 82 which reciprocates horizontally in ways 83 on the bottom of second operation feed table 46. Crosshead 82 carries a pair of horizontally reciprocating feed bars 84 slidably mounted in slideways 86 in feed table 46. Feed bars 84 carry pivoted spring-biased feed fingers 87 which push strips of tinplate carried by lugs 62 on chains 61 into feed rollers 58—59. Guide roller 88 and upper and lower guide fingers 89 guide the tinplate properly into feed rollers 58—59. Guide fingers 89 are mounted on transverse bars 90 by means of bolts 98. On either side of the table adjacent the discharge end thereof is a pair of aligning bars 91 which center the strips centrally of the table. Adjacent the discharge end of table 46 is sheet bar 92 which is caused to move in and out on each stroke of feed bars 84, as well understood in the art, bar 92 being mounted on bracket 93 transversely slidably mounted on table 46. Bracket 93 is caused to reciprocate by a cam (not shown) on shaft 94.

First operation feed table 26 carries a transversely extending chain drive shaft 101 journalled in sides 24 of feed table 26. Shaft 101 is driven from one of shafts 22 by pinion 99, idler 100 and gear 102. Shaft 22, in turn, is driven from shaft 49 by sprockets 103 and 104 and chain 28. When table 26 is lifted, it is not necessary to remove chain 28 and hence re-timing of the machine is not required. Chain drive shaft 101 carries a pair of drive sprockets 116 for first operation feed chains 117 having lugs 115. Idler sprockets 118 for chains 117 are located on adjustable shafts 119 on the intake end of first operation feed table 26. Chain shaft 101 gear 102 meshes with gear 122 on countershaft 123 which carries barrel cams (not shown) which cause sheet centering arms 126 mounted on brackets 127 to move outwardly and then inwardly as each sheet of tinplate enters the machine in order to center the sheet on first operation table 26.

Sheets are fed onto first operation table 26 by downwardly extending feed-out belts 131 which extend from a conventional sheet feeder 130, as well understood in this art. One of the features of the machine is the fact that the slitter-trimmer can be located in close proximity to the sheet feeder and yet when first operation table 26 is tilted, there is no interference with the sheet feeder nor is it necessary to alter the position of feed-out belts 131. Feeder 130 is driven by motor 31 and for this purpose a stub shaft 133 projects from the end of shaft 44 through bracket 134 and is connected to universal joint 136 and thence to shaft 137 which extends rearwardly upwardly to drive feeder 130 by mechanism not herein illustrated or described.

In normal operation of the machine, sheets are fed from the feeder one at a time on belts 131 and deposited on first operation feed table 26 in timed sequence to the operation of the rest of the machine. The rear edge of each sheet is engaged by lugs 115 on feed chains 117 and moved longitudinally of first operation feed table 26. As the sheets move, they are centered on the table by outward and then inward movement of sheet centering arms 126. The first operation feed chains 117 move the sheets until the forward edge is engaged by feed rolls 58—59 on shafts 49—53 and the sheets are then slit by first operation cutter rollers 56—57 into strips of exact width. The strips are deposited on second operation feed table 46 as they are discharged from first operation feed rollers, their travel being guided by guide fingers 132 mounted on transverse bars 132a. Feedout rolls 138 drive the strips onto table 46, one feature of this invention being that only one set of rolls 138 is required by reason of the mounting of shafts 49—53 in end plates

140 rigidly connected to second operation table 46. Shafts 139 of rollers 138 are driven from shaft 49 by sprockets 141—142 and connecting chain 143. Gears 144 drive one shaft 139 from the other.

One of the features of the present invention is the location of shafts 49–53 relative to second operation table 46 so that the distance which the strips must travel is reduced. After the strips have been deposited on second operation feed table 46 after completion of the first operation slitting, they are picked up one at a time by one of lugs 62 on second operation feed chains 61 and moved in a direction which is transverse to the direction of the original movement of sheets on first operation feed table 26. As the strips approach the discharge end of second operation table 46, they are fed one at a time into second operation slitter rolls 56—57 by the reciprocation of feed fingers 87 on feed bars 84 and slit and trimmed into blanks of the proper dimension.

When, with the passage of time, it is necessary to sharpen and adjust first operation cutter rollers 56—57, the mechanic removes bolts 27 which secure first operation table 26 in place resting on ledge 19 and thereupon first operation table 26 can be tilted to vertical position by the use of a jack or other lifting means. Thereupon the mechanic can enter in the space between pedestal 21 and subframe 12 and has ready access to first operation rollers 56—57 while shafts 49—53 continue to revolve.

Although the foregoing invention has been described in some detail by way of illustration and example for purposes of clarity of understanding, it is understood that certain changes and modifications may be practiced within the spirit of the invention and scope of the appended claims.

What is claimed is:

1. In a slitter-trimmer, a frame, a first operation slitter table on said frame, a second operation slitter table on said frame, means pivotally mounting said first operation table on said frame about a substantially horizontal axis remote from and parallel to said second operation table to alternately support said first operation table in an operative, substantially horizontal position, with a portion of said first operation table contiguous said second operation table and in a tilted position tilted substantially vertically to provide access between said first and second operation tables, first and second operation slitter mechanisms mounted on said second operation table, and first and second operation feed mechanisms mounted on said first and second operation tables, respectively, and drive means for driving said slitter mechanisms and said slitter feed mechanisms, said drive means including a single motor for both said slitter mechanisms and both said slitter feed mechanisms.

2. A slitter trimmer according to claim 1 wherein said first operation drive mechanism includes a pivot shaft concentric with the pivotal mounting of said first operation table and driving the other elements of said first operation feed mechanism, and which further comprises means for driving said pivot shaft continuously from said second operation table when said first operation table is in operative and in tilted position.

3. In a slitter-trimmer, a frame, a first operation slitter table on said frame, a second operation slitter table on said frame, means pivotally mounting said first operation table on said frame about a substantially horizontal axis remote from and parallel to said second operation table to alternately support said first operation table in an operative, substantially horizontal position, with a portion of said first operation table contiguous said second operation table and in a tilted position tilted substantially vertically to provide access between said first and second operation tables, first slitter shafts on said second operation table adjacent said first operation table, first slitter rollers on said first slitter shafts; second slitter shafts on said second operation table transverse to said first shafts, second slitter rollers on said second slitter shafts, first and second operation feed mechanisms on said first and second operation tables, respectively, second operation table drive means on said second table for driving said first and second slitter shafts and said second operation feed mechanisms, first operation table drive means on said first table for driving said first operation feed mechanism, and means for driving said first and second operation table drive means together.

4. In a slitter-trimmer, a frame, a first operation slitter table on said frame, a second operation slitter table on said frame, means pivotally mounting said first operation table on said frame about a substantially horizontal axis remote from and parallel to said second operation table to alternately support said first operation table in an operative, substantially horizontal position, with a portion of said first operation table contiguous said second operation table and in a tilted position tilted substantially vertically to provide access between said first and second operation tables, first slitter shafts on said second operation table adjacent said first operation table, first slitter rollers on said first slitter shafts, second slitter shafts on said second operation table transverse to said first shafts, second slitter rollers on said second slitter shafts, first and second operation feed mechanisms on said first and second operation tables, respectively, second operation table drive means on said second table for driving said first and second slitter shafts and said second operation feed mechanisms, first operation table drive means on said first table for driving said first operation feed mechanism, said first operation drive means including a pivot shaft coaxial with the pivotal mounting of said first table and arranged to drive the other elements of said first operation drive means, and means for driving said pivot shaft from said second operation table drive means.

5. In a slitter-trimmer, a frame, a first operation slitter table on said frame, a second operation slitter table on said frame, means pivotally mounting said first operation table on said frame about a substantially horizontal axis remote from and parallel to said second operation table to alternately support said first operation table in an operative, substantially horizontal position with a portion of said first operation table contiguous said second operation table and in a tilted position tilted substantially vertically to provide access between said first and second operation tables, first slitter shafts on said second operation table adjacent said first operation table, first slitter rollers on said first slitter shafts, second slitter shafts on said second operation table transverse to said first shafts, second slitter rollers on said second slitter shafts, first and second operation feed mechanisms on said first and second operation tables, respectively, means for driving said first slitter shafts together and said second slitter shafts together, a drive motor, means for driving one of said second slitter shafts from said motor, means for driving one of said first slitter shafts from one of said second slitter shafts, means for driving said second operation feed mechanism from said motor, and means for driving said first operation feed mechanism from said motor.

6. In a slitter-trimmer, a frame, a first operation slitter table on said frame, a second operation slitter table on said frame, means pivotally mounting said first operation table on said frame about a substantially horizontal axis remote from and parallel to said second operation table to alternately support said first operation table in an operative, substantially horizontal position, with a portion of said first operation table contiguous said second operation table and in a tilted position tilted substantially vertically to provide access between said first and second operation tables, first slitter shafts on said second operation table adjacent said first operation table, first slitter rollers on said first slitter shafts, second slitter shafts on said second operation table transverse to said

first shafts, second slitter rollers on said second slitter shafts, first and second operation feed mechanisms on said first and second operation tables, respectively, means for driving said first slitter shafts together and said second slitter shafts together, a drive motor, means for driving one of said second slitter shafts from said motor, means for driving one of said first slitter shafts from one of said second slitter shafts, means for driving said second operation feed mechanism from said motor, a pivot shaft on said first operation table coaxial with the pivotal mounting of said first table and arranged to drive said first operation feed mechanism, and means for driving said pivot shaft from said motor.

7. In a slitter-trimmer, a frame, a first operation slitter table on said frame, a second operation slitter table on said frame, means pivotally mounting said first operation table on said frame about a substantially horizontal axis remote from and parallel to said second operation table to alternately support said first operation table in an operative, substantially horizontal position, with a portion of said first operation table contiguous said second operation table and in a tilted position tilted substantially vertically to provide access between said first and second operation tables, first slitter shafts on said second operation table adjacent said first operation table, first slitter rollers on said first slitter shafts, a second slitter shaft on said second operation table transverse to said first shafts, second slitter rollers on said second slitter shafts, first and second operation feed mechanisms on said first and second operation tables, respectively, means for driving said first slitter shafts together and said second slitter shafts together, a drive motor, means for driving one of said second slitter shafts from said motor, means for driving one of said first slitter shafts from one of said second slitter shafts, means for driving said second operation feed mechanism from said motor, a pivot shaft on said first operation table coaxial with the pivotal mounting of said first table and arranged to drive said first operation feed mechanism, and means for driving said pivot shaft from one of said first slitter shafts.

8. In a slitter-trimmer, a frame, a first operation slitter table on said frame, a second operation slitter table on said frame, means pivotally mounting said first operation table on said frame about a substantially horizontal axis remote from and parallel to said second operation table to alternately support said first operation table in an operative, substantially horizontal position, with a portion of said first operation table contiguous said second operation table and in a tilted position tilted substantially vertically to provide access between said first and second operation tables, first slitter shafts on said second operation table adjacent said first operation table, first slitter rollers on said first slitter shafts, second slitter shafts on said second operation table transverse to said first shafts, second slitter rollers on said second slitter shafts, first and second operation feed mechanisms on said first and second operation tables, respectively, means for driving said first slitter shafts together and said second slitter shafts together, a drive motor, means for driving one of said second slitter shafts from said motor, means for driving one of said first slitter shafts from one of said second slitter shafts, means for driving said second operation feed mechanism from one of said second slitter shafts, and means for driving said first operation feed mechanism from one of said first slitter shafts.

9. A machine according to claim 8 in which said last-named means is operative when said first table is in operative and in tilted positions.

10. In a slitter trimmer, a frame, a first operation table on said frame, a second operation table on said frame, said first table being movable relative to said second table from an operative to a remote position to provide access to enable a workman to stand between said tables for maintenance and adjustment, a pair of first slitter shafts on said second table adjacent said first table, means for driving said first slitter shafts together, a pair of second slitter shafts on said second table transverse to said first slitter shafts, means for driving said second slitter shafts together, means for driving one of said first slitter shafts and one of said second slitter shafts together, a motor, means for driving one of said slitter shafts from said motor, first and second feed mechanisms on said first and second tables, respectively, means for driving said feed mechanism and said second slitter shafts together, and means for driving said first feed mechanism and said first slitter shafts together when said first table is in operative and in remote positions.

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