Aug. 18, 1959 G. E. LAMB 2,900,025

TAIL SLITTER

Filed June 25, 1956 3 Sheets-Sheet 1

Fig. 1

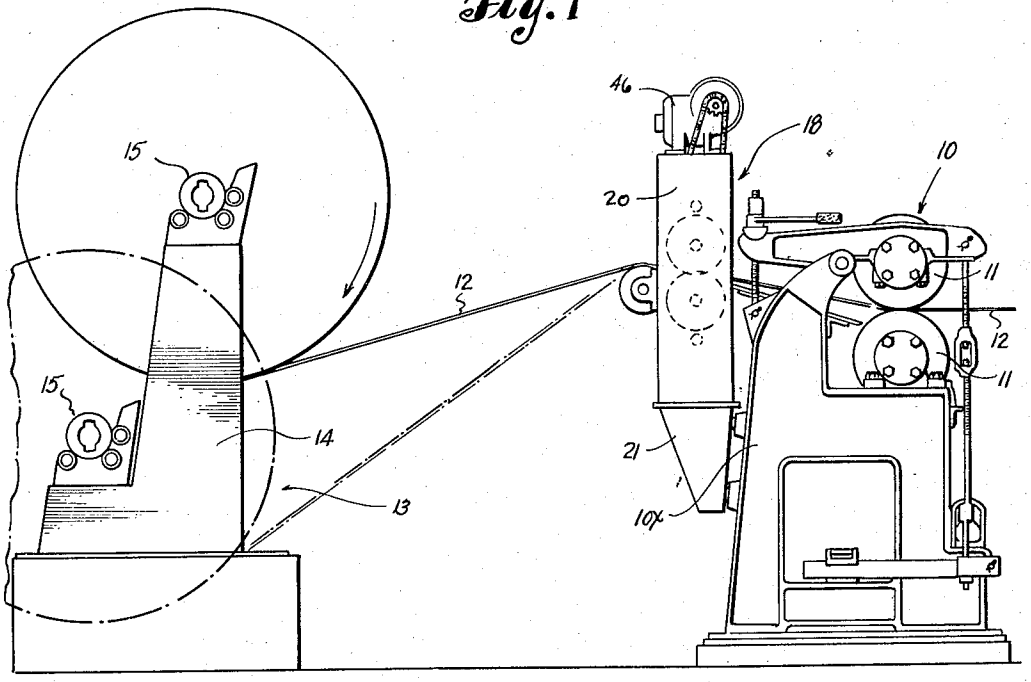
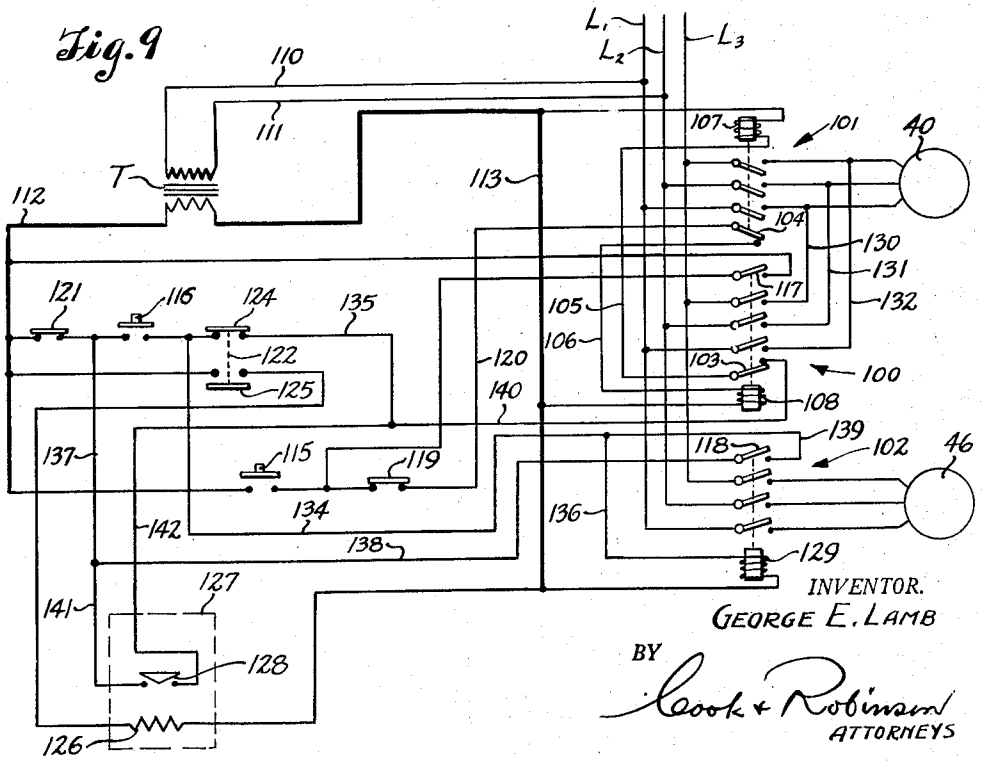


Fig. 9



INVENTOR.
GEORGE E. LAMB

BY Cook & Robinson
ATTORNEYS

Aug. 18, 1959 G. E. LAMB 2,900,025

TAIL SLITTER

Filed June 25, 1956 3 Sheets-Sheet 2

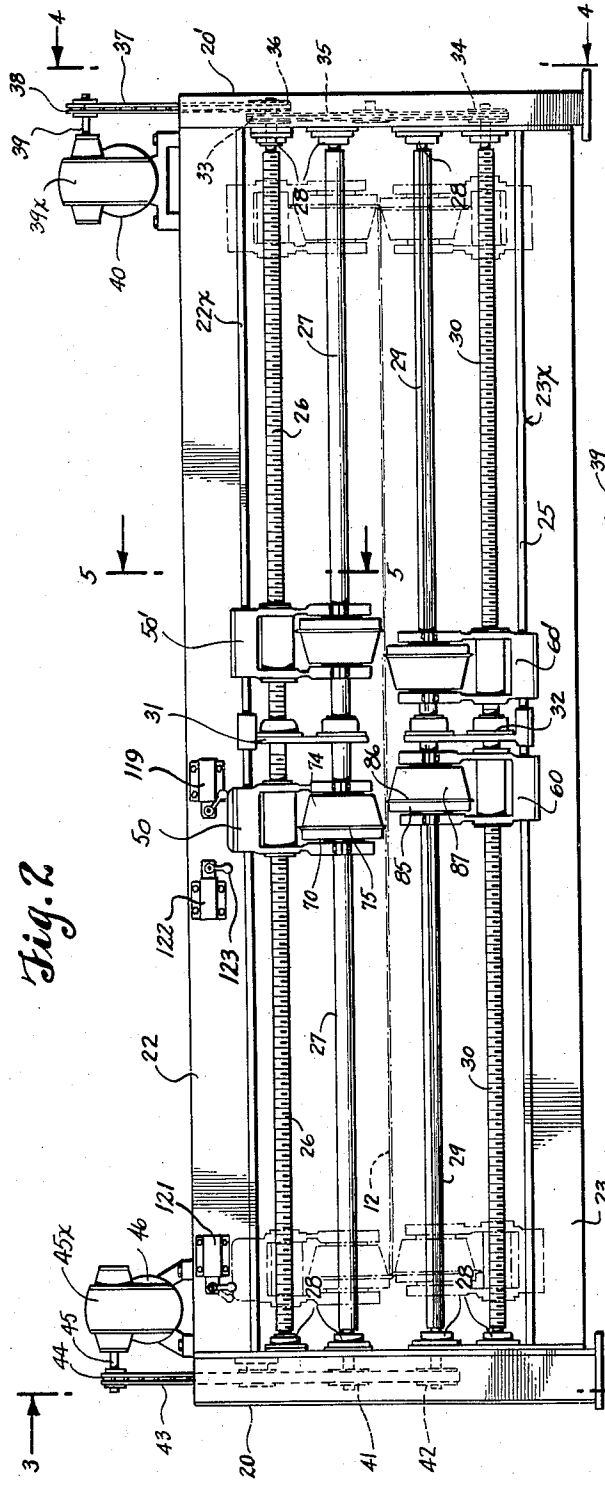


Fig. 2

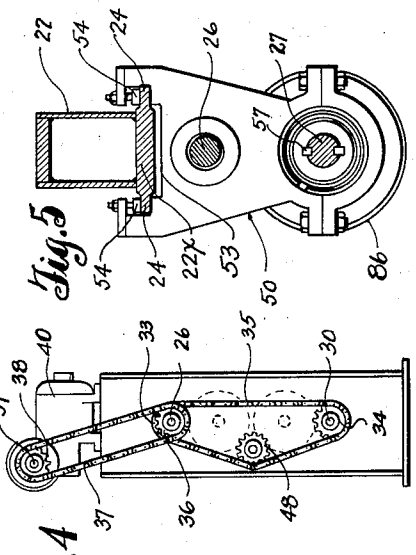


Fig. 5

Fig. 4

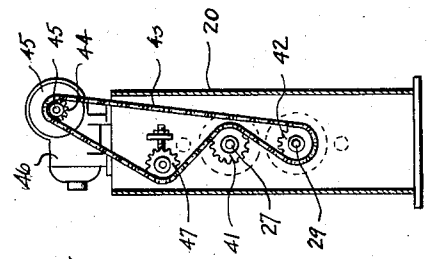


Fig. 3

INVENTOR.
GEORGE E. LAMB
BY
Cook & Robinson
ATTORNEYS

Aug. 18, 1959 G. E. LAMB 2,900,025

TAIL SLITTER

Filed June 25, 1956 3 Sheets-Sheet 3

Fig.6

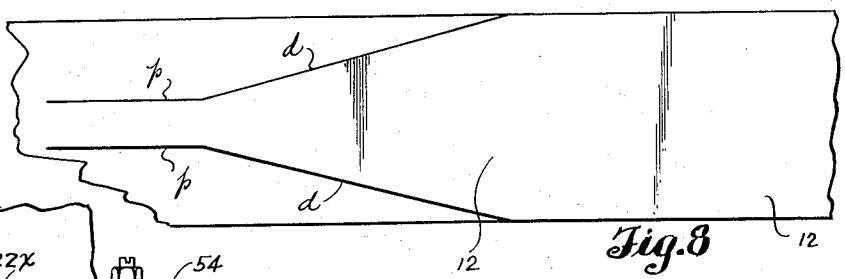
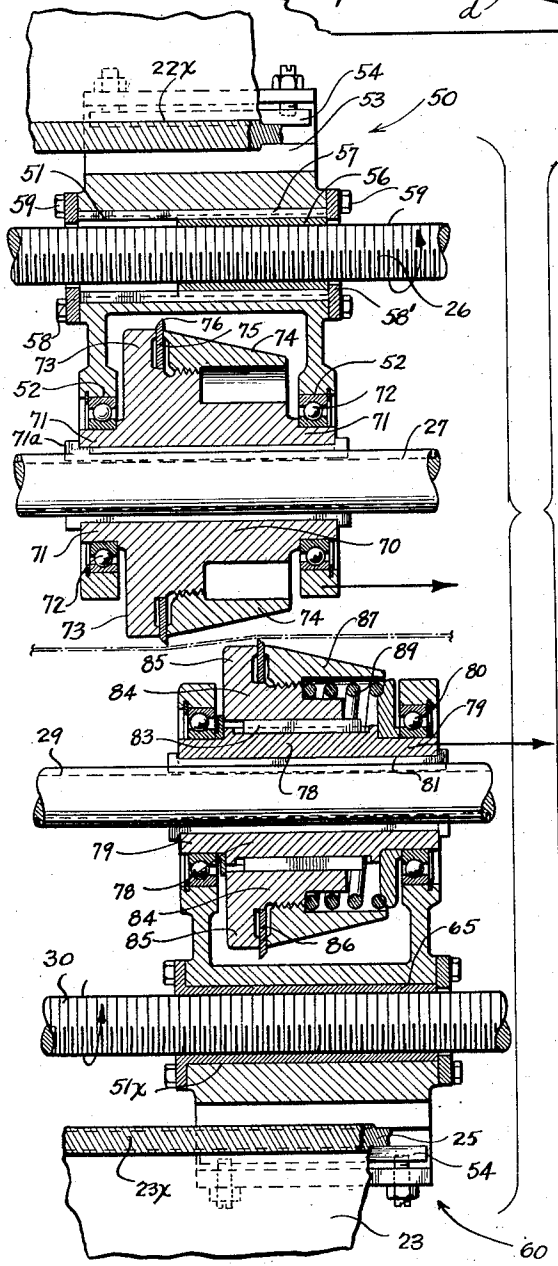


Fig.8



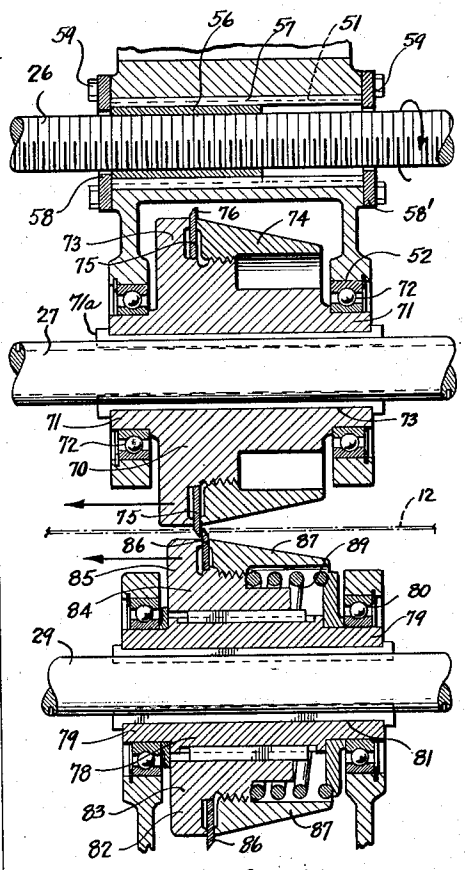


Fig.7

INVENTOR.
GEORGE E. LAMB
BY
Cook & Robinson
ATTORNEYS

United States Patent Office 2,900,025
Patented Aug. 18, 1959

2,900,025

TAIL SLITTER

George Emerson Lamb, Hoquiam, Wash., assignor to Lamb-Grays Harbor Co., Inc., Hoquiam, Wash.

Application June 25, 1956, Serial No. 593,507
6 Claims. (Cl. 164—65)

This invention relates to a machine associated with and known in the paper making industry as a "tail slitter"; the machine being designed for use in connection with the draw roll mechanism which draws the paper web from the drier and with the winder whereby the web, as drawn from the drier, is wound onto spools.

It is the principal object of this invention to provide a simple practical and automatically operable mechanism whereby the continuous paper web, which is of substantial width, as extended between the draw rolls that take it from the drier and a spool of the winder onto which it is being wound, can be slit in such manner as to leave only a narrow neck-like retaining connection that can be easily and quickly broken by the attendant when a change over of the web from a full spool to an empty one is to be made and which in the breaking provides a web end portion that can be easily and readily threaded onto the hub of the empty spool without necessitating the stopping of the winding mechanism.

More specifically stated, the novelty of the present invention resides in the provision of a mechine for making cooperating slits in the paper web while it is traveling, and to start the two tail forming slits in close relationship for the purpose above stated and whereby with the breaking of the neck-like temporary retaining connection provided by the slitting, the forward end of the web, which is to be applied to an empty spool for winding thereonto, will be forwardly tapered to a narrow threading portion.

It is a further object of the invention to provide a tail slitter that starts the operation by forming two co-extensive slits in the web, located relatively close together and at opposite sides of the center line of the web, which slits, after continuing substantially parallel for a short distance to provide the neck-like connection retaining portion, diverge at equal angles, to and through the opposite edges of the web; the neck portion temporarily serving as a tie whereby the web is continued to be taken by the winder from the draw rolls until the slitting has been finished and the neck portion broken.

It is also an object of the present invention to provide a machine wherein slitting is effected by the coaction of paired slitter disks, and which disks are so mounted that they can be moved apart and then shifted, while spaced, in a direction inwardly across the web without slitting it, and then caused to be moved together and thus caused to coact for the formation of a slit while moving in an outward direction across the web.

Still further objects of the invention resides in the details of construction of the various parts of the machine; in the functional relationship of parts, and in the mode of operation of the machine as will hereinafter be fully described.

In accomplishing these and other objects of the invention, I have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein:

Fig. 1 is a side view of the present tail slitter mechanism as functionally applied to a draw roll machine to receive the paper web therethrough for slitting as delivered to the spools of of the winder.

Fig. 2 is an enlarged elevation of the present tail slitter mechanism, as seen from its right hand side in Fig. 1.

Fig. 3 is a vertical section, taken on line 3—3 in Fig. 2.

Fig. 4 is a vertical section, taken on line 4—4 in Fig. 2.

Fig. 5 is an enlarged cross-section taken on line 5—5 in Fig. 2.

Fig. 6 is an enlarged sectional view of the left hand pairs of slitters of Fig. 2, in their non-slitting relationship as when moving inwardly from the outer edge of the web toward its center line preparatory to a tail slitting operation.

Fig. 7 is a similar view showing the paired slitters as moving away from a starting position and while forming a slit.

Fig. 8 is a flat view of the web as cut by the two pairs of slitters.

Fig. 9 is a wiring diagram for the electrical system that controls the machine operation.

In Fig. 1, **10** designated in its entirety, a machine which herein is referred to as the "draw roll machine," and which is equipped with two co-acting rollers **11—11**, driven in such manner as to cooperate to draw a paper web **12** from the drier rolls, not herein shown, for its delivery to a spool of a winder onto which the web is to be wound. In Fig. 1, the winder, which is designated in its entirety by numeral **13**, is shown to comprise a frame structure **14** in which spool shafts **15—15**, are rotatably supported at different levels, thus to permit the winding of the paper web first onto a spool at one level and then wound onto the spool at the other level while the paper roll first formed is being removed.

Referring now to the tail slitter mechanism which is the subject matter of the present invention: this is designated in its entirety in Fig. 1 by numeral **18**. As seen best in Fig. 2, it comprises opposite end frames, or housings **20—20'**, rigidly fixed at the same level upon supporting brackets **21** that are fixed to the opposite side frame members **10***x* of the machine **10**. The lateral spacing of these two housings is substantially greater than the width of the paper web **12** which passes between them, as noted by the dotted line showing of the web in Fig. 2. The two housings **20—20'** are joined across their upper and lower ends, respectively, by beams **22** and **23** which, in cross-section, preferably are of the hollow form shown in Fig. 5. The upper cross-beam **22** is closed along its bottom side by a flat plate **22***x* which projects, at its opposite longitudinal edges, beyond the sides of the beam, thus providing flanges, shown at **24** in Fig. 5, for a purpose presently explained. Likewise, the lower cross-beam **23** is closed along its top side by a plate **23***x* which provides projecting flanges **25** along opposite side edges of the beam, for a purpose presently explained.

Extending between the upper end portions of the two housings, **20** and **20'**, are horizontally disposed and paired cross-shafts **26** and **27**, each of which is revolubly mounted at its ends in pads **28** that are fixed to the inside walls of the housings. Likewise, extending between the lower portions of the two housings **20** and **20'**, are horizontally disposed and paired cross-shafts **29** and **30**, likewise revolubly supported at their ends in pads **28** that are fixed to the inside walls of the housings. These four shafts are all in the same vertical plane, coextensive, and parallel. At points midway of their ends, the upper and lower pairs of shafts are revolubly contained in supporting bearing brackets **31** and **32** that are fixed respectively to the cross-beams **22** and **23** as shown in Fig. 2.

The upper and lower shafts **26** and **30** at opposite sides of the bearing brackets **31** and **32** are threaded with right and left hand threads, respectively, extending to their outer ends. Also, both shafts extend at the right hand end of the machine as seen in Fig. 2, through their

mounting pads into the housing 20' and are there equipped, as seen in Fig. 4, with driving sprocket wheels 33 and 34, of like diameter, about which a sprocket chain belt 35 operates to cause the shafts to rotate in unison and in the same direction. Also, the shaft 26 is equipped at its extended end with a sprocket wheel 36 which is driven by a sprocket chain belt 37 operating thereover and over a small sprocket wheel 38 fixed on a driven shaft 39 of gear reduction mechanism 39*x* associated with a reversible electric motor 40 that is mounted upon cross-beam 22 at the right hand end of the frame structure as seen in Fig. 2.

The shafts 27 and 29, as observed in Fig. 2, are not threaded, and both extend at their left hand ends through their mounting pads 28 to the inside of the housing and are there equipped, respectively, with driving sprocket wheels 41 and 42 about which a sprocket chain belt 43 operates to drive the shafts in unison; belt 43 being extended also over a driving sprocket 44 fixed on the driven shaft 45 of a gear reduction mechanism 45*x* associated with an electric motor 46 mounted on the cross-beam 22 at the left hand end of the machine as shown in Fig. 2. The belt 43 operates about the sprockets 41 and 42 in the manner shown in Fig. 3, to drive the shafts 27 and 29 in opposite directions.

It is shown in Fig. 3 that the drive belt 43 is engaged by an adjustable belt tightener sprocket wheels 47 mounted on housing 20, and likewise, the belt 35 as seen in Fig. 4, is engaged by an adjustably mounted belt tightener sprocket 48, thus to keep the belts properly engaged with their sprocket wheels.

Mounted on the upper paired shafts 26 and 27, at opposite sides of the centrally located supporting brackets 31, are what are designated as cutter carrier housings 50 and 50'. Each of these housings is of inverted U-shaped form, with its upper end or base portion bored, as at 51 in Figs. 6 and 7, for passage of the threaded shaft 26 therethrough. Also, the opposite leg portions of the housings have horizontally aligned openings 52 formed therein for the mounting therein of bearings and the passing therethrough of the shaft 27 as presently explained.

The base, or top ends of each of the carrier housing 50—50' is recessed, as shown at 53, in Fig. 5, to receive the bottom plate 22*x* of beam 22 therethrough. Gibs 54 are attached to the carrier base as supports therefor that slidably rest upon the opposite edge flanges 24 of the plate, thus to support and guide the carrier housing in its travel along the beam 22 and shafts 26 and 27.

It is also shown in Figs. 6 and 7 that the bore 51 of each carrier housing 50—50' contains a cylindrical nut 56 that is threaded onto the shaft 26, but is held by keys, as at 57, against rotation in the carrier housing. However, these nuts 56 each has a predetermined and limited endwise travel in its containing bore; being limited in moving in opposite directions by its coming into abutment, at its ends, with stop plates 58—58' that are applied to the opposite ends of the carrier housings about the shaft 26, and over opposite ends of the bores 51 and secured by screw bolts 59.

The arrangement of the nuts 56 in the bores 51 of the two carrier housing 50—50', as applied to shaft 26, is such that when the shaft rotates in a direction to move the housings inwardly along the shaft, the nuts, which are keyed against turning therewith, will travel inwardly in the bores until they are stopped by engagement at their inner ends with the inner stop plates. Then as shaft 26 continues to rotate, the nuts operate to push the carrier housings inwardly along the beam 22 and shafts 26 and 27. When the direction of rotation of shaft 26 is reversed, the nuts 56 reverse in direction and move toward the outer ends of their containing bores, and finally come into abutment with the stop plates at outer ends of the bore 51. Each nut then operates to slide its carrier housing along the beam 22 and the shafts 26 and 27 in the outward direction.

It is noted also in Fig. 2 that carrier housings 60 and 60' of U-shaped form are applied to the lower paired shafts 29 and 30, and lower cross-beam 23 for travel therealong, to move toward or away from each other according to direction of rotation of the shaft 30. These carrier housing are like the carrier housings previously described and are adapted to travel in the same manner along the beam 23 as the upper housings travel along beam 22. However, their motivating connections with the shaft 30, are as seen in the lower portion of Fig. 6, which shows the bore 51*x* that is formed through the base of the carrier housing to be fitted with a cylindrical nut 65 that is fixed therein against any relative rotation and longitudinal movement. Thus, when shaft 30 changes in its direction of rotation, the direction of travel of the carrier housings change, but without any lost motion as is provided for in the upper set of carrier housings.

Revolubly mounted between the downwardly directed leg portions of the upper set of carrier housings, 50—50' as applied to shaft 26, are collars 70, each of which has trunnions 71 at its ends revolubly mounted in anti-friction bearings 72 carried in the aligned openings 52 of the carrier legs. These collars are keyed on shaft 27, as at 71*a*—71*a*, to be driven by the shaft and to provide for their longitudinal travel thereon under the influence of the carriers as moved by the turning of shaft 26.

Each collar 70 has a circumferential flange 73, and clamped against the inside face of this flange, by a clamp nut 74 threaded onto the collar is a cutter disk 75 with beveled shearing edge 76.

Likewise mounted between the upwardly directed and spaced legs of the carrier housings 60—60' as applied to the lower set of paired shafts 29 and 30, are hubs 78, with mounting end trunnions 79 carried in anti-friction bearings 80 fitted in openings in the legs. These hubs are keyed, as at 81, for driving by and for longitudinal shifting on the shafts 29. Keyed on each hub, as at 83, is a collar 84 with a circumferential flange 85 against which a shearing disk 86 is seated and secured by a clamp nut 87 threaded onto the collar and against the disk. The disks 86 of these lower carriers are so arranged as to coact with the disks 75 of the upper carrier under certain conditions, as has been illustrated in Fig. 7, for the slitting of the paper web 12 as presently explained.

It is to be observed in Fig. 6, that the collar 84 is urged by a coiled spring 89 toward the coacting disk 86. However, the spring will yield under pressure, to accommodate the shearing disk to the material that is being slit thereby.

With the slitter mechanism 18 applied in the manner shown in Fig. 1, and a web 12 of paper or pulp passed through it and being wound onto a spool 15, and with the paired upper and lower sets of slitter disks disposed at the outer ends of their paired carrier shafts, beyond the edge limits of the paper web, as indicated in dotted lines in Fig. 2, assume that it is desirable to slit the web to provide a tail that is adapted to be broken thus to detach the web from the roll and permit the roll to be lifted from the winder and the end of the tail as coming from the slitter, applied to the lower spool 15 for starting another roll: The operator first energizes motor 40 which operates through belts 37 and 35 to drive the screw shafts 26 and 30 at the same speed and in such direction as to cause the two sets of carrier housings to be moved inwardly toward the center line of the web. Although the rotation of shaft 26 starts at the same instant the shaft 30 is started, the carrier housings 50—50' mounted thereon do not immediately start to move inwardly, this being due to the fact that their moving nuts 56 have the lost motion, sliding relationship in the bores 51 that allows the lower carriers, which start inwardly with the turning of the shaft 30, to move in advance of

the upper set, as indicated by the lateral spacing in which they are shown in Fig. 6. In this spaced relationship the cutters can move inwardly across the top and bottom faces of the web **12** without tearing or in any way damaging it. When the lower slitter disks of the two lower carriers reach a predetermined spacing, the motor **40** is automatically stopped. This leaves the coacting pairs of slitters at each side of the center line in the laterally spaced relationship shown in Fig. 2.

While this inward travel of the slitters is taking place the web continues to be wound on the roll **15**.

When it is desired to start the slitting operation both motors **40** and **46** are energized, but this time the motor **40** is reversed in direction. With the turning of shaft **30**, the carrier housings **60—60'** begin moving apart, at the same speed. At the same instant these lower carrier housings start outwardly, the sliding nuts **56**, as then contained at the inner ends of the bores **51** of the upper carrier housings start moving outwardly, and when they engage against the stop plates **58** covering the outer ends of the bores, the upper carriers then start moving apart. However, the timing and arrangement of parts is so determined that the coacting upper and lower disks are brought into shearing contact immediately before this takes place so that the coiled springs **89** will maintain the desired cutting tension between the paired slitting disks.

As soon as the coacting disks have been pressed into shearing contact as in Fig. 7, the two sets of cutters start moving apart at the same speed, thus forming diverging slits that lead to and through opposite edges of the web.

The slitting of the web, as formed by the two sets of cutters, is as shown in Fig. 8 wherein *p* and *p* designate short parallel slits relatively close to the center line of the web, as formed by the upper and lower slitting disks while the disks are moving into shearing relationship but before the nuts **56** have come into end abutment with the stop plates to move the carrier housings outward along their shafts. The diverging slits are designated at *d* and *d*. With the slits thus made, the attendant then breaks the narrow neck portion, and carries it forwardly and applies it to the empty spool **15** which then starts winding in the web thereon. The filled spool may then be removed.

All operations are under control of the electrical system shown, in Fig. 9 which will now be explained.

The electrical circuitry is supplied with current through the main lines L1, L2 and L3. These main lines provide regular three-phase alternating current to the travel motor **40** and the slitting motor **46** through a plurality of solenoid operated motor contactors designated at **100**, **101** and **102**. The motor contactor **101** controls the forward running of the travel motor **40** to thus drive the slitter supports **50**, **50'**, **60** and **60'** inwardly towards the center of the frame structure **22**. The motor contactor **101** controls the reverse running of the travel motor **40** to thus drive the slitter supports outwardly from the center of the frame structure **22** and towards the edge of the paper **12**. It will be not that the motor contactors **100** and **101** are provided with normally closed interlocking and co-acting switches **103** and **104**, respectively which become open with the actuation of the particular contactor with which it is mechanically linked, thus to prevent the actuation of more than one of the contactors **100** or **101** at any time by preventing the flow of current through one of the lines **105** or **106**, to either of the associated solenoid coils, **107** or **108**.

The motor contactor **102** controls the running of the slitting motor **46** which is arranged to run in one direction only.

Branching off from two of the main lines L1 and L2 are paired lines **110** and **111** which supply current at original voltage to the primary side of a step-down transformer T. The secondary side of the transformer T is connected to a pair of feed lines **112** and **113** which distribute low voltage current to the various control switches embodied in this invention. These switches include two manually operated push button type starter switches **115** and **116**. The so-called "in" button **115** is used to initially energize the contactor **100** to thus start the travel motor **40** in a forward direction to move the slitter supports inwardly towards the center of the machine. The contactor **100** is self-holding through a holding switch **117** associated therewith. The so-called "our" button **116** is used to initially energize not merely the travel motor's reversing contactor **101** but also the contactor **102** which starts the slitter motor **46**. After an initial energization, both of these latter contactors, i.e. **101** and **102** are self-holding, as will be explained later, through a single holding switch **118**.

Certain automatic switches are also included in this invention, these include a limit switch **119** which automatically stops the travel motor **40** when the slitters have moved inwardly as far as they should go, see Fig. 2. Similarly a second limit switch **121** automatically stops the travel motor **40** when the slitters have moved outwardly as far as they should go. Furthermore, a double-acting so-called tail switch **122**, the operation of which will be explained in detail later, is inserted into the circuit to temporarily shut off the travel motor **40** so as to interrupt the outward travel of the slitters as soon as the slitters have moved outwardly far enough to come into slitting position and shearing contact with each other. It is during this interruption of travel of the slitters that they perform the operation of travel of the slitters that they perform the operation of cutting the straight portion, *p*, *p*, of the tail, as seen in Fig. 8. As will be explained in detail hereinafter, a time relay switch **127** is connected to the tail switch **122** in such manner as to restart the travel motor **40** after a short time interval and thus permit the slitters to make the diagonal cuts *d* and *d* of Fig. 8 as they proceed to move outwardly towards the edge of the sheet.

The detailed operation of the present invention is as follows:

When the operator desires to prepare the machine for the cutting of a tail in the paper he momentarily presses and closes the push button switch **115** which is the so-called "in" button. This results in current flowing from the feed line **112** through the normally closed limit switch **119**, through lines **120** and **106** to energize the solenoid coil **108** of the motor contactor **100**. When the motor contactor **100** is thus actuated, it not only closes the holding switch **117** to by-pass the "in" button **115** for continued energization of coil **108**, but also causes the high voltage current to flow through the lines **130**, **131** and **132** to the travel motor **40** to start the latter so that it begins moving the slitter supports **50**, **50'** and **60** and **60'** inwardly towards the center of the paper sheet **12**. However, because of the slip keys **56** embodied in the upper slitter supports **50** and **50'**, these particular slitters will lag behind the lower slitter supports **60** and **60'** so as to cause a lateral displacement between the cutting knives **75** and **86** while they are moving inwardly towards the center of the paper sheet. This prevents any shearing or cutting action upon the paper. Also, at this same time, the slitter knives **75** and **86** are not rotating since the slitter motor **46** is inactive.

As soon as the slitter supports have reached their inward limit of travel, as illustrated by the solid lines in Fig. 2, the limit switch **119** will be automatically opened by the lateral movement of the slitter support **50**, to thus break the current to lines **120** and **106** and cause the de-actuation of contactor **100** and the consequent stopping of travel motor **40**. It might be pointed out here that the inward movement of the slitter support **50** has no effect upon the switch **122** in Fig. 2 as it passes the latter.

In order to start the machine cutting a tail, the operator momentarily presses the push button or so-called

"out" button 116. This feeds current from line 112 through the button 116 and into two other lines 134 and 135 which ultimately feed current through the lines 136 and 105 respectively, to energize the solenoid coils 129 and 107. The energizing of solenoid coils 129 and 107 will cause the actuation of the motor contactors 102 and 101 respectively, to thus start the slitter motor 46 and the travel motor 40.

The actuation of contactor 102 causes the closing of a holding switch 118 to enable the by-passing of the push button 116 and thus feed current to the solenoid coil 129 via the lines 137, 138, 139 and 136 to permit the continued running of slitter motor 46 even after the release and opening of button 116. Similarly, an alternate path for current is provided to solenoid coil 107 via the lines 137, 138, 139, 135, 140 and 105 to permit the continued running of travel motor 40 after the release of button 116.

With the start of the travel motor 40, the slitter supports 50, 50' and 60 and 60' start moving apart towards the edge of the paper. Again, because of the slip-keys 56, the upper slitters 50 and 50' will lag enough the allow the lower slitters 60 and 60' to catch up and come into shearing contact with them and thus actually start shearing the paper therebetween. At approximately this same instant the upper slitter support 50, on its return travel, will strike the lever arm 123 of Fig. 2 of the "tail" switch 122 and cause the opening of contacts 124, Fig. 9. This, of course, breaks the current to the solenoid coil 107 so that the travel motor 40 will stop as a result thereof. It is at this time that the straight portion *p*, Fig. 8 of the tail is being cut since there is no lateral movement of the slitter knives, although they continue to rotate and shear the paper as it is being pulled through the machine.

However, the halt in the lateral or outward travel of the slitter knives is only temporary. The aforementioned actuation of the tail switch 122 has in the meantime caused the closing of the contacts 125 of the said tail switch and this provided a flow of current to a heating element 126 in the time relay switch 127. The heating of the element 126 will cause, after a short time, the closing of contacts 128. As soon as the contacts 128 become closed, current is supplied via lines 137, 141, 142, 140 and 105 to the solenoid coil 107 thus causing the restart of travel motor 40. Thus, the slitters start moving outwardly once again. As soon as the slitter support 50 passes the switch arm 123 and releases it, the switch 122 again assumes its normal position with contacts 124 closed. The time relay 127 is thus again de-actuated and solenoid coil 107 is once again receiving current from the same lines as before, i.e., 137, 138, 139, 134 135, 140 and 105. It is during this particular period of time the diagonal cuts *d*, Fig. 8, are being made since both the travel motor 40 and the slitter motor 46 are in operation. This cutting continues until the slitters have moved all the way outwardly and until the limit switch 121 is actuated and opened by the outward travel of the slitter support 50. Thereupon, the tail slitting portion of the machine comes to rest and the cycle is completed.

What I claim as new is:

1. The combination with means for supporting and advancing a paper web or the like, of a tail slitting mechanism comprising a pair of parallel and revolubly driven shafts extended across the web at opposite sides thereof, paired disk-cutters slidably keyed on said shafts and movable therealong between outer positions, beyond the opposide side edges of the web, and inner positions closely adjacent the longitudinal center line of the web, threaded shafts located at opposite sides of the web, parallel to and coextensive with the first mentioned shafts, carrier housings mounted on said threaded shafts corresponding to the disk-cutters, means for rotating said threaded shafts in unison in one direction to cause the two carrier housings on each to move inwardly therealong in unison from beyond opposite side edges of the web to their inner limits of travel, and for rotating said shafts in the opposite direction to cause the carrier housings to move outwardly therealong in unison; each of the carrier housings, as associated with one of said threaded shafts, having a sleeve-like actuating element threaded on the shaft, and keyed for limited endwise sliding in said housing, thus providing a lost motion connection between housing and shaft whereby travel of the corresponding disk-cutter under influence of that housing is delayed at the start of the turning of said threaded shafts for an inward moving operation, thus to provide for the relative adjustment of the complemental disks to non-functional relationship, and at the start of the subsequent reverse turning of said shafts to cause said disk-cutters to be brought back to their coacting relationship for slitting the web.

2. The combination recited in claim 1 wherein said threaded shafts are driven in unison for moving the carrier housings therealong by a reversible electric motor, a circuit for the motor and limit switches in said circuit disposed in positions for actuation by one of said carrier housings as it reaches its opposite limits of travel.

3. The combination recited in claim 1 wherein the disk-cutter driving shafts are driven by an electric motor, and said threaded shafts are driven in unison by a reversible electric motor, an electric circuit for each motor, limit switches in the circuit for the reversible motor, disposed in positions for actuation by one of the carrier housings as it reaches its opposite limits of travel, and a double acting switch between and operated by said one of the carrier housings to stop the reversible motor temporarily, as the cutters come into their shearing relationship at the beginning of their outward travel.

4. A paper slitting machine of the character described including means for supporting and advancing a paper web or the like through the machine, the paper slitting mechanism comprising a pair of parallel and revolubly driven shafts that extend across the web and between which the web passes, paired disk cutters mounted on and freely movable along said shafts, rotatable threaded shafts located at opposite sides of the web parallel to and coextensive with said driven shafts, cutter moving means on said threaded shafts engageable with each disk cutter and functionally engageable therewith, means for rotating said threaded shafts in unison whereby the cutter moving means are caused to move inwardly or outwardly along the threaded shafts and means operable incident to engagement by one of the cutter moving means for controlling the rotation of the thread shafts and means to cause the paired disk cutters to move out of coacting relationship when the cutters are moved inwardly toward the center of the shafts and to move the paired disk cutters into coacting relationship when the cutters move outwardly on the shafts.

5. A paper slitting machine as in claim 4 including rotatable, threaded shafts located at opposite sides of the web and parallel to said driven shafts, said cutter moving means being mounted on said threaded shafts and means for rotating said thread shafts.

6. A paper slitting machine as in claim 5 wherein means is provided for reversing the rotation of the threaded shafts and thereby causing the carrier housings to move inwardly or outwardly incident to the direction of rotation.

References Cited in the file of this patent

UNITED STATES PATENTS

204,145	Ford	May 28, 1878
801,036	McCorkindale	Oct. 3, 1905
2,629,441	Eager	Feb. 24, 1953
2,672,198	Jones et al.	Mar. 16, 1954
2,698,662	Moody	Jan. 4, 1955
2,713,903	Smith	July 26, 1955

FOREIGN PATENTS

483,107	Germany	Oct. 4, 1929