

Oct. 16, 1951

E. W. CLEM

2,571,201

SLITTING MECHANISM

Filed Oct. 3, 1947

3 Sheets-Sheet 1

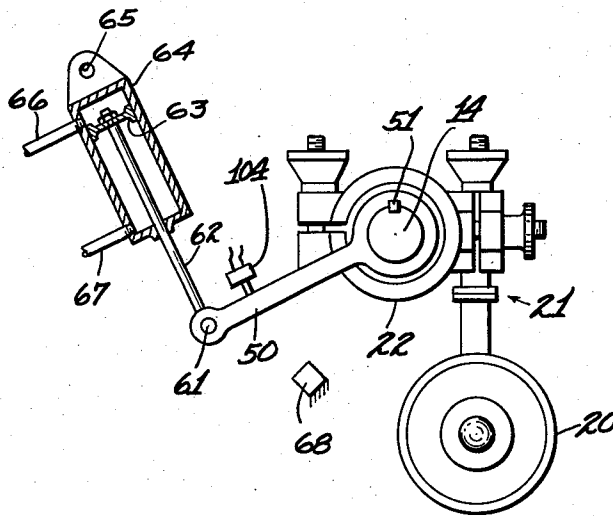


Fig. 2.

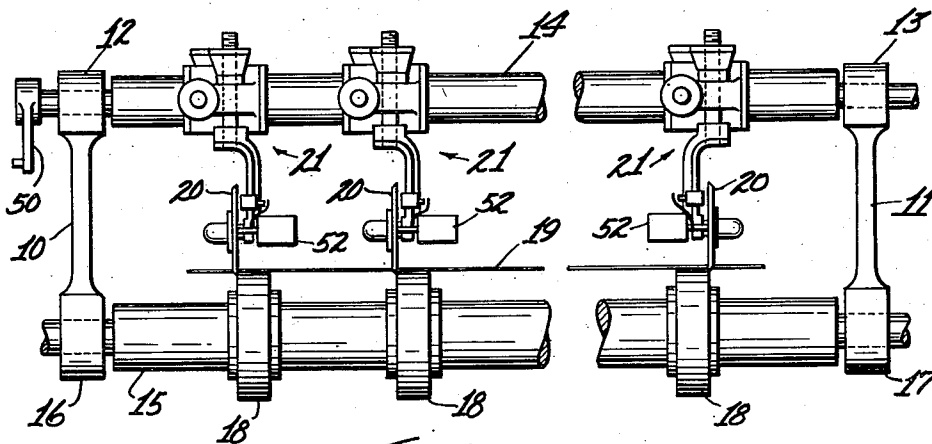


Fig. 1.

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3 Sheets-Sheet 2

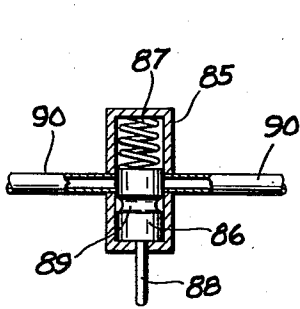


Fig. 5.

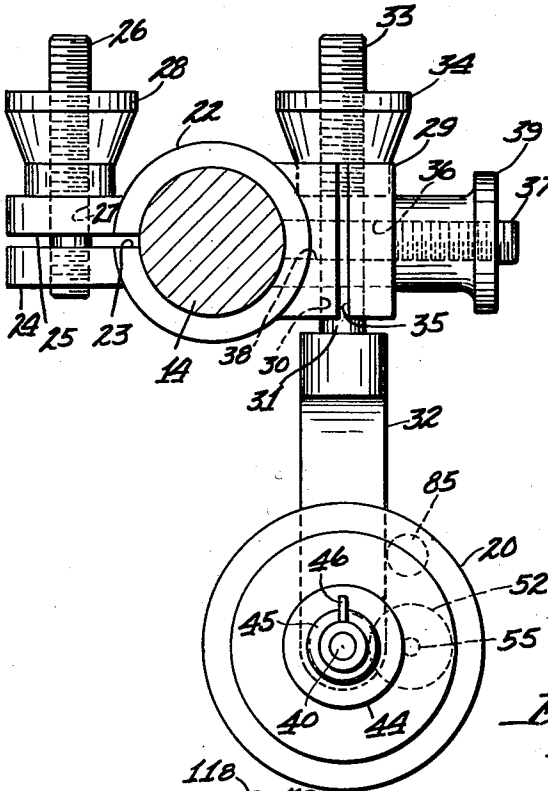
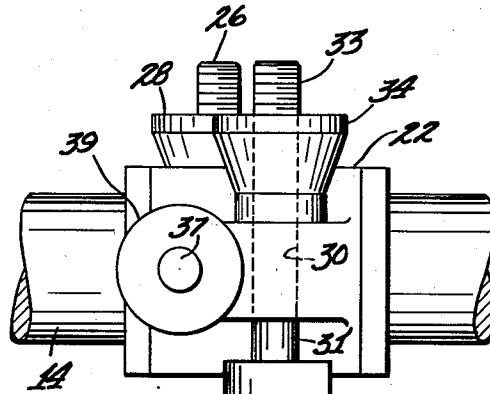


Fig. 4.

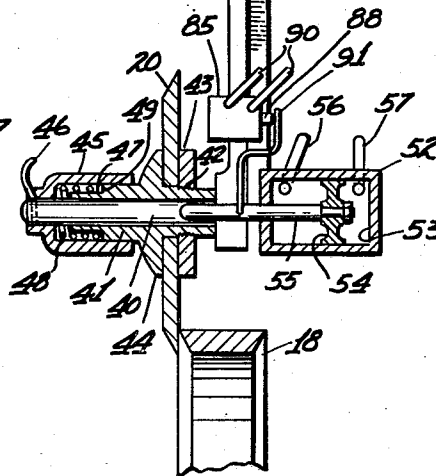


Fig. 3.

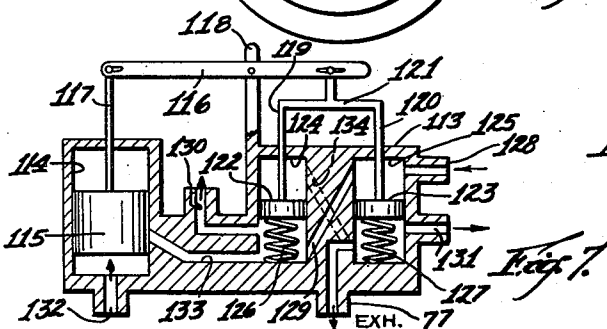


Fig. 7.

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3 Sheets-Sheet 3

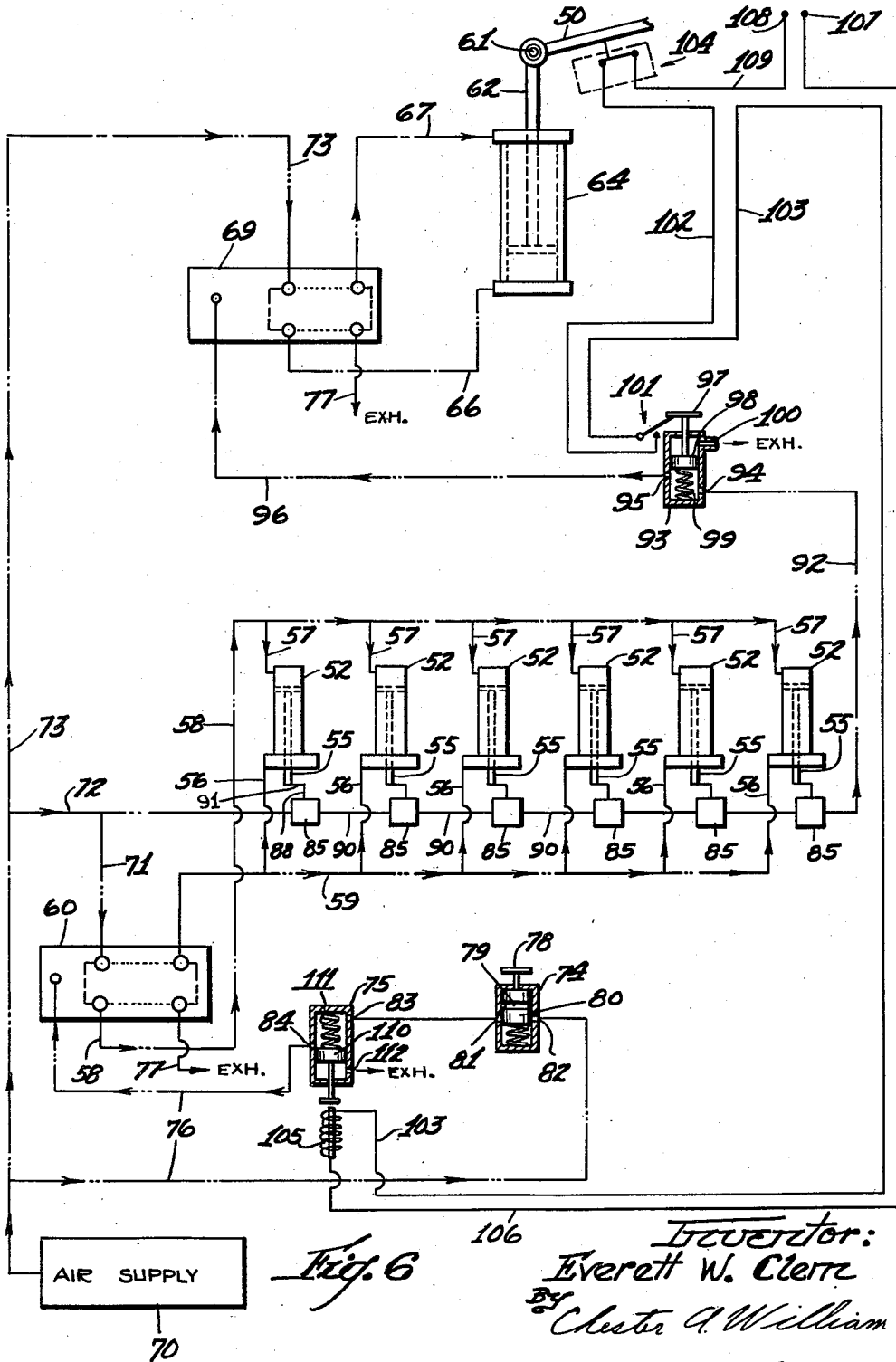


Fig. 6

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UNITED STATES PATENT OFFICE

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SLITTING MECHANISM

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7 Claims. (Cl. 164-60)

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The present invention relates to slitting mechanisms, and, more particularly, to that type of slitting mechanism which is employed in the slitting of endless paper webs.

It is common practice in the paper-making art to provide a paper winding machine with slitting devices, the purpose of which is to trim the marginal edge portions of a paper web as the latter is wound into a roll. Such slitting devices are also employed on a paper winding machine for slitting the web into a plurality of ribbons which are all wound up, either on a single cylinder or core or on a plurality of axially aligned cylinders or cores.

Whenever a paper winding machine is so provided with a plurality of slitting devices, it becomes necessary to remove the devices from the path of the paper web preparatory to threading the web initially through the machine, thereby to permit the web to be positioned and tensioned properly. Thereafter, the slitting devices may be shifted to their operable positions, and the winding operation may be initiated. From the above, it will be readily understood that the amount of time required by an operator to thread a paper web initially through a winding machine depends, in a large measure, upon the efficiency of the means provided for maneuvering the slitting devices back and forth between their operable and inoperable positions. Therefore, it is a primary object of the present invention to provide a slitting mechanism which may be readily and efficiently shifted back and forth between its operative and inoperative positions by an operator who may be located at a point remote from the various slitting elements.

A further object of the present invention is to provide a slitting mechanism with means whereby the same may be actuated by an operator with a minimum expenditure of time and effort.

Another object of the present invention is to provide a slitting mechanism of the above described type which may be readily applied to existing types of winding machines with a minimum of alteration and expense.

With the above and other objects in view, as will hereinafter appear, the invention comprises the devices, combinations, and arrangements of parts hereinafter set forth and illustrated in the accompanying drawings of a preferred embodiment of the invention from which the several features and objects thereof will be understood by those skilled in the art.

Fig. 1 represents a fragmentary front view of a slitting mechanism having the present invention incorporated therein.

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Fig. 2 represents a fragmentary left-hand side view of certain of the devices of Fig. 1, shown in association with a sectional representation of shifting mechanism therefor.

Fig. 3 represents, on an enlarged scale, a front view, partly in section, of one of the slitting devices disclosed in Fig. 1.

Fig. 4 represents a left-hand side view of the device disclosed in Fig. 3.

Fig. 5 represents, on an enlarged scale, a sectional view of an air valve used in conjunction with each slitting unit as disclosed in Fig. 3.

Fig. 6 is a diagrammatic view illustrating the means whereby the slitting devices are actuated.

Fig. 7 represents, on an enlarged scale, a sectional view of a master air valve of the type used in conjunction with the present invention.

Referring particularly to Figs. 1 and 2, the present invention is incorporated with any conventional winding machine having side frame members, not shown, which are provided with a pair of oppositely spaced bracket members 10 and 11. Rockably mounted in bearing bosses 12 and 13, of said bracket members 10 and 11, respectively, is a shaft or support member 14. Disposed below the support member 14 is a rotatable shaft 15, the opposite end portions of which are journaled in bearing bosses 16 and 17, of bracket members 10 and 11 respectively. Provided on the lower shaft 15, and spaced longitudinally thereof, are a plurality of lower slitting elements 18, 18, over which a paper web 19 is adapted to be threaded.

Cooperating with the lower slitting elements 18, 18 are a plurality of upper slitting disks 20, 20, each of which is adapted to be rotatably mounted upon a head mechanism generally designated by the numeral 21. Means, not herein illustrated, are usually provided for rotating the shaft 15 for the purpose of rotating each of the lower slitting elements 18, 18 and, as the paper web 19 passes over each of the elements 18, 18 and beneath each of the disks 20, 20, the web is thereby slit into a plurality of widths; it being understood that each of the upper disks 20, 20 is mounted so as to be freely rotatable. Referring particularly to Fig. 1, it should be understood that each of the extreme outer slitting disks 20, 20 functions to sever a marginal edge portion of the paper, while the intermediate disks function to sever the paper into ribbons of various widths, depending upon the spacing between the slitting heads 21, 21. Means, hereinafter described, are provided on the slitting heads for adjusting the same back and forth longitudinally of the support member 14, to the end that

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ribbons of various widths may be produced from the paper web.

Referring particularly to Figs. 3 and 4, each of the slitting heads 21, 21 comprises a split collar 22 which is adapted to encircle the shaft or support 14. Each of these collars 22, 22 is provided with a longitudinal slit 23 therein which provides a pair of bosses 24 and 25. A screw 26 has its lower end portion force-fitted into the lower boss 24, while its upper portion is freely received within an aperture 27 provided in the upper boss 25. The extreme upper end portion of the screw 26 is appropriately threaded so as to receive a hand nut 28, the function of which is to clamp the collar member 22 tightly about the support member 14. From the above, it will be readily understood that each of the head mechanisms 21, 21 may be adjusted longitudinally of the support member 14.

Also projecting out from each of the collars 22, 22 is a boss 29 which is provided with a vertically disposed aperture 30, which is adapted slidably to receive therein an upper cylindrical portion 31 of a disk-carrying arm 32. The upper portion of the cylinder 31 is threaded, as at 33, for the purpose of receiving thereon a hand nut 34 which may be adjusted along the cylinder for the purpose of raising or lowering the arm 32 relative to the collar 22. As may be best seen from Fig. 4, the boss 29 is provided with a vertically disposed slot 35 and a horizontally disposed aperture 36. A screw 37 has its one end force-fitted into an aperture 38 which is provided within the boss 29 and aligned with the aperture 36. A hand nut 39 is adapted to be received over the threaded end portion of the screw 37, for the purpose of providing a means whereby the member 31 may be rigidly clamped or locked in any desired position within the boss 29.

The lower portion of each of the vertically disposed arms 32, 32 is provided with a horizontally disposed stud 40, upon which is rotatably mounted a sleeve 41. The right-hand end portion of the sleeve 41 is threaded, as at 42, for the purpose of receiving thereon a clamp nut 43, the function of which is to lock the upper slitting disk 20 directly against a shoulder member 44 which is formed integrally with the sleeve 41. As above described, the sleeve 41 is freely mounted upon the stud 40 and, therefore, may rotate about and be shifted axially of the stud. In order to limit this axial movement, there is provided on the end of the stud 40 a cup-shaped cap 45 which is carried directly upon the stud 40 by means of a radially disposed key or pin 46, one end of which is force-fitted within the left-hand end portion of the stud 40.

The sleeve 41 is formed with a reduced portion 47 over which is placed a coil spring 48, one end portion of which engages the cap 45, and the other of which engages a shoulder 49 provided on the sleeve 41. Thus, the coil spring 48 functions to bias the sleeve 41 and, consequently, the upper slitting disk 20 toward the right, in the direction of the associated slitting element 18. Fig. 3 illustrates a fragmentary and sectional view of a lower slitting disk 18, and from the above, it is to be understood that the spring 48 functions forcibly to engage the upper slitting disk 20 with the rotatable disk 18 for the purpose of providing an efficient severing means for the paper web 19.

As hereinabove noted, it is the purpose of the present invention to provide a means whereby each of the slitting heads 21, 21 may be with-

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drawn from the path of the paper web 19. To accomplish this objective, the present invention contemplates the use of means which will be effective to rock the support member 14 about its longitudinal axis and in a counterclockwise direction, as viewed in Fig. 2. Such rotation of the support member 14 will be effective to swing each of the head mechanisms 21, 21 upwardly and away from the cooperating lower slitting elements 18, 18, to the end that a paper web may be freely introduced between the upper disks 20, 20 and the lower elements 18, 18. For so actuating the support member 14, the present invention contemplates the use of a crank 50 which is suitably secured to one end portion of the member 14 as by means of a key 51. Thus, whenever the crank 50 is shifted downwardly, as viewed in Fig. 2, it will be understood that the member 14 will rock in a counterclockwise direction, to the end that the various slitting heads 21, 21 will be rotated upwardly and away from the lower elements 18, 18.

Since each of the upper disks 20, 20 is spring-biased at all times towards its associated element 18, it will be readily understood that, whenever the crank 50 is moved upwardly for the purpose of shifting each of the slitting disks 20, 20 into its operative position, each of the disks 20 will forcibly engage the marginal portion of its associated slitting element 18, and, thus, it will be impossible to position the various slitting heads in their proper locations. Therefore, means have to be provided whereby each of the upper disks 20, 20 are shifted endwise relative to the elements 18, 18, before the slitting heads can be moved from their inoperative positions to their operative positions. Furthermore, it is also desirable to so shift the upper disks 20, 20 sidewise relative to the lower elements preparatory to shifting the head mechanisms from their operative to their inoperative positions. More specifically, the present invention contemplates the provision of means which will initially shift the various disks 20, 20 sidewise relative to the lower elements 18, 18 and retain the disks in their inoperative positions, while the head mechanisms 21, 21 move outwardly to their inoperative positions. In other words, in the present invention, the disks 20, 20 will not be shifted back to their operative position until after the various head mechanisms have been returned to their lower or operative positions.

The present invention contemplates the use of pneumatic means for shifting each of the disks 20, 20 sidewise relative to its associated member 18. More specifically, there is provided on each of the arms 32, 32 an air cylinder 52. Each of these cylinders is provided with the usual hollow cylindrical portion 53 in which is slidably mounted a piston 54 having a suitable piston rod 55 connected therewith. One end of the piston rod 55 projects out of the cylinder so as to engage a rear face portion of the disk 20 whenever the piston is shifted in a left-hand direction within the cylinder 52. From this, it is to be understood that an outward movement of the piston 54 will be effective to shift the disk 20 against its biasing spring 48, to the end that the disk will be shifted from engagement with the slitting element 18. Also, upon a reverse movement of the piston 54 within the cylinder 52, the piston rod 55 will shift toward the right, thereby to allow the spring 48 to shift the disk 20 back towards its arm 32 and into operative engagement with the element 18. For so actuating the piston 54, the cylinder 52 is

connected to an air supply system through a pair of flexible conduits 56 and 57. Referring particularly to Fig. 6, it is to be understood that each of the conduits 57 and each of the conduits 56 are connected, respectively, to air supply conduits 58 and 59, each of which latter conduits is, in turn, connected with a master valve 60, the construction of which will hereinafter be described. Thus, from the above, it is to be understood that the present invention contemplates the provision of pneumatic means which is effective simultaneously to shift all of the disks 20, 20 back and forth relative to the lower slitting elements 18, 18 and the disk-carrying arms 32, 32.

Pneumatic means are also provided in the present invention for rocking the support member 14 back and forth about its longitudinal axis. Referring particularly to Fig. 2, the crank arm 50 is connected by means of a pin 61 to the lower end of a piston rod 62, whose upper end is connected with a piston 63 which is slidably mounted within an air cylinder 64. The air cylinder 64 is adapted to be secured pivotally to an appropriate portion of the slitting machine frame, and, more specifically, it is provided with an aperture 65 for receiving a bolt about which the air cylinder may pivot as the piston 63 slides lengthwise of its cylinder. From this, it is to be understood that, when the piston 63 is forced downwardly by means of air entering into the cylinder through a conduit 66, it will be effective to shift the crank 50 in a counterclockwise direction, thereby simultaneously lifting each of the various head mechanisms 21, 21 away from the various lower slitting elements 18, 18. By the same token, whenever the piston 63 is forced upwardly within the cylinder 64, by means of air entering the cylinder through a conduit 67, the various head mechanisms 21, 21 will be lowered towards their operative positions. Fig. 2 represents somewhat diagrammatically, a mechanical stop boss 68 which may be appropriately secured upon the frame of the slitting mechanism, for the purpose of limiting the downward movement of the crank 50 and, consequently, the piston 63.

Referring now to Fig. 6, each of the air supply conduits 66 and 67 of the air cylinder 64 is connected to a master cylinder 69, which is a structure similar to the first noted master cylinder 60.

As mentioned hereinabove, the present invention contemplates the provision of means for relating the movements of the various slitting disks 20, 20 with that of the head mechanisms 21, 21. In other words, it is important to provide the present type of mechanism with some means for preventing the various slitting disks 20, 20 from forcibly engaging the various lower slitting elements 18, 18, whenever the various head mechanisms are shifted from their upper and inoperative positions to their lower or operative positions. Thus, means have been provided in the present invention which, when actuated, function initially to shift all of the various slitting disks 20, 20 simultaneously away from their associated lower elements 18, 18 and, furthermore, these disks are held in their inoperative positions, while all of the head mechanisms 21, 21 are raised away from the paper web 19, and these disks are not returned to their various operative positions until after all of the head mechanisms have been returned to their lower or operative positions. The means for accomplishing this objective are described hereinbelow.

Referring particularly to Fig. 6, it is to be understood, as hereinabove noted, that the air supply

conduits 58 and 59 of the various air cylinders 52, 52 are suitably connected to a master valve 60. This master valve 60 is, in turn, connected to an air supply tank or pump 70 by means of conduits 71 and 72, the latter of which is, in turn, connected to a main air supply conduit 73 connected directly with the air supply tank 70. Also connected to the master valve 60 is a pilot valve 74 and a solenoid-actuated cut-off valve 75. These two valves are connected in series to the master valve 60 by means of conduits, which are diagrammatically illustrated in Fig. 6 by means of a continuous broken line 76, one end of which is connected with the main supply conduit 73, and the other end of which is connected directly with the master valve 60.

The specific construction of the master valve 60 will be hereinafter described in detail, but for the present, merely the functions of this valve will be described. In the operation of the above described system, the air supply tank 70 supplies air, under pressure, directly to the main conduit 73, and this air will find its way directly to the master valve 60 by way of conduits 72 and 71. Also, the air from the supply tank 70 will pass to the conduit 76 which will direct the air to the pilot valve 74 which, in its normal position, is closed and, therefore, will prevent this air from reaching the master valve 60. However, initially, the master valve 60 receives the air from the conduit 71, and it will direct this air to the conduit 59 and, thus, it is to be understood that all of the air cylinders 52, 52 will have their various pistons 54, 54 maintained in their inoperative positions, which are particularly illustrated in Figs. 3 and 6. Furthermore, the master valve, in its initial condition, functions to connect the conduit 58 to an exhaust conduit 77, thereby to connect the head end of each of the air cylinders 52, 52 with the atmosphere.

Still referring to Fig. 6, it is to be understood that the main supply conduit 73 is connected directly with the second master valve 69, which initially functions to supply this incoming air directly to the conduit 67 which, in turn, is connected to the bottom portion of the air cylinder 64 (see Fig. 2). Therefore, the master valve 69, in its normal position, will be effective to maintain the crank 50 in its upper position so that all of the various head mechanisms 21, 21 will be maintained in their operative positions. The other air supply conduit 66 of the cylinder 64 is connected to the master valve 69 in a manner such that it will communicate with the exhaust conduit 77, thereby to maintain one portion of the cylinder 64 in communication with the atmosphere.

In order to initiate the operation of the present mechanism, it is merely necessary for an operator to depress a button 78 of the pilot valve 74, thereby placing one portion of the conduit 76 in communication with its remaining portion by way of a valve groove 79 the latter being formed in a valve 80 which is slidably received within the pilot valve 74. Since this pilot valve 74 is provided with a pair of oppositely disposed ports 81 and 82, it will be understood that, whenever the button 78 is depressed, the groove 79 will be positioned in register with the two ports, thereby to permit the air to pass uninterruptedly through the valve. This air, after passing through the valve, in a direction as indicated by the arrows, will enter, by way of a port 83, the solenoid-operated valve 75 which, in its normal condition, permits this air to pass directly into the remaining

portion of the conduit 76 by way of a second port 84. Thus, it is to be understood that, whenever the operator depresses the valve button 78, air from the supply source 70 will enter the master valve 60 by way of the conduit 76. This inrush of air into the master valve 60 is effective, as will hereinafter be described, to alter the initial pneumatic connections between the valve 60 and the various air cylinders 52. More specifically, as soon as this inrush of air is received within the master valve 60, it is effective to connect the conduit 71 directly with the conduit 58 and, at the same time, connect the exhaust conduit 77 directly with the conduit 59. From this, it will be understood that these new connections will be effective to supply air to each of the air cylinder conduits 57, 57, to the end that the various pistons 54, 54 will shift within the cylinders, thereby simultaneously to move all of the slitting disks 20, 20 to their inoperative positions.

Referring particularly to Figs. 3 and 6, there is provided on the lower portion of each of the head mechanism arms 32, 32 a lock valve 85, the specific construction of which is particularly illustrated in Fig. 5. Referring particularly to Fig. 5, it will be understood that each of these valves has slidably mounted therein a piston 86, which is biased in one direction by means of a coil spring 87. Secured to each of the pistons is a piston rod 88, 88, which projects out through one end of the cylinder 85. Circumferentially provided about each of the pistons 86 is a groove 89, the function of which is to place the opposed conduits 90, 90 in register with each other, whenever the piston rod 88 is retracted. Referring now to Fig. 3, there is provided on each one of the piston rods 55, 55, a bent arm member 91, the free end portion of which overlies the end of the piston 88 of the air valve 85. This valve 85 is so positioned upon the arm 32 that its piston will be depressed into its operative position only after the piston 54 of the valve 52 has reached its extreme left-hand location. Referring now to Fig. 6, it will be seen that each of the valves 85, 85 are connected in series, so that air coming to these various valves by way of the conduit 72 cannot pass into a conduit 92 (which is connected to the right-hand valve 85) until all of the valves 85, 85 have been actuated. Thus, upon the actuation of each of the valves 85, 85, air from the conduit 72 will pass into the conduit 92 and, thereafter, into a second pilot valve 93 by way of a port 94. A second port 95 is provided in this pilot valve so that the air may pass uninterruptedly directly to the second master valve 69 by way of a conduit 96 which, in effect, is merely an extension of the conduit 92. The pilot valve 93, in its normal position, which is illustrated in Fig. 6, permits the air to so pass through its interior.

The second master valve 69 is constructed exactly in the same manner as valve 60 and thus, this inrush of air into the valve, by way of the conduit 96, will function to reverse the pneumatic connections of the valve in the same manner as was hereinabove described in connection with valve 60. More specifically, this inrush of air will function to connect the main supply conduit 73 directly with the conduit 66 of the cylinder 64, and also, it will connect the conduit 67 directly with the exhaust conduit 77, thereby to permit air to enter the top portion of the cylinder 64, for the purpose of moving the crank arm 50 in a downward direction (see Fig. 2). From the above, it is to be understood that, by depressing the button 78 of the first pilot valve 74, 75

one will initiate a sequence of operations which result in having all of the various disks 20, 20 shifted to their inoperative positions and, thereafter, upon the completion of this initial operation, the crank 50 will be actuated so as to move all of the various head mechanisms 21, 21 to their respective inoperative positions. The pneumatic means hereinabove described will be effective to maintain the various slitting disks and head mechanisms in their respective inoperative positions until the operator wishes them to be returned.

In order to return the various elements to their operative positions, it is merely necessary for the operator to depress a button 97 of the second pilot valve 93. By thus depressing this button 97, it is to be understood that a piston 98 of this valve will be shifted downwardly against its biasing spring 99, to the end that the port 95 will be placed in communication with an exhaust port 100 which communicates directly with the atmosphere. However, this movement of the piston 98 will not be effective to bleed the conduit 92, for the reason that the lower portion of the valve 93 will be cut off entirely from the ports 95 and 100. As soon as the ports 95 and 100 are placed in communication with each other, it will be clear that the pressure within the line 96 will immediately drop to atmospheric pressure, after which, the master valve 69 will be effective to reconnect the air cylinder conduits 67 and 66 with the conduits 73 and 77, respectively, thereby causing the piston 63 to move again to its upper position (see Fig. 2) and, thus, force all of the head mechanisms 21, 21 downwardly into their operative positions.

It is to be noted that there is associated with the second pilot valve 93 an electrical switch generally designated by the numeral 101. As may be seen by reference to Fig. 6, this switch is normally open, but upon a downward movement of the pilot valve button 97, this switch will be closed, thus effectively closing a circuit between electrical conductors 102 and 103. Also, there is associated with the crank 50, a second electrical switch generally designated by the numeral 104. As may be noted from Figs. 2 and 6, the switch 104 is normally closed whenever the various head mechanisms 21, 21 are in their operative positions. The electrical conductor 102 connects one side of the switch 101 directly with a side of switch 104. The conductor 103, however, is connected directly to one side of a solenoid 105, the other side of which is connected by means of an electrical conductor 106 to a terminal 107. The second terminal 108 is connected directly to the switch 104 by means of an electrical conductor 109. It is to be understood that the terminals 107 and 108 may be appropriately connected to any normal power source. From the above, it will be understood that the solenoid 105 can never be connected across the electrical circuit until both of the switches 101 and 104 are closed at the same time. Thus, by depressing the button 97 of the second pilot valve 93, the solenoid 105 will be energized only in the event that the switch 104 is closed by means of the crank 50 being positioned in its upper position, as viewed in Fig. 2.

Whenever the solenoid 105 is energized, it will be effective to shift a piston 110 of the solenoid-actuated valve 75 against the action of its biasing spring 111 and thus, place the valve port 84 in communication with an exhaust valve port

112 of the valve. Furthermore, this movement of the valve piston will cut off all communication between the valve ports 83 and 84 and thereafter, the conduit 76, between port 84 and valve 60, will effectively have its pressure dropped to that of atmosphere. As soon as the air pressure drops within the conduit 76, the master valve 60 will function to reestablish its pneumatic connections to their initial conditions. More specifically, the conduit 58 will be placed in communication with the exhaust conduit 77, and the conduit 59 will be placed in communication with the air supply conduit 71 and thus, the various pistons 54, 54 of the air cylinders 52, 52 will be shifted inwardly again, so that the various slitting disks 20, 20 will be relocated in engagement with their associated slitting elements 18, 18 under the impetus of the biasing springs 48, 48.

In order to give all of the various pistons 54, 54 of the air cylinders 52, 52 time enough in which to traverse the length of their associated cylinders, it will be necessary for the operator to hold the pilot valve button 97 in its depressed position for a definite interval of time. Otherwise, if the operator releases the button 97 prematurely, it will be obvious that the second master valve 69 will again operate, for the reason that the various cut-off valves 85, 85 will still be in their operative positions and will thus be effective to supply air directly to the conduit 96. However, if the operator retains the pilot valve button 97 in its lower position until the various pistons 54, 54 have reached their extreme outer positions, he will be assured that the master valve 69 will not again operate, for the reason that the various cut-off valves 85, 85 will be closed. From the above, it will be seen that the fact that the operator must hold the button 97 in its depressed position for an interval of time makes for a safety feature in that a release of this button at any time before the complete cycle has been effected will function to return all the various slitting elements 20, 20 and the head mechanisms 21, 21 to their inoperative positions. Thus, if the operator, while returning the slitting elements and head mechanisms to their operative positions, detects some improper condition of the paper web 19 or any element of the mechanism, he may immediately release the button 97 and thereby return all of the various elements to their inoperative positions.

Referring now to Fig. 7, each of the master valves 60 and 69 comprises a casting 113 in which is provided a master cylinder 114. Slidably mounted within the master cylinder 114 is a piston 115, the upper end portion of which is connected to a yoke 116 by means of a piston rod 117. This yoke is pivotally mounted upon an arm 118, and the other end portion of the yoke is appropriately connected with a pair of secondary piston rods 119 and 120 by means of an inverted T-bar 121. Each of these secondary piston rods 119, 120 is, in turn, connected respectively to pistons 122 and 123. The pistons 122 and 123 are slidably mounted within cylinders 124 and 125 formed within the casting 113. Springs 126 and 127 function to elevate each of the pistons 122 and 123 and thus depress the piston 115 within the master cylinder 114. The main air supply, such as that which is delivered through the conduit 73, is adapted to enter the master cylinder by way of a port 128, and while the master valve is in its normal position, which is illustrated in Fig. 7, this air will enter the cylinder 125 and be conducted to the lower portion of

the cylinder 124 by way of an interconnecting conduit 129. Thereafter, this air will pass through the cylinder 124 and to, for example, the conduit 59 by way of a conduit 130. Communicating with the lower portion of the cylinder 125 is the hereinabove noted exhaust conduit 77 which is normally effective to place the lower portions of each of the air cylinders 52, 52 in direct communication with atmosphere, by reason of the fact that the conduit 58 may be connected directly to the cylinder 125 by means of a port or connection 131.

As hereinabove described, it is the function of either of the two pilot valves 74 or 93 to supply an inrush of air to its associated master valve whenever the pilot valve button is depressed. For example, whenever the button 78 of the valve 74 is depressed, a blast of air from the air supply unit 70 will enter master valve 60 by way of the conduit 76 which is connected to the master valve cylinder 114 by way of a port 132. From this, it will be understood that this inrush of air will be effective to raise the master valve's piston 115, thereby lowering each of the two auxiliary pistons 122 and 123. Although the operator would normally release the button 78 of the pilot valve 74 soon after depressing the same, it is to be understood that the master piston 115 will remain in its upper position, due to the fact that a continuous supply of air will be conducted to the lower portion of the cylinder 114 by way of a conduit 133, one end portion of which will be uncovered whenever the piston 115 is raised. The other end portion of the port 133 communicates directly with the lower portion of the auxiliary cylinder 124 and also with the upper portion of cylinder 125 by way of the conduit 129. Thus, whenever the master piston 115 is elevated, it will uncover one end of the conduit 133, thereby placing the lower portion of the cylinder 114 in direct communication with the main air supply by way of the port 128 of the master valve. By thus delivering small quantities of air to the master cylinder by way of the conduit 133, it will be realized that the piston 115 will be maintained in its upper position, even though there may be some slight leakage of air in the conduit 76 tending to reduce the pressure within this latter conduit. Also, when the piston 115 is so raised and the auxiliary pistons 122 and 123 are lowered against the action of their respective biasing springs 126, 127, it will be understood that the ports 128 and 131 of the master valve will be placed in communication with each other, thereby to connect, for example, the conduit 58 to the main air supply for the purpose of shifting each of the pistons lengthwise within the air cylinders 52, 52. Furthermore, the lowering of the auxiliary piston 122 will place the port 130 thereof in communication with the exhaust conduit 77, by way of a conduit 134, thereby to connect the lower end portion of each of the air cylinders 52, 52 with the atmosphere.

As hereinabove described, this latter condition of the master valve 60 will prevail until the solenoid-actuated valve 75 is operated by means of the solenoid 105. Of course, as soon as this solenoid functions in the manner as hereinabove described, it will be effective to bleed the air from the master cylinder 114, thereby to place the master valve in its initial condition. It is to be clearly understood that the operation of master valve 69 is exactly the same as that described in connection with the valve 60 and thus the master cylinder of valve 69 will be lowered whenever the

button 97 of the pilot valve 93 is shifted to its lower position.

From the above, it is clear that the present invention provides a novel and meritorious slitting mechanism which may be readily applied to practically any type of paper winding machine. Furthermore, it will be understood that the use of the present invention will permit the machine operator to manipulate the various slitting elements with ease and in a highly efficient and safe manner from a position remote from the individual slitting elements.

I claim:

1. A slitting machine for slitting a flowing web, comprising, a first rotatable web-slitting member disposed at one side of the web, a support member disposed at the other side of said web, a head mechanism carried upon said support, a second web-slitting member in the form of a disk rotatably mounted upon said head mechanism and normally disposed in engagement with said first web-slitting member, fluid-actuated means for axially shifting said disk relative to said head mechanism and away from said first web-slitting member, manually operable valve means located remotely from said head mechanism for controlling said fluid-actuated means, and means for rotating said head mechanism about said support and angularly away from said first web-slitting member.

2. A slitting machine for slitting a flowing web, comprising, a first rotatable web-slitting member disposed at one side of the web, a support member disposed at the other side of said web, a head mechanism carried upon said support, a second web-slitting member in the form of a disk rotatably mounted upon said head mechanism and normally disposed in engagement with said first web-slitting member, fluid-actuated means for axially shifting said disk relative to said head mechanism and away from said first web-slitting member, fluid-actuated means for rotating said head mechanism about said support and angularly away from said first web-slitting member, and manually operable valve means located remotely from said head mechanism for controlling said fluid-actuated means.

3. A slitting machine for slitting a flowing web, comprising, a first rotatable web-slitting member disposed at one side of the web, a support member disposed at the other side of said web, a head mechanism carried upon said support, a second web-slitting member in the form of a disk rotatably mounted upon said head mechanism and normally disposed in engagement with said first web-slitting member, fluid-actuated means for shifting said disk axially of itself and sidewise relatively to said head mechanism and said first web-slitting member, fluid actuated means for rotating said entire head mechanism about an axis parallel with and spaced from the disk axis, and manually operable valve means located remotely from said head mechanism for controlling said fluid-actuated means.

4. A slitting machine for slitting a flowing web, comprising, a first rotatable web-slitting member disposed at one side of the web, a support member disposed at the other side of said web, a head mechanism carried upon said support, a second web-slitting member in the form of a disk rotatably mounted upon said head mechanism and normally disposed in engagement with said first web-slitting member, a first fluid-actuated means for axially shifting said disk relative to said head mechanism and away from said first

web-slitting member, manually operable valve means located remotely from said head mechanism for controlling said first fluid-actuated means, a second fluid-actuated means for rotating said head mechanism about said support and angularly away from said first web-slitting member, and a second valve means connected between said first and second fluid-actuated means for controlling said second fluid-actuated means in response to the movements of said first fluid-actuated means.

5. In a slitting machine having a first rotatable web-slitting member located at one side of the path over which a web is adapted to be conveyed, a support member located at the other side of said path, a head mechanism carried upon said support, a second web-slitting member in the form of a disk rotatably mounted upon said mechanism and normally disposed in engagement with said first web-slitting member, a first fluid-actuated means for axially shifting said disk towards and away from said first web-slitting member and relative to said head mechanism, manually operable valve means for controlling said first fluid-actuated means, a second fluid-actuated means for rotating said head mechanism angularly towards and away from said web-slitting member, and a second valve means connected between said first and second fluid-actuated means for controlling said second fluid-actuated means in response to the movements of said first fluid-actuated means, said second valve means functioning to prevent the actuation of said second fluid-actuation means until said disk has first been shifted away from said first web-slitting member.

6. A slitting machine for slitting a flowing web, comprising, a support member mounted for rotation about its longitudinal axis, a plurality of slitting disks mounted upon said support member, primary fluid-actuated means associated with each of said disks for axially shifting the disks back and forth transversely of said support member, secondary fluid-actuated means associated with said support member for rotating said support member about its longitudinal axis, valve means interconnected between said primary and secondary fluid-actuated means for automatically initiating the operation of the latter means only upon the completion of an initial movement of all of said disks, and a manually operable valve means for initiating the operation of said primary fluid-actuated means.

7. In a slitting machine having a first rotatable web-slitting member located at one side of the path over which a web is adapted to be conveyed, a support member located at the other side of said path, a head mechanism carried upon said support member, a second web-slitting member in the form of a disk rotatably mounted upon said head mechanism and normally disposed in engagement with said first web-slitting member, a first fluid-actuated means for axially shifting said disk towards and away from said first web-slitting member and relative to said head mechanism, manually operable valve means connected with said first fluid-actuated means for initiating the movements of said disk away from said head mechanism, a second fluid-actuated means for moving said head mechanism towards and away from said first web-slitting member, valve means connected between said first and second fluid-actuated means for initiating the movements of said head mechanism away from said first web-slitting means upon the completion of

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movement of said disk away from said head mechanism, a second manually operable valve means connected with said last mentioned valve means for initiating the movements of said head mechanism toward said first web-slitting member, and means automatically operable to initiate the movement of said disk back toward said head mechanism whenever said head mechanism completes its return movement toward said first web-slitting member.

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