United States Patent [19]

Treff

[11] **3,734,487**

[45] **May 22, 1973**

[54] **AUTOMATIC RIBBON ASSOCIATING APPARATUS**

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[22] Filed: **Dec. 31, 1970**

[21] Appl. No.: **103,021**

[52] **U.S. Cl.** **270/52,** 156/259, 156/512, 226/197, 270/10, 270/43

[51] **Int. Cl.** **B65h 39/00**

[58] **Field of Search**.....270/10, 58, 18, 52, 270/43, 44; 226/197; 156/259, 260, 512

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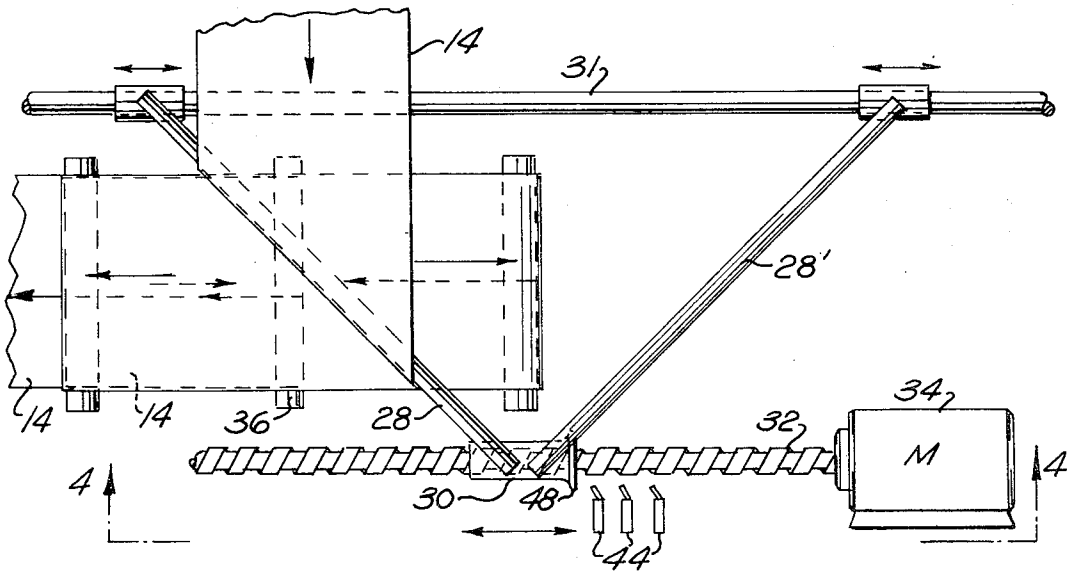
[57] **ABSTRACT**

An improved ribbon associating and interleaving apparatus for web fed printing presses which provides automatic positioning of the slitter wheels, turner bars and compensator rolls for predetermined interleaving patterns. A control circuit enables the operator to dial the desired pattern and a visual display of the pattern dialed facilitates webbing of the ribbons. A system both for fixed ribbon width folders and for variable ribbon width folders is disclosed.

14 Claims, 8 Drawing Figures



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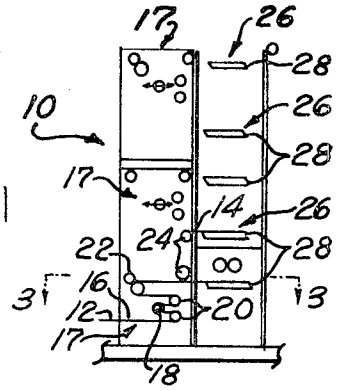

FIG. 1

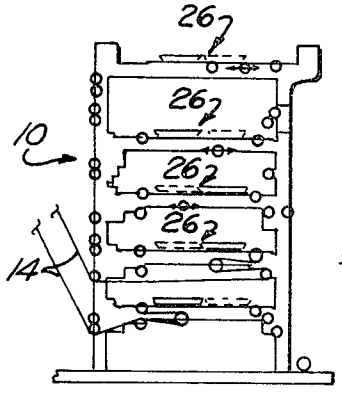

FIG. 2

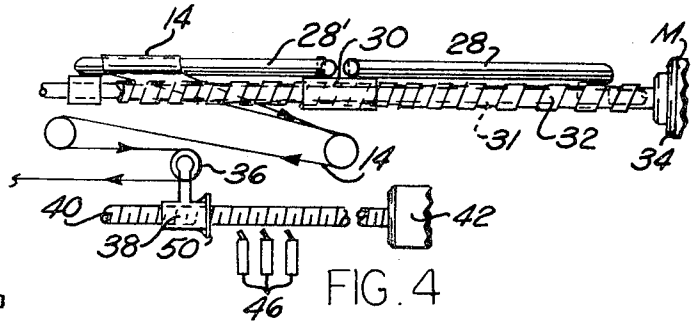

FIG. 4

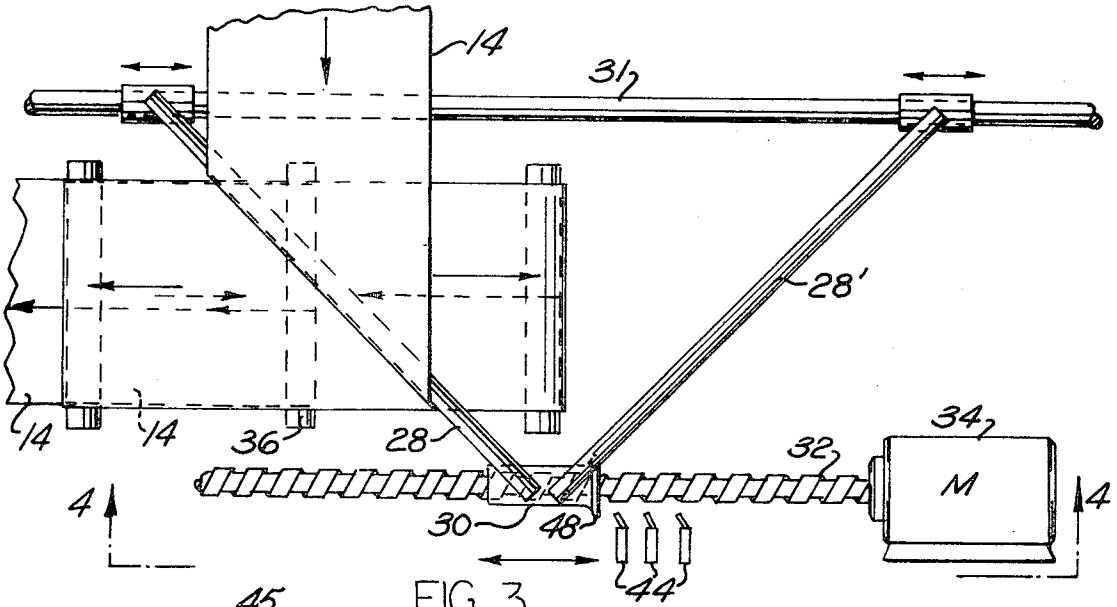

FIG. 3

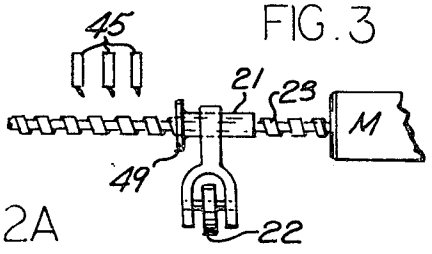

FIG. 2A

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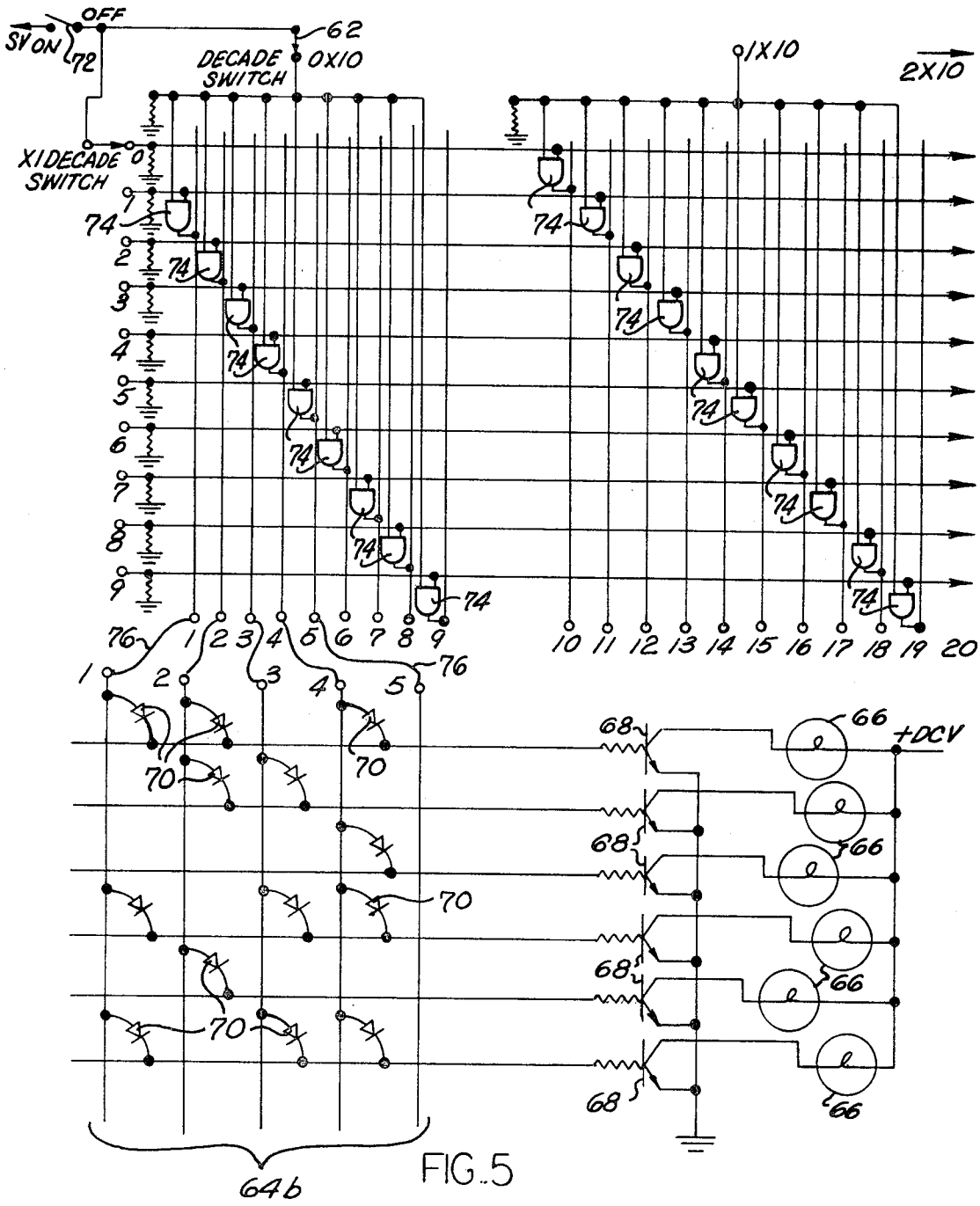

FIG. 5

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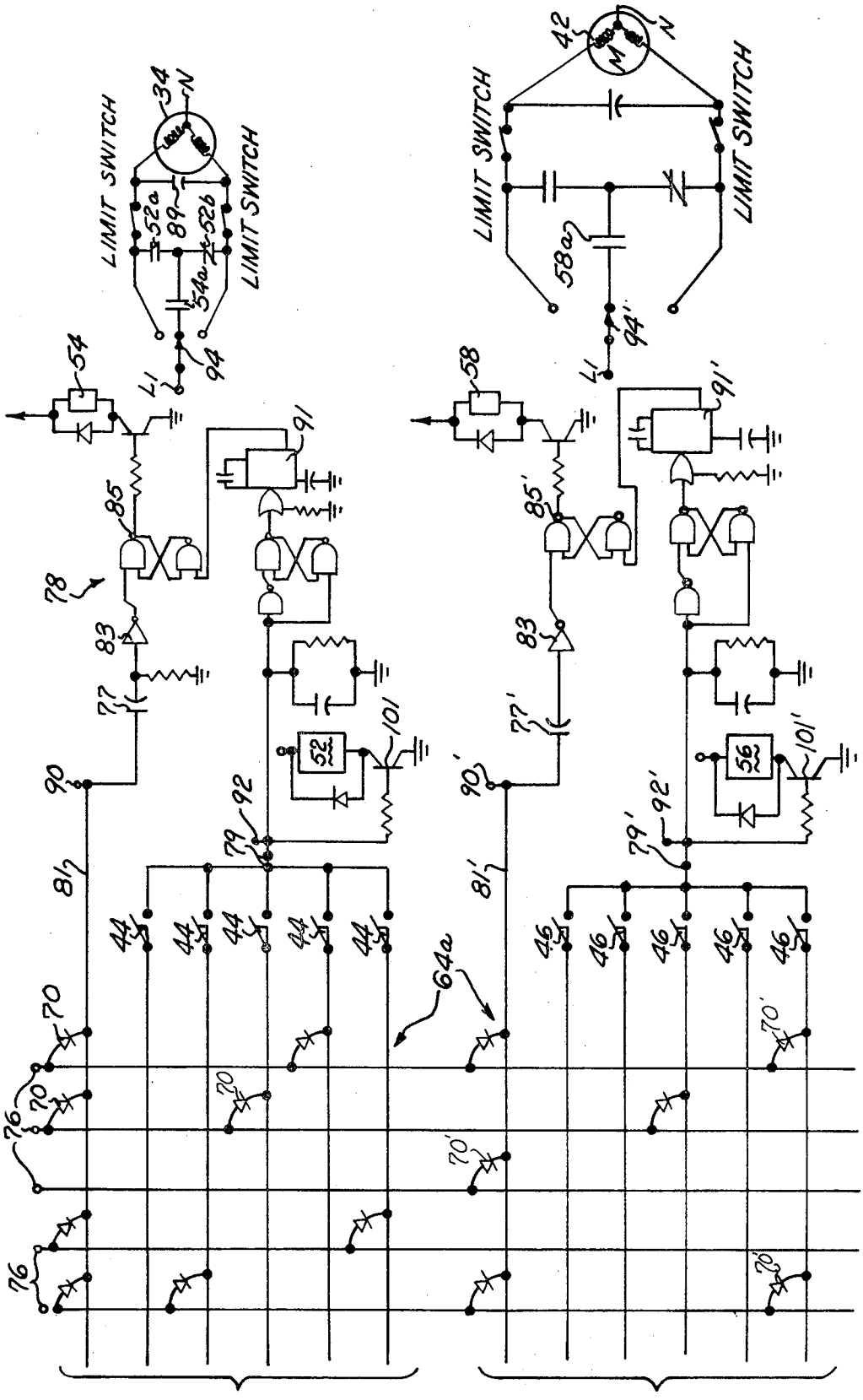
LIMIT SWITCH
LIMIT SWITCH
LIMIT SWITCH
LIMIT SWITCH
34
42
52
56
58
64a
70
70'
76
77
77'
78
79
79'
81
81'
83
85
85'
90
90'
91
91'
92
92'
94
94'
101
101'

FIG. 6

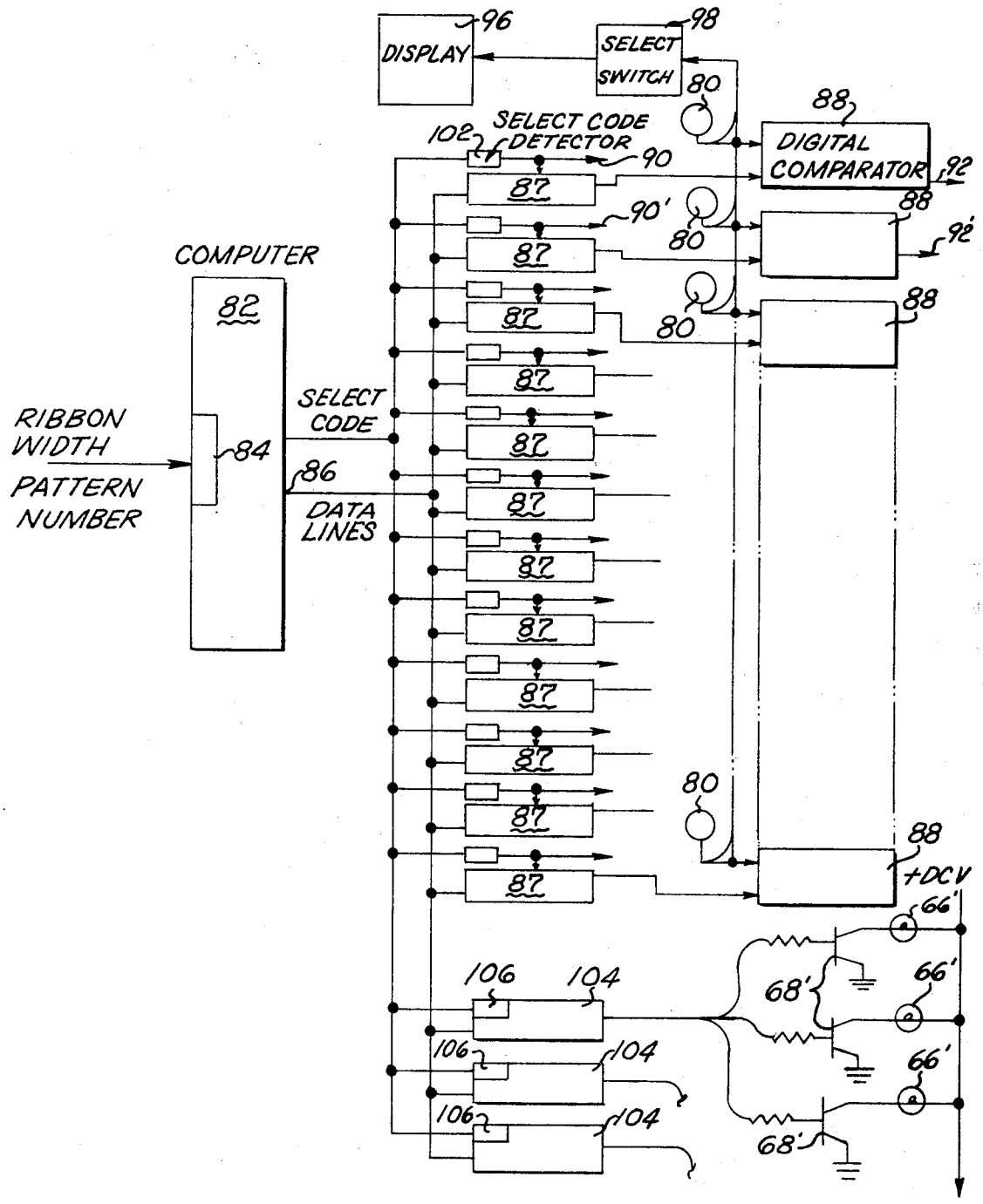

FIG. 7

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AUTOMATIC RIBBON ASSOCIATING APPARATUS

This invention relates to folders for web fed printing presses and, more particularly, to improved apparatus for slitting the printed webs into ribbons and associating the various ribbons with each other in a particular interleaved pattern before the ribbons pass into the folding apparatus.

A number of systems are already available in the printing industry for continuously slitting printed webs at desired lateral locations and interleaving the ribbons in a particular pattern. These known systems were developed in response to the need for suitable apparatus for interleaving multiple color and black and white pages in almost unlimited combinations for binding in to brochures, magazines and books.

The desired functions are performed in the prior art systems by the use of adjustable slitter wheels, by adjustable angle bars mounted at a 45° angle with respect to the direction of travel of the web and by compensator rolls which can be moved to adjust the relative longitudinal position of the ribbons. Although these known systems are generally satisfactory in terms of obtaining the desired interleaved patterns, one substantial problem has been the excessive make-ready time required to set up the system for each pattern. The prior art systems have required the pressman to manually change the position of the slitters, angle bars and compensator rolls as different patterns are to be run and these make-ready operations are not only complicated but time consuming.

It is the principal object of this invention to provide an automatic ribbon associating apparatus which is capable of producing a wide variety of interleaving patterns and in which the manual mechanical adjustments heretofore required are performed automatically.

In accordance with the principles of this invention, the adjustments of the slitter wheels, angle bars and compensator rollers are automatically made by motors under the control of a memory system and a control circuit. With the described invention, the make-ready operations require only that the operator select the desired ribbon pattern by dialing a number into the control circuit with the memory system and control circuit automatically positioning the slitter wheels, angle bars and compensator rollers. A visual presentation in the form of a system of colored lights indicates to the operator the individual ribbon paths in the system.

The principles of the invention further contemplate a system which may be used not only for a limited number of predetermined fixed ribbon widths but which is also capable of handling infinitely variable ribbon widths. The system for handling variable ribbon widths includes means which, responsive to a pattern number input and a ribbon width input, computes the required position for the slitter wheels, angle bars and compensator rollers and supplies the appropriate signals for positioning those elements in the computed position.

Other objects, features and advantages of the invention will become more apparent upon a complete reading of the following description which, together with the attached drawings, discloses but a preferred form of the invention.

Referring now to the drawings wherein like reference numerals indicate like parts in the various views:

FIG. 1 is an elevational side view of a ribbon associating apparatus in accordance with the present invention, in which a web is shown in place in the apparatus, the web being divided into two ribbons within the apparatus;

FIG. 2 is an elevational end view of the apparatus of FIG. 1;

FIG 2A is a plan view of a slitter wheel assembly;

FIG. 3 is a plan view taken along the line 3—3 of FIG. 1 illustrating an angle bar assembly, some of the rollers beneath it and a ribbon compensator;

FIG. 4 is an elevational view taken generally along the line 4—4 of FIG. 3;

FIG. 5 is a schematic electronic circuit diagram showing switch means provided for entering product numbers into the apparatus and also showing lamps which collectively define routes for webbing the apparatus;

FIG. 6 is a schematic electronic circuit diagram for controlling the motors which position the slitters, angle bars and rollers;

FIG. 7 is a schematic electronic circuit diagram for a modified form of the invention, wherein ribbon widths are controlled by the entry of digital data into the apparatus, and the apparatus has a memory and a computational capability, and carriage positions are sensed by digital shaft encoders.

Referring now more in detail to the drawings, there is illustrated in FIGS. 1 and 2 an automatic ribbon associating apparatus **10** which is located between a web-fed printing press and a folder, neither of which is shown and may be of conventional construction. When the printing press is running, one or more printed webs **12**, normally printed on both sides, flow from the printing press to the ribbon associating apparatus **10**. The printed webs are made into signature form by first slitting the web lengthwise into several ribbons and then arranging them one on top of the other in proper registration and sending them into one or more folders. The folder folds the associated group of ribbons as a group, cuts it into short lengths, and may fold the short lengths again to produce booklets or portions of books called signatures.

The general functions of the ribbon associating apparatus are to cut the web into ribbons, interleave the ribbons in a desired pattern and control the position of pages in the finished signatures by controlling the ribbons before they enter the folder. More specifically, these functions are as follows:

1. The ribbon associating apparatus **10** controls the longitudinal registration of the entire web **12** with respect to other webs, if any, that are coming from the same press.

2. The apparatus must cut the web or webs into ribbons **14** of the proper widths as required for making the final product.

3. The relative arrangement or order of pages must be controlled by appropriately interleaving the ribbons.

4. Some of the ribbons may have to be turned over so as to be upside down with respect to the other ribbons in the final interleaved arrangement.

5. The apparatus must control the relative sideways position of the various ribbons with respect to each other after they are interleaved; that is, it must control the lateral or cross-web registration.

6. The longitudinal registration of the individual ribbons of each web must be controlled so that the ribbons have proper "head-and-toe" registration with respect to one another.

The apparatus for performing these functions, in accordance with the principles of this invention, will now be described. At a point **16** where, during routine printing operations, a web **12** enters the automatic ribbon associating apparatus **10**, the web is already under careful control as to tension, lateral position and tilt, this having been accomplished by equipment that is not part of the invention.

The first portion of the ribbon associating apparatus is the web compensation and slitting portion **17**. The longitudinal registration of the web with respect to other webs, if any, with which it is to be interleaved is controlled by lengthening or shortening its route of travel by means of a compensator roller **18**. The compensator roller **18**, which is used for longitudinally compensating an entire web, is adjustable in position by means of a motorized threaded rod arrangement which drives a carriage upon which the roller is mounted. Idler rollers **20** are also used with each compensator so as to permit a wide range of adjustment capability within a small space.

As the web proceeds, through the apparatus, it next encounters slitter wheels **22** which slit the web into ribbons **14** of the desired width. The widths of the ribbons **14** into which the web **12** is cut are controlled by the number and lateral positions of the slitter wheels. The slitter wheels **22** are each mounted on motorized carriages **21** and threaded rods **23** for crossweb travel for ribbon width adjustment.

The web material, in traversing the automatic ribbon associating apparatus, passes over idler rollers **24** which redirect and support the material in various positions along its path of travel. The relative order of interleaving the various ribbons is controlled by carrying some ribbons over rollers **24** to a higher level than others after they leave the slitters, where they enter the angle bar section **26** of the apparatus. FIGS. **3** and **4** show a pair of angle bars **28,28'** in more detail.

The interleaving order is controlled by (a) the relative elevations of the ribbons at their points of entry into the angle bar section, cooperating with (b) the action of an angle bar **28** to change the direction of travel of each ribbon **14** from its initial horizontal direction to a new horizontal direction at right angles to the initial direction. Because, as shown in FIG. **1**, the angle bars for different ribbons are located vertically over one another, the ribbons are situated one on top of the other in lateral register after they leave the angle bars.

Sometimes some of the ribbons must be turned or "flopped" over before they are associated with the other ribbons, in order to carry out a desired over-all plan for creating a signature. This inversion is accomplished by turning some of the ribbons over angle bars **28** which are mounted at one 45° angle to the direction of travel of the ribbon, and turning other ribbons over angle bars **28'** which are canted at 45° in the other direction so that the latter ribbons leave the angle bars in an opposite horizontal direction of travel from that of the first ribbons. The direction of travel of those which are not going in a desired final direction is later reversed by passing them over an extra idler roller. When a ribbon is passed over an angle bar it is always turned over regardless of the direction in which the angle bar is canted at 45°. All of the ribbons are, therefore, turned over at least once. For those ribbons which must end up inverted with respect to the other ribbons, an additional turn is required. This cannot be achieved by an idler roller alone because, while an idler roller does flop a ribbon over, it also reverses its direction, so it is afterwards going in the opposite direction from the other ribbons. Thus, to get an extra inversion, it is necessary both to use an idler roller and to cant the angle bar at an opposite 45° angle from the 45° angle of the other ribbons so that the angle bar reverses the relative direction, in addition to merely flopping the ribbon.

Mutual lateral registration of the ribbons is accomplished by adjusting the positions of the angle bars **28,28'**. This adjustment does not affect the lateral location of a ribbon at the place where it approaches the angle bar, but does affect the lateral position of the ribbon at the place where the ribbon leaves the angle bar. Thus, lateral registration is controlled by angle bar location, which is adjustable in a direction transverse to the direction of travel of the original web. Each of the angle bars **28,28'** is supported for adjustment as shown in FIG. **3**. One end of the angle bars is slidably supported on a rod **31** while the other end of the bars is secured to a threaded nut **30** supported on a threaded rod **32**. A reversible motor **34** is drivingly connected to rod **32** to rotate the rod and thereby adjust the position of the angle bars.

Longitudinal registration of the ribbons is also affected by adjusting the angle bar locations. To compensate for the effects of shifting the angle bars, additional compensator rollers **36** are provided over which the individual ribbons pass. As shown in FIG. **4**, the position of each ribbon compensator roller **36** is adjustable by means of a carriage nut **38** and threaded rod device **40**. A reversible motor **42** rotates the rod **40** to adjust the position of compensator **36**. Although only a single roll **36** is illustrated, it is to be understood that each of the compensator rolls in the system will be mounted in similar fashion.

All of the adjustments required to achieve a desired ribbon pattern are made by means of motors, such as motors **34** and **42**, which drive the above-mentioned carriages to the correct positions under control of an electronic control circuit. In accordance with one form of the invention, it is contemplated that each carriage for the web compensators, the slitter wheels, the angle bar assemblies and the individual ribbon compensators, will be equipped with a plurality of "position" switches, such as those shown at **44,45,46** which are actuable by suitable disks **48, 49,50** affixed to each of the carriages. These switches, which are of a bistable toggle type, are secured to the frame and swerve the function of turning off each carriage adjustment motor when the associated carriage has reached the desired position. It is contemplated that the switches may be mounted on the frame for adjustment along the length of the threaded rods whereby the stopping points for each carriage may be adjusted. Motor control relays **52, 54, 56, 58,** shown in FIG. **6**, control the direction and on/off operation of the motors **34,42** in cooperation with the position switches **44,46**. Similar control relays would, of course, be provided for each of the other motors in the system.

Selection of the motors to be operated is controlled by pattern number switches **60,62** in FIG. **5**, into which pattern identification numbers may be entered by an operator. These switches are connected to a diode matrix **64*a***, **64*b***, one portion of which (**64*a***, FIG. **6**) is for selection and control of the motors mentioned above and the other portion of which (**64*b***, FIG. **5**) is for selection of indicating lamps **66**, FIG. **5**, employed for

showing the correct routing of the web **12** and its ribbons **14** through the ribbon associating apparatus. Transistor lamp amplifiers **68** drive the lamps **66.**

The diode matrix **64***a*, **64***b* stores certain pattern interpretation information, corresponding to the various pattern identification numbers which the operator enters in operating the apparatus. Included in that pattern interpretation information are data specifying the particular carriage position switch which, for each pattern, is to turn off the adjustment motor for each of the adjustable carriages for the web compensators **17,** the slitter wheels **22,** the angle bars **28,28'** and the ribbon compensators **36.** In other words, the particular combination of position switches which are to be used with each pattern must be entered by insertion of diodes **70** in the proper places in the diode matrix **64***a*,**64***b*. Each diode in the matrix represents one of the position switches. In addition, the position switches must be placed in the desired positions. The combination of the diodes in the diode matrix and the set position of the position switches comprises a "memory" or "store" of information by which the various carriages may be automatically controlled.

Information concerning the routing of webs **12** and ribbons **14** is also stored in the system so that the proper indicator lamps **66** will automatically be turned on to provide a visual display of the web routing corresponding to any particular pattern identification number. Diodes **70** are placed in the diode matrix **64***a*,**64***b* to select the correct lamps **66.**

The control circuit for the automatic operation of the apparatus will be described with reference to a typical automatic make-ready operation. The operator manually enters a pattern identification number into the pattern identification switches **60,62.** The operator then closes the master control switch **72,** FIG. **5.**

Signals from the pattern identification switches **60,62** operating through AND circuits **74** which combine the units and tens digits, produce a binary "**1**" signal on only one of many pattern control lines **76.** These pattern control lines enter the diode matrix **64***a*,**64***b*, which has two groups of outputs, namely lamp control outputs from **64***b* and motor control outputs from **64***a*. The selection of a particular pattern, as evidenced by the energizing of only one particular pattern control line **76,** causes a particular set of indicator lamps **66** to light. The particular set which is lighted provides a visual display of the route along which the web **12** and ribbons **14** are to be threaded through the apparatus by the operator.

The pattern control lines **76** also control the carriage motors in a manner shown in FIG. **6.** Signals from the selected pattern control line **76** are connected by means of diodes **70** only to motor control circuits **78** that are the appropriate ones for the pattern selected. For example, any one pattern control line **76** may be connected to operate one particular angle bar carriage motor **34** and to make the final stopping position of the corresponding carriage **30** dependent upon only one of the position switches **44** associated with that carriage. Thus, although for each carriage there are several position switches **44** only one of these switches is active at any time because only one of them is connected to the pattern control line **76** for the pattern which has been selected by the operator. The switch which is to be utilized corresponds to a diode plug **70** at an appropriate jack in the diode matrix plugboard **64a.**

All of the carriage motors which have been selected start to operate simultaneously when the operator closes the master switch **72,** because a leading edge pulse is coupled through capacitors **77,77'** of FIG. **6** to inverters **83,83'.** The inverters set bi-stable multivibrators **85,85'** and energize relays **54,58** which close contacts **54***a*,**58***a*, and connect AC line power from L1 to the motors. The carriages all move to their final positions and are stopped by the selected position switches. Stopping occurs because a decreasing in signal level on each of wires **79,79'**, after signal filtering and shaping, triggers a one shot multivibrator **91,91'**, whose output pulse resets bi-stable multivibrator **85,85'**, de-energizing relay **54, 58,** so as to disconnect line power from the motors.

The direction of operation of each carriage adjustment motor, upon receiving a command to move to a correct position depends, of course, upon the relative initial positions of the carriages and of the "position" switch which is to stop it in its final position. If the initial position of the carriage is on a first side of the selected position switch, the reversible motor will operate in a first direction so as to drive the carriage toward the position switch where it will stop. If the carriage is on a second side of the selected position switch, the motor operates in a second direction so as to drive the carriage toward the position switch. In this second situation, however, the motor does not stop when the carriage first arrives at the position switch but instead passes that switch just far enough to reverse the driving motor after which the carriage goes in the other direction until it again reaches the position switch, where it stops. This arrangement eliminates hysteresis due to the switch by causing the carriage always to approach the switch in the same final direction and therefore to stop always at the same position irrespective of its initial position.

With the positioning of the carriages, the next step in the make-ready operation is for the operator to web the press along a route shown by the lamp indicators **66.** The printing press, the automatic ribbon associating apparatus and the folder may then all be operated together to produce samples of the product.

From the foregoing, it will be apparent that the time consuming make-ready process is drastically reduced with all of the carriage adjustments being performed automatically based on information stored in the memory system. All that is required of the operator is to dial the selected pattern identification and web the apparatus.

Illustrated in FIG. **7** is a modified form of the automatic ribbon associating apparatus which makes it suitable for general purpose commercial folders and which has the ability to handle infinitely variable ribbon widths. The circuit of FIG. **7** is combined with FIG. **6** in this modified embodiment by disconnecting wires **79,79', 81,81'** from the left hand portion of FIG. **6** and connecting them to terminals **90, 92, 90', 92'** of FIG. **7.** In this embodiment, the carriage positions are not limited to places at which position switches such as **44,46** have previously been placed. Instead of position switches and the diode matrix **64***a*,**64***b*, a digital shaft encoder **80,** sometimes called a resolver, is mounted on the mechanism which drives each carriage. Each resolver **80** produces electrical signals in digital form which indicate the instantaneous position of its carriage as determined by the shafts **23, 32, 40** which drive the

carriages and to which the resolvers are mechanically connected. This modified embodiment also employs a process control computer **82** such as, for example, a computer which is manufactured by the Digital Equipment Corporation of Maynard, Massachusetts and known as Model PDP8.

Information concerning the particular carriage settings for any number of different patterns is fed into the computer with each pattern being assigned a pattern identification number. In addition, since the particular location of the carriages varies with ribbon width, the mathematical relationship between ribbon width and carriage location is also fed into the computer. With this information stored in the computer, the operator thereafter need only enter the desired pattern number and ribbon width in the switch register **84** of the computer in order to perform a make-ready operation.

The ribbon width data, together with the pattern number and the information relating to the relationships between ribbon widths and carriage positions, are all utilized by the computer to determine which carriages are involved, and the desired position of every carriage that is to be adjusted. The computer performs the required computations, and digital data specifying the desired carriage positions appear sequentially in an output accumulator **86** of the computer from which they are transferred to parallel-data output registers **87.**

The basic concept of this embodiment of the invention is that the desired carriage positions, as indicated by the digital data at the computer's output **86,** are continuously compared with an actual carriage position as revealed by digital data from each resolver **80.** When these data match, a transition in signal level, which serves as a stop signal, is produced at terminals **92** by a digital comparator **88.** A start signal produced at terminal **90** connects to a circuit **77, 83, 85** to start the run relay **54.**

Initial direction of operation of each carriage motor being operated is ascertained by automatically comparing the desired carriage position as indicated by the output **86** of the computer **82** with the actual carriage position as indicated by the resolver **80.** When the resolver shows that the carriage is in a position farther forward than the desired position, the digital comparator **88** produces a binary "1" at its direction terminal **92,** which causes the carriage motor to operate in a reverse direction. A binary "1" at terminal **92** causes transistor **101** to conduct, which energizes relay **52,** closing its contacts **52***a* and opening contacts **52***b,* thereby controlling direction of motor **34,** because of the effect of phase-splitting capacitor **89.** Conversely, when the resolver **80** shows that the actual carriage position is not as far forward as the desired position, a binary "0" appears at output **92** of the digital comparator **88,** which causes the direction of operation of the carriage motor to be forward. After the automatic adjustments are completed, minor refinements in carriage positions can be made either manually or by the operation of other equipment not part of this invention which automatically and continuously controls the ribbon registration by photoelectric means while the press is running. Manual adjustments in carriage position may be made by operating the switches **94,94'** which are capable of momentarily transferring the control of the motor relays from the digital comparators to the manual pushbutton switches themselves. A display device **96,** such as a digital register, from the resolver **80** shows the position of any carriage selected by a selector switch **98** for display.

To recapitulate, the operator first enters a pattern number is the switch register **84** of the computer **82,** and stores it. He then enters data stating the desired ribbon width in the same switch register, stores it, and presses a computer switch to start the operation. Proper carriage positions for the slitters, the compensators and the angle bars are calculated by the computer **82** based upon both the data that have just been entered and earlier-performed programmed data that has been stored in the internal core memory of the computer.

Data stating the desired positions of the carriages are then transmitted from the computer to output registers **87,** under control of select code detectors **102** which recognize the select code for data to be stored in each output register, and which control motor starting by producing a pulse at terminal **90.** Data from resolvers **80** and from output register **87** are compared in digital comparators **88** (one being provided for each motor). Their outputs **92,92'** control motor directions by producing a binary "1" only when the motor is to run in a first direction to get to the desired position, and a binary "0" when the motor is to run in a second direction to get to the desired position, which position is dictated by the output register **87.** Direction of operation of each motor is determined as described above by the relative magnitudes of the resolver data and the digitally computed desired position of each carriage. The correct motor operates until such time as the associated carriage comes to a desired position as signified by change of relative magnitudes of the digital resolver **80** output and the data from the register **87** concerning desired position. The carriage motors stop the carriages at the correct places, with the circuits **91, 85, 54, 91' 85' 58,** operating in the same way as in the first embodiment described above.

The operator then webs the ribbon associating apparatus along a route indicated by the train of lamps **66'** which are glowing. FIG. **7** shows the lamps **66'** and their driver amplifiers **68'.** The lamps **66'** are controlled by output registers **104** which accept data from the computer's accumulator output **86** under control of a select code detector **106,** just as did the other output registers **87.** Each lamp requires only one bit of data, so the status of many lamps can be specified by each word of data.

The operator then starts the entire printing system, inspects the product, and either refines the carriage settings manually or else permits the refinements in position to be made automatically by a continuous ribbon registration device if available, which is not part of this invention.

Final positions of the carriages may then be read one at a time by the operator on the switchable display device If the operator wishes to do so, he may correct the contents of the core memory of the computer **82** as to the constants required for setting the carriages. Thus, the data stored in the computer can be made more accurate and re-stored therein in accordance with whatever actual final positions of the carriages are required to produce an accurate product. Subsequent make-ready operations of the ribbon associating apparatus therefore cause the carriages to move to new and more accurate values of final positions based upon new val-

ues of constants in the internal memory of the computer **82**.

Ordinarily all pages of a signature have the same width so that a single word of digital data suffices to place in the computer **82** the information about ribbon width for any one product setup. However, in the case of products with, for example, gatefold pages, where one ribbon **14** in a signature may be 50 percent wider than the others, programming provision is made for manual entry of the additional words of information required for indicating the width and identity of the wider page or pages into switch register **84**.

Those having skill in the art will appreciate that the computer **82** may be programmed in various ways to produce the desired result. In general, the basic carriage positions for each pattern number are stored in the computer core. The information would include, for example, which turner bars **28,28'**, web compensators and ribbon compensators are to be used for a particular pattern. This information could be calculated or obtained empirically for each pattern and a basic ribbon width such as, for example, a 10 inch ribbon. Since the mathematical relationship between carriage position and ribbon width is a linear relationship, the computer may be programmed to vary the carriage locations in accordance with this relationship for all ribbon widths other than a 10 inch width.

Other embodiments of the invention may involve having all of the data stored externally on punched cards or other data storage means. Also, final position settings of the carriages could be recorded automatically on the external punched cards or other external data storage devices. It will be evident to a practitioner of the art that such other embodiments and still others differing in detail from the examples described herein may be employed, completely within the contemplation of the present invention.

Having thus described the invention, what is claimed is:

1. In a ribbon associating apparatus for interleaving ribbons in a variety of patterns, said apparatus including a frame, slitter means on said frame for slitting a web into ribbons of a desired width, and angle bars and compensator rollers around which the ribbons are adapted to pass with each of said angle bars and compensator rollers being adjustably supported on said frame whereby the position of said angle bars and compensator rollers may be varied to vary the interleaved ribbon pattern, the improvement comprising:

said adjustable supports comprising carriage means movably supporting each of said angle bars and compensator rollers,

a separate motor means operatively connected to each of said carriage means and being operable to displace said carriage means relative to said frame thereby to alter the position of said angle bars and compensator rollers,

selectively interrogatable memory means for storing information representative of desired positions of said angle bars and said compensator rollers for each of a plurality of ribbon patterns, said memory means having output circuit means for carrying position command signals for said desired positions for a selected said ribbon pattern when said memory means is selectively interrogated for said selected ribbon pattern;

means for selectively interrogating said memory means to cause said output circuit means to carry position command signals for a selected said ribbon pattern; and

control circuit means responsive to said command signals for controlling said motor means to displace said carriage means so that said angle bars and said compensator rollers are positioned in accordance with an associated selected said ribbon pattern.

2. The apparatus of claim **1** and further including carriage means movably supporting said slitter means,

motor means operatively connected to each of said slitter carriage means and being operably to displace said slitter carriage means relative to said frame thereby to vary the width of the ribbons slit from the web.

3. The apparatus of claim **2** wherein each of said carriage means comprises a rotatable threaded rod rotatably supported on said frame, and

threaded carriage nut means received over said threaded rod whereby rotation of said threaded rod displaces said carriage nut means longitudinally of said rod.

4. The apparatus of claim **2** wherein said memory means includes means for also storing information representative of desired positions of said slitter means for each of said plurality of ribbon patterns, said memory output circuit means also carrying slitter position command signals for said desired slitter positions for a selected said ribbon pattern in response to being interrogated by said interrogating means, and said control circuit means including circuit means responsive to said slitter position command signals for controlling said slitter motor means to displace said slitter carriage means to vary the width of ribbon slit from said web.

5. The apparatus of claim **4** wherein said memory means comprises the memory bank of a computer.

6. The apparatus of claim **1** including means indicating the position of said carriage means and means for comparing the indicated position of said carriage means to the selected position of said carriage means stored in said memory means.

7. The apparatus of claim **6** and further including display means for displaying the position of said carriage means, and

selector switch means connecting said display means to said means for indicating the position of said carriage means whereby the position of any selected carriage means may be displayed.

8. The apparatus of claim **1** and further including means for providing a visual display of the angle bars and compensator rollers for each of the plurality of ribbon patterns,

said memory means including information relating to the visual display for each ribbon pattern, and

circuit means connecting said memory means to said visual display means.

9. The apparatus of claim **8** wherein said visual display means comprises light means associated with each of said angle bars and compensator rollers.

10. The apparatus of claim **1** including a plurality of spaced apart position sensing means for respectively sensing the presence at particular locations of an associated said carriage means as it is being displaced by a said motor means, said control circuit means including circuit means for deenergizing said motor means when said sensing means detect the presence of said carriage

means at a said particular location corresponding with the selected said ribbon pattern.

11. The apparatus of claim **10** wherein said memory means further includes means for selecting certain of the position sensing means in accordance with the selected ribbon pattern whereby only the selected position sensing means are operative for use in de-energizing said motor means.

12. A method of performing make-ready operations on a ribbon associating apparatus wherein said apparatus includes slitter means, angle bars and compensator rollers supported on the frame of the apparatus and wherein motor means are connected to each of said angle bars and compensator rollers with said motor means being operative to vary the relative positions of said angle bars and compensator rollers whereby a variety of interleaved ribbon patterns may be obtained, said method comprising the steps of:

storing information in an electrically interrogatable memory means concerning the position of the angle bars and compensator rollers for each of a plurality of ribbon patterns,

storing information in the memory means which identifies each of the ribbon patterns by a pattern identification number, and

electrically interrogating the memory means in accordance with a selected pattern identification number to obtain said information for each ribbon pattern to be run, and providing position command signals in dependence upon said information to actuate the motor means associated with said angle bars and compensator rollers to position the angle bars and compensator rollers in accordance with the information stored in the memory means for the selected pattern identification number.

13. The method of claim **12** and further including the steps of:

storing information in the memory means relating to the relationship between ribbon width and the position of the angle bars and compensator rollers for each ribbon pattern; and

the step of interrogating the memory means further includes the step of specifying the desired ribbon width.

14. The method of claim **13** wherein said slitter means are operatively connected to motor means and the step of interrogating the memory means causes the motor means associated with said slitter means to position said slitter means in accordance with the selected ribbon width.

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