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Ploeger, Jr. et al.

[11] **3,716,125**

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[54] **THREE COMPONENT PRINTING RIBBON AND METHOD OF MAKING SAME**

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[51] **Int. Cl.** **B41j 31/02**

[58] **Field of Search** 197/172, 175, 165

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[57] **ABSTRACT**

A printing ribbon has two differently constructed portions interconnected by an uninked connector strip welded to the ends of said portions to form a three component ribbon.

4 Claims, 3 Drawing Figures

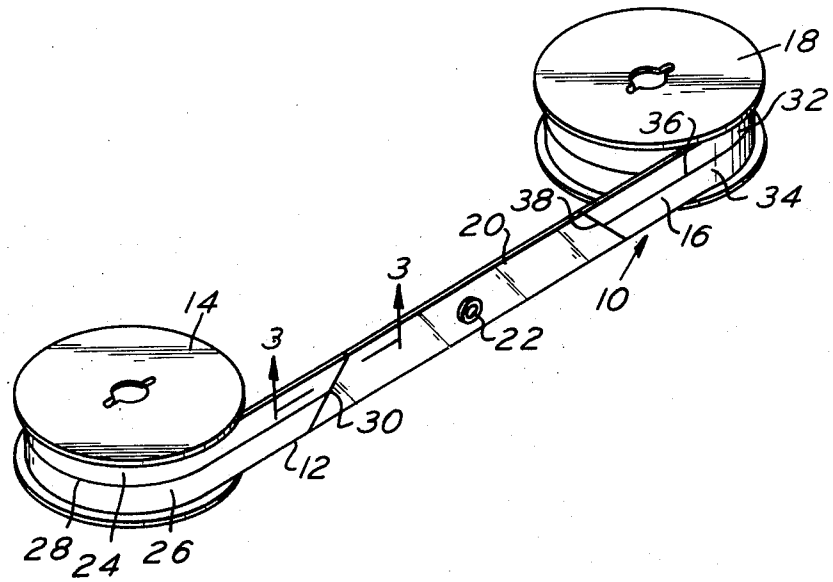


FIG. 1

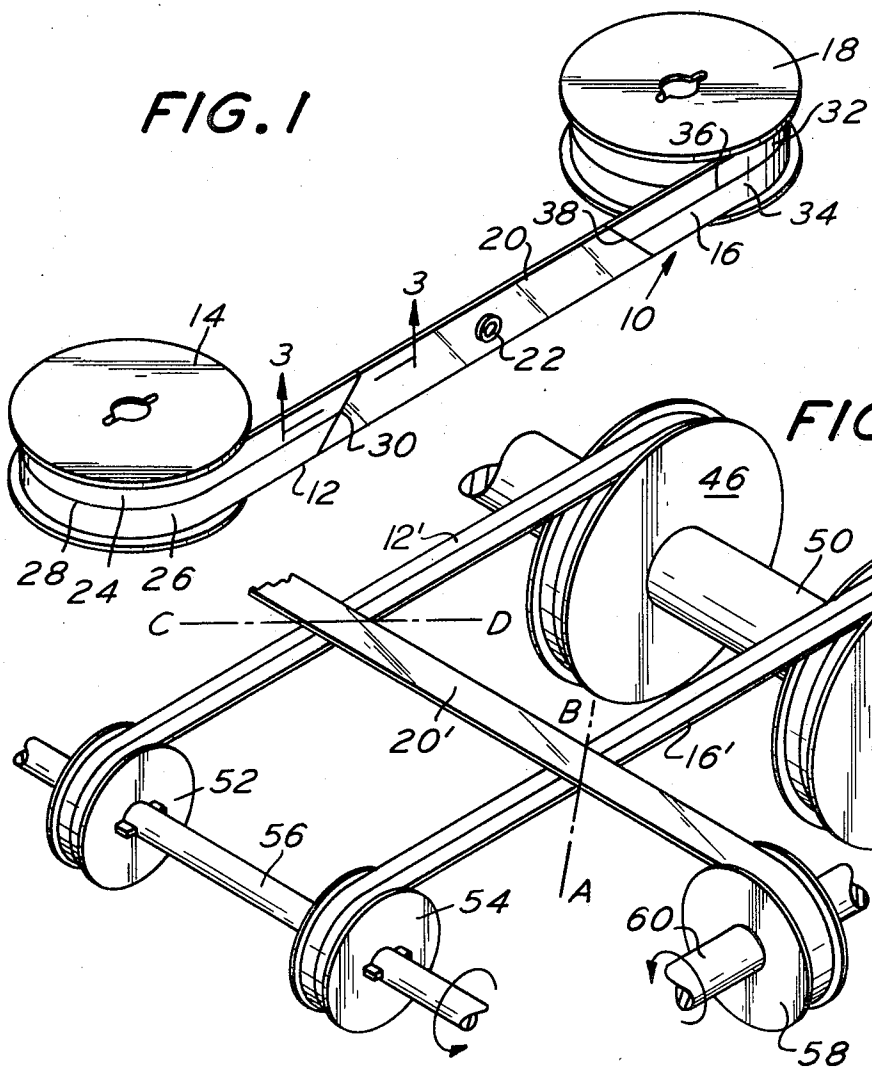


FIG. 2

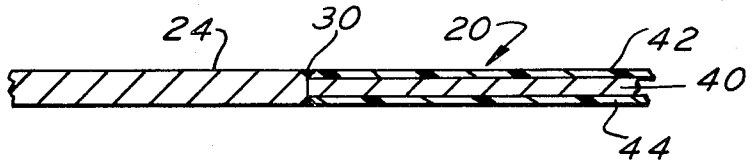


FIG. 3

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THREE COMPONENT PRINTING RIBBON AND METHOD OF MAKING SAME

The invention is directed to a printing ribbon which is to be wound on spools for use in machines such as typewriters, computers, bank record machines, etc. The ribbon has three components including first and second ribbon portions which are different from each other and interconnected by an uninked connector strip. The connector strip is preferably welded to each of the first and second portions by a weld disposed along a bias. The bias of the weld is preferably a 45° angle.

The first and second ribbon portions may differ from each other by details of construction. For example, one ribbon portion may be a conventional printing ribbon and the other may be a strip of correction material such as the correction material designated as layer 22 in U.S. Pat. No. 3,273,686. For a conventional printing ribbon which is preferably made from nylon, see U.S. Pat. No. 3,010,559. Alternatively, the first and second portions of the ribbon may differ from one another only in the color of the ink or other printing medium on each portion. Each of the first and second portions need not be inked completely from a single color, but may be inked with dual colors.

The connector strip may be a layer of nylon plastic film. Preferably, the connector strip is a sandwich of uninked nylon fabric between layers of nylon film with the layers being welded along their longitudinally extending side edges. The sandwich construction is preferred so as to be opaque and thereby facilitate ease of distinguishing between the ribbon portions. A trademark, installation instructions, or other information may be printed on the connector strip. The connector strip is preferably located at the center of the ribbon so that it will be the portion grasped by the fingers when installing the ribbon without soiling one's fingers. A connector strip prevents migration of the ink or printing medium from one portion of the ribbon to the other. The connector strip is preferably of a sufficient length so that it may completely wrap around one portion of the ribbon wound on the spool and thereby prevent contact between the portions when they are wound on the same spool.

It is an object of the present invention to provide a novel printing ribbon.

It is another object of the present invention to provide a novel printing ribbon having two differently constructed portions interconnected by a connector strip.

It is another object of the present invention to provide a more versatile printing ribbon having two differently inked portions interconnected by an uninked connector strip.

It is another object of the present invention to provide a printing ribbon having an uninked connector strip substantially at the center thereof to prevent soiling fingers when installing the ribbon.

It is another object of the present invention to provide a novel method of making a printing ribbon.

It is another object of the present invention to provide a novel method of making a printing ribbon from two differently constructed portions in a simple, reliable and inexpensive manner.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the drawing a form which is presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a perspective view of a printing ribbon in accordance with the present invention wound on spools.

FIG. 2 is a perspective view of apparatus used in making the printing ribbon of the present invention.

FIG. 3 is a sectional view taken along the line 3—3 in FIG. 1.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIG. 1 a printing ribbon designated generally as **10**. The ribbon **10** includes a first ribbon portion **12** wound on spool **14** and a second ribbon portion **16** wound on spool **18**. One end of ribbon portion **12** is secured to its spool **14**. One end of ribbon portion **16** is secured to its spool **18**. The free ends of the ribbon portions **12** and **14** are interconnected by a connector strip **20**.

The connector strip **20**, if desired, may have a grommet **22** attached thereto to designate the center of the ribbon **10**. The ribbon portion **12** differs from the ribbon portion **16**. For purposes of disclosure, these ribbon portions **12** and **16** differ from one another in the color of ink or printing medium applied thereto. For example, ribbon portion **12** is comprised of longitudinally extending strips **24** and **26** which are inked with different colors separated by the barrier **28**.

The barrier **28** may be a mechanical barrier such as that disclosed in U. S. Pat. No. 3,274,039. Alternatively, the barrier **28** may be a normal barrier attained when strip **24** is inked with a color red and strip **26** is inked with a color black, using repelling inks which do not migrate into one another. In a similar manner, the strips **32** and **34** may be colored blue and green respectively with the barrier **36** preventing migration of the different colored inks.

The connector strip **20** is joined at one end to ribbon portion **12** by a butt weld **30**. Weld **30** is disposed at a bias of approximately 45° with respect to the side edges of the ribbon **10**. The other end of the connector strip **20** is joined to the ribbon portion **16** by means of weld **38**. Weld **38** is likewise disposed at a bias of approximately **45°** with respect to the side edges of the ribbon **10**. It will be noted that the welds **30** and **38** converge.

As shown more clearly in FIG. 3, the connector strip **20** is preferably a sandwich comprised of uninked fabric **40** between layers of film **42** and **44**. The combined thickness of the layers **40**, **42**, and **44** of the sandwich forming the connector strip **20** preferably correspond approximately to the thickness of the ribbon portions **12** and **16**. The fabric **40** is preferably one which can be welded, and therefore is preferably nylon. The film layers **42** and **44** are also preferably nylon film having their longitudinally extending side edges welded to the longitudinally extending side edges of the fabric **40**. The connector strip **20** preferably has a length which is slightly greater than the diameter of the ribbon portion **12** when it is wound on spool **14** or the ribbon portion **16** when it is wound on spool **18**. In this manner, the connector strip **20** will prevent migration of ink or printing medium from ribbon portion **12** to ribbon portion **16** when they are wound on the same

spool. Typically, connector strip **20** will have a length of approximately **6** inches.

In FIG. **2**, there is shown apparatus as used in the present invention. As shown therein, reels **46** and **48** are mounted on a shaft **50** for rotation therewith in the direction of rotation indicated in FIG. **2**. Reels **52** and **54** are mounted on shaft **56** for rotation in the direction thereof as indicated in FIG. **2**. The reels **46**, **48**, **52** and **54** are preferably adjustable along the length of their respective shafts **50** and **56** so that they may be aligned with one another as indicated in FIG. **2**.

The ribbon material **12'** wound on reel **46** corresponds to the ribbon portion **12**. The ribbon material **12'** is to be unwound from reel **46** and wound on reel **52**.

The ribbon material **16'** corresponds to the ribbon portion **16**. The ribbon material **16'** is wound on reel **48**. As the material **16'** is unwound from reel **48** it is wound onto reel **54**. The distance between adjacent reels **46**, **48**, **52** and **54** on the shafts **50** and **56** is selected so as to correspond generally to the desired length of the connector strip **20**.

Ribbon material **20'** is wound on spool **58**. Spool **58** is attached to shaft **60** which rotates in a direction indicated in FIG. **2**. When a sufficient or desired amount of the materials **12'** and **16'** have been wound on the reels **52** and **54** respectively, rotation of the shafts **50** and **56** is terminated. Thereafter, the material **20'** is unwound from spool **58** so that it overlies the ribbon materials **12'** and **16'** is shown in FIG. **2**. Thereafter, a cut is made with a heated knife along the lines designated AB and CD. This cutting action severs the connector strip **20** from the ribbon material **20'**, severs the ribbon portion **12** from the ribbon material **12'**, severs the ribbon portion **16** from the ribbon material **16'**, and simultaneously welds the ends of the connector strip **20** to the free ends of the ribbon portions **12** and **14**. In this manner, the ribbon **10** that is produced is wound on a pair of reels wherein reels **52** and **54** would correspond to spools **14** and **18** respectively.

As soon as the reels **52** and **54** are removed from the shaft **56**, replacement reels may be added thereto so that the process may be repeated. In repeating the process, the free end of ribbon material **12'** is secured to the replacement reel aligned therewith. Also, the free end of ribbon material **16'** is attached to the replacement reel aligned therewith. Reel **46** preferably contains ribbon **12'** of nylon fabric ½ inch wide and reel **48** preferably contains similar ribbon material **16'** of the same width. The ribbon material **20'** has a width corresponding to the width of the ribbon materials **12'** and **16'**. After the cutting action along the lines AB and CD, the free ends of the ribbon materials **12'**, **16'** and **20'**, may be squared. That is, the ribbon materials **12'**, **16'** and **20'** are cut transversely and any portion of the ribbon materials **12'**, and **16'** and **20'** which were joined together when said cutting action occurred along lines A, B, and C, D are discarded.

The cutting of the material **12'**, **16'** and **20'** along lines AB and CD may be accomplished by heated knives, heated wires, or other conventional devices well know to those skilled in the art. Hence, the structure of such knives or heated wires are not described in detail.

While nylon is the preferred material referred to above, other materials capable of being welded may be used. Thus, portions **12** and **16**, and fabric **40** may be made from Dacron, while the layers of films **42** and **44** may be made of Mylar. If desired, portions **13** and **16** may be provided with a protective film welded only to the side edges thereof as disclosed in U. S. Pat. No. 3,010,559 to prevent direct contact between a type bar and the printing medium on the ribbon portions **12** and **16**. The lack of such direct contact eliminates the need for cleaning the printing key. The printing portions **12** and **16** and the connector strip **20** are each flexible and pliable so that they may be wound on spools and used in the machines referred to above.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof, and, accordingly, reference should be made to the appended claims, rather than to the foregoing specification as indicating the scope of the invention.

We claim:

1. A printing ribbon having two different printing portions, a connector strip different from said printing portions, said connector strip having each end connected to one end of each of said printing portions and forming a continuation thereof, two spools, each printing portion having its free end secured to one of said spools, the length of said connector strip being greater than the circumference of at least one printing portion when wound around its spool, each end of said connector strip being joined to one end of said printing portions by a butt weld, said butt welds being disposed on a bias and being a barrier for preventing a printing medium on said printing portions from migrating into said connector strip, said connector strip and printing portions being made from a material which may be welded to each other, said connector strip being a sandwich with the outer layers of the sandwich being layers of plastic film.

2. A printing ribbon in accordance with claim 1 wherein said sandwich includes nylon fabric between the layers of plastic film.

3. A printing ribbon in accordance with claim 1 wherein at least one of said printing portions has different colored inked strips separated by a longitudinally extending ink impervious center barrier.

4. A method of making a three component printing ribbon comprising the steps of winding two different components each having a printing medium thereon on separate reels spaced from one another, placing a connector strip so that it extends transversely across and overlies a portion of said components not wound on the reels, using a connector strip whose length is greater than the distance between the component portions, said step of placing a connector strip including unwinding a spool of the connector strip supported for rotation about an axis at an angle with respect to the longitudinal axis of said reels, welding the connector strip to the juxtaposed portion of the components with the weld being on a bias while severing the components to produce a three component ribbon with one end of one component connected to one end of the other component by said connector strip.

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