Aug. 12, 1969 W. PLOEGER, JR 3,460,666

ENDLESS PRINTING RIBBON

Filed March 6, 1968

FIG. 1

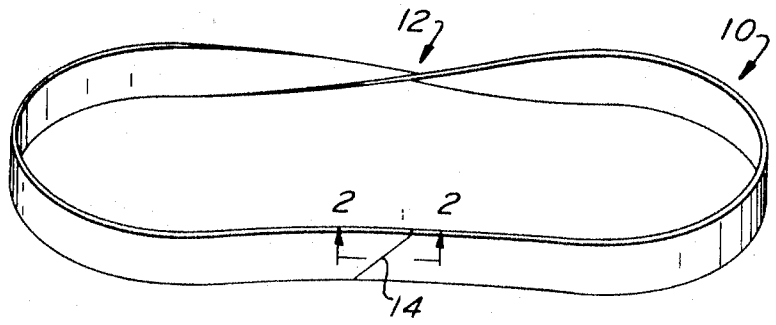


FIG. 2

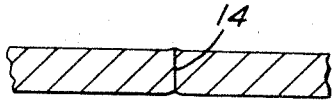


FIG. 3

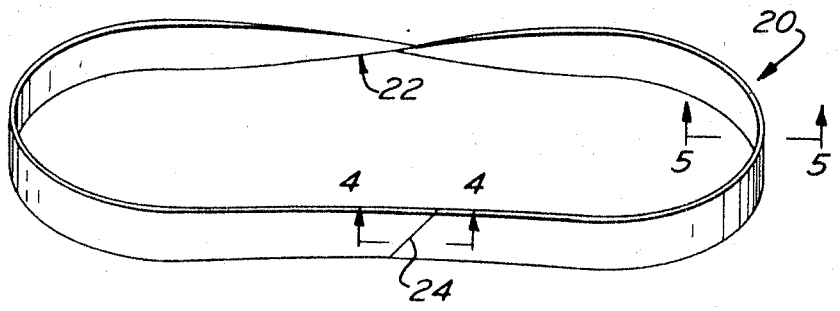
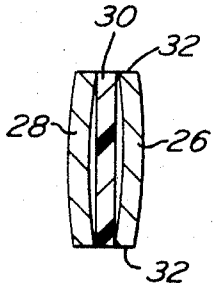


FIG. 5



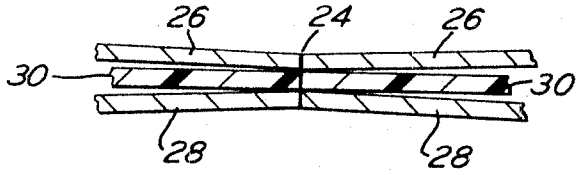


FIG. 4

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United States Patent Office 3,460,666
Patented Aug. 12, 1969

3,460,666

ENDLESS PRINTING RIBBON

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Filed Mar. 6, 1968, Ser. No. 710,900
Int. Cl. B41j *33/10, 31/02*
U.S. Cl. 197—172 4 Claims

ABSTRACT OF THE DISCLOSURE

Endless printing ribbons are disclosed with a permanent ravelproof 180 degree twist in the ribbon for increased structural life and increased ink life.

Endless printing ribbons are known. For example, see U.S. Patents 2,793,153 and 3,086,901. Endless printing ribbons are used on a variety of machines, such as certain teletype machines, price tag printing machines, cash registers, time recording machines, stenographic machines, etc. Heretofore, endless printing ribbons were made from tape having its ends welded as per Patent 3,086,901 or from tubes which are cut transversely to form the ribbons.

The ribbons of the present invention have increased structural life and increased ink life due primarily to the 180 degree twist as well as improved ink consistency. The 180 degree twist is permanently built into the ribbon as to be ravelproof. On every cycle of the ribbon, alternate sides thereof will be exposed to the type face. The 180 degree twist is a gentle or graceful twist so as to extend over a substantial length of the ribbon and as a result thereof does not interfere with the cycling mechanism in the machines.

It is an object of the present invention to provide a novel endless printing ribbon having a 180 degree twist to the ribbon.

It is another object of the present invention to provide a novel endless printing ribbon having increased structural life, increased ink life, as well as improved ink consistency.

Other objects will appear hereinafter.

For the purpose of illustrating the invention there is shown in the drawing forms which are presently preferred.

FIGURE 1 is a perspective view of a preferred embodiment of the endless printing ribbon of the present invention.

FIGURE 2 is a sectional view taken along the line 2—2 of FIGURE 1.

FIGURE 3 is a perspective view of another embodiment of the present invention.

FIGURE 4 is a sectional view taken along the line 4—4 in FIGURE 3.

FIGURE 5 is a sectional view taken along the line 5—5 in FIGURE 3.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIGURE 1 an endless printing ribbon designated generally as **10**. Ribbon **10** is provided with a **180** degree twist **12**. Twist **12** extends over a substantial length of the ribbon **10** so that the ribbon **10** can pass around guide posts during cycling within the printing machine without interfering with the same. Because of the twist **12**, the ribbon **10** will have its opposite faces alternatively exposed to the type face. Printing machines which utilize endless ribbons normally have an inking fountain which periodically re-inks the ribbon.

The opposite sides of the ribbon **10** are alternately exposed to the type face and the inking fountain. As a result thereof, the ink life and structural life are increased. Structural life is increased since the opposite sides of the ribbon **10** contact the type face, whereby each side absorbs

one-half the pounding which is normally absorbed by a single side of the ribbon **10**.

Heretofore, inked ribbons wasted ink due to the fact that ink was present adjacent the surface which is remote from the paper in amounts which are insufficient to flow by capillary action to the opposite surface of the ribbon. Because of the 180 degree twist, this ink can now be utilized for printing. Further, the 180 degree twist will result in both surfaces of the ribbon **10** being alternately inked by contact with the ink fountain thereby providing improved consistency.

The ribbon **10** is preferably made from a flexible woven thermoplastic fabric such as nylon, having a thickness of about .004 inch. The width of the ribbon **10** can be varied as desired. Most printing machines use a ribbon having a width of one-half inch. Ribbon **10** may be made from elongated tape as disclosed in U.S. Patent 3,086,901. When made as per said patent, the tape is twisted to form twist **12** before making the butt-weld joint **14**. Hence, twist **12** is permanent and ravelproof. Joint **14** is on a bias of approximately 45 degrees and contains ink due to the fact that the ribbon **10** was pre-inked before joint **14** was made. Joint **14** lies in the plane of the ribbon **10** so as not to interfere with smooth operation of the printing machine.

In FIGURES 3–5, there is disclosed another embodiment of the present invention designated generally as **20**. Ribbon **20** has a 180 degree twist **22** as described above and may be made in the same manner so as to have a butt-weld joint **24** on a bias of approximately 45 degrees. Ribbon **20** includes a first layer of fabric **26** spaced from a second layer of fabric **28** by a layer of film **30**. Layers **26** and **28** are joined to layer **30** only by a weld **32** along the extreme edges of said layers **26** and **28**. The welds **32** only affect the last thread along the edges of layers **26** and **28**.

Layers **26** and **28** are made from the same material as ribbon **10**. Layer **30** is a flexible, pliable layer of inked impervious, tough, thermoplastic film. I prefer to make layer **30** from nylon film having a thickness of about .0005 to .0010 inch. Substantially more ink may be applied to ribbon **20** due to the fact that a reservoir will exist between each fabric layer **26** and **28** and the film layer **30** without causing puddling. Puddling occurs when the ribbon is inked to excess so that blurred images are transferred when the ribbon is contacted by type face.

Since layers **26** and **28** are alternately exposed to the type face, the life of the ribbon **20** is substantially increased. Since each layer **26** and **28** is a separate entity having its own reservoir, ink life of the ribbon **20** is substantially greater than expected. Layer **30** is thin enough so as not to affect the transfer of the image on the type face. Ribbon **20** otherwise has the attributes of ribbon **10**.

Each of the ribbons **10** and **20** have a sealed edge of fused nylon in addition to having the configuration of a Mobius strip. In ribbon **10** the fused seal which is less than the thickness of a thread is attained by slitting the ribbon from a bolt by use of a heated rotating knife. In ribbon **20** the edge seal is attained by weld **32**. Weld **32** is attained by simultaneously slitting layers **26**, **28** and **30** with a heated rotating knife. The edge seal makes the ribbons leakproof at their edges and in the case of ribbon **20** it also maintains the layers in assembled relationship.

It is claimed:

1. An endless printing ribbon having the configuration of a Mobius strip so that alternate sides of the ribbon may be exposed to contact with type face, said ribbon including a layer of inked, woven, flexible, nylon fabric having a butt-welded joint on a bias across its width and having sealed edges.

2. A ribbon in accordance with claim **1** including a second layer of inked, woven, flexible, nylon fabric separated from the first layer by a thin flexible layer of tough ink-

impervious nylon film, with only the extreme edges of said fabric layers being joined to said film layer by a weld.

3. A ribbon in accordance with claim **2** wherein the film has a thickness which is less than one-half the thickness of the first fabric layer.

4. A ribbon in accordance with claim **3** wherein the butt-weld lies in the plane of the ribbon.

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U.S. Cl. X.R.

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