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W. PLOEGER, JR.

3,461,998

IMPRESSION RIBBON AND METHOD OF MAKING SAME

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FIG. 1

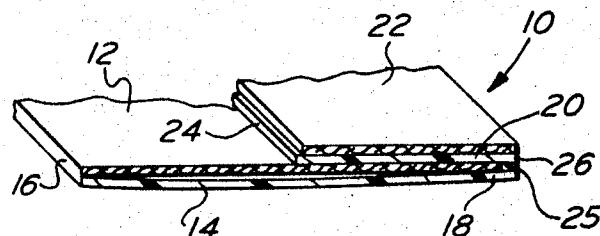


FIG. 2

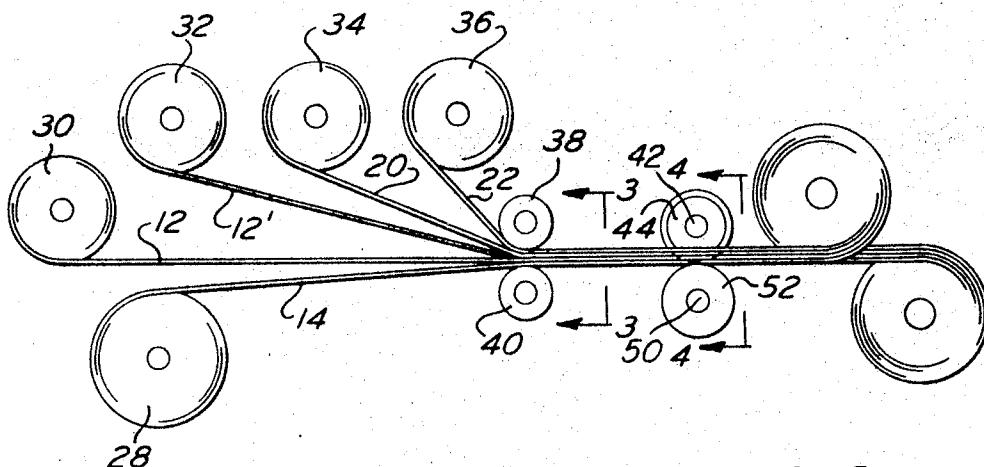


FIG. 3

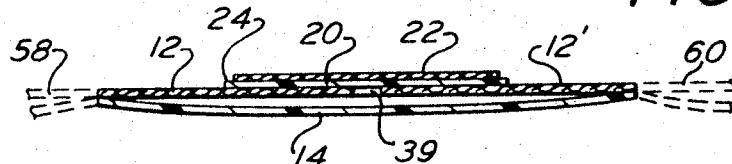
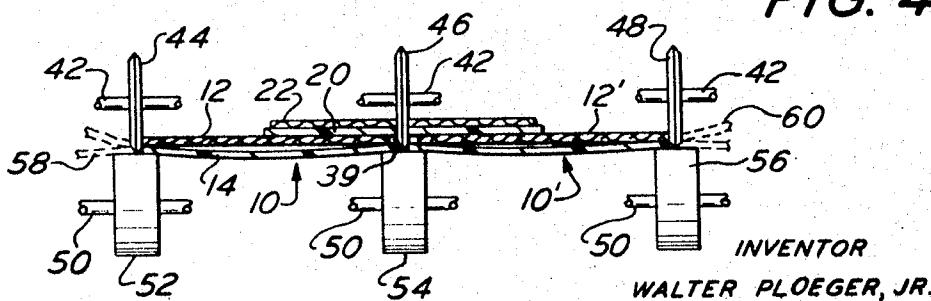


FIG. 4



BY *Seidel & Honda*

ATTORNEYS

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## IMPRESSION RIBBON AND METHOD OF MAKING SAME

Walter Ploeger, Jr., North Bellmore, N.Y., assignor to  
Filmon Process Corporation, New York, N.Y., a cor-  
poration of New York

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6 Claims

### ABSTRACT OF THE DISCLOSURE

A method of making a multi-layer impression ribbon is provided wherein a layer of fabric having a transfer medium thereon is joined to a superimposed layer of ink impervious film only along one edge so that the layers may independently expand or contract in width.

The present invention is directed to an improvement over my prior invention described in U.S. Patent 3,273,-686. The present invention is directed to a method of making a multi-layer impression ribbon of the type disclosed in said patent but wherein the fabric and film layers may independently expand or contract in width. Such expansion or contraction will take place as a result of heat, atmospheric conditions such as relative humidity, etc. The film which overlies the fabric layer protects the fabric layer from contact with the keys of office machinery such as a typewriter.

Constant pounding of the protective film layer by the keys of a typewriter tend to make the film thinner and therefore wider. There is a tendency of the film to pucker or wrinkle when both longitudinal side edges of the film and fabric are joined together. The present invention is directed to a method of making the multi-layer impression ribbon in a manner so as to reduce the tendency of the film to pucker. At the same time, the thickness along one edge of the multi-layer impression ribbon is reduced by the thickness of the fabric so that this edge may be more readily fed through guides of the office machine.

It is an object of the present invention to provide a method of making a multi-layer impression ribbon.

It is another object of the present invention to provide an impression ribbon wherein various layers thereof may independently expand or contract in width.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there is shown in the drawing a form which is presently preferred.

FIGURE 1 is a partial perspective view of the impression ribbon produced by the method of the present invention.

FIGURE 2 is a schematic elevation view of apparatus for making the impression ribbon of FIGURE 1.

FIGURE 3 is a sectional view taken along the line 3—3 in FIGURE 2.

FIGURE 4 is a sectional view taken along the line 4—4 in FIGURE 2.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIGURE 1 an impression ribbon designated generally as 10. An impression ribbon in accordance with the present invention may be of a width suitable for use in typewriters or may be in a greater width suitable for use in other office machinery such as tabulators, computers, etc. wherever an impression ribbon is utilized.

The impression ribbon 10 may be an elongated member having a length of approximately ten yards with its ends wound on spools. Alternatively, the impression ribbon may be in the form of an endless loop. Impression ribbon 10 includes a first layer 12 adapted to have a transfer

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medium thereon. Layer 12 may be a layer of nylon, Dacron, or other similar fabric and the transfer medium thereon may be any formulation of ink. The thickness of layer 12 is .004 inch. This thickness may be slightly greater or lesser as desired.

Layer 12 is superimposed over a second layer 14. Layer 14 is a layer of polymeric material which is ink impervious, flexible, pliable and heat sealable. Layer 14 may be made of nylon, polyethylene, Mylar, etc. Layer 14 has a thickness of between .0005 and .001 inch. In ribbon 10, layer 14 has a width which is greater than the width of layer 12 by a distance of between .03 and .18 inch. I prefer to have this difference in width at the smaller end of the range, namely about .03 inch since the wider layer 12 is, the more ink it will hold.

The layers 12 and 14 are joined together only along the extreme side edge 16 by a fused welded joint. A third layer 20 overlies a longitudinal half of the ribbon 10 remote from the edge 16. Layer 20 is preferably made from the same material as layer 14. A fourth layer 22 overlies the third layer 20. Layer 22 is narrower than layer 20 so as to provide an exposed edge portion 24 on the layer 20. Layer 22 has a transfer medium thereon which is preferably different from the transfer medium on layer 12. Thus, the respective transfer mediums may differ in color, composition, formulation, etc. In a simple form of ribbon 10, the transfer medium on layer 12 may be black ink and the transfer medium on layer 22 may be red ink. In another simple form of the ribbon 10, the transfer medium on layer 22 may be a camouflage material such as a tacky mixture of a finely divided powdered pigment such as titanium oxide with a binder and carrier such as partly polymerized natural oils, waxes, or the like. Such camouflage materials are well known to those skilled in the art. When the transfer medium on layer 22 is a camouflage material, the transfer medium on layer 12 may be any color ink.

The layers 14, 20 and 22 are connected together by a fused welded joint along edge 26. Edge 26 is spaced from edge 18 on the layer 12. Edge 18 is not physically connected to any of the layers of the ribbon 10. In this manner, the layer 12 may expand due to environmental conditions into the gap 25 between the welded joint along edge 26 and the edge 18.

The film 14 is wound on a spool 28. The layer 12 is wound on spool 30. A layer 12', identical with layer 12, is wound on a spool 32. Spools 30 and 32 may be disposed on a common shaft and spaced from one another by a gap. The layer 20 is wound on spool 34. The layer 22 is wound on spool 36. The various layers are unwound from the spools and fed through drive rollers 38 and 40 with the layers superimposed over one another as shown more clearly in FIGURE 3. For purposes of illustration, FIGURE 3 illustrates the layers in relationships involved in producing two or more of the ribbons 10 simultaneously. It will be noted that the width of layer 14 is greater than the combined widths of layers 12 and 12'. Thus, layers 12 and 12' are separated from one another by a gap 39. Layers 20 and 22 are centrally disposed with respect to the gap 39. The width of gap 39 is twice the intended width of gap 25.

The layers of material as described above and illustrated in FIGURE 3 are fed by the rollers 38 and 40 beneath a shaft 42. On shaft 42, there is provided three heated cutter knives 44, 46, and 48. The knives are driven by the shaft 42 and are circular in periphery. The distance between the side faces of any two adjacent knives corresponds to the width of the ribbon 10.

An anvil 52 is provided on shaft 50 beneath the knife 44. Anvil 54 is provided on shaft 50 below knife 46. Anvil 56 is provided on shaft 50 below knife 48. It will

be noted that knife 46 is orientated so that it will cut through the center of the gap 39. When making the ribbons 10 two at a time, the width of the layers 12, 12' and 14' may be greater than that occurring in the ribbon 10. Thus, any waste 58 or 60 occurring along the side edges may be discarded.

As referred to above, FIGURE 4 illustrates the production of two identical ribbons which are designated as 10 and 10'. Knife 44 provides the welded joint along the edge 16 while cutting through the layers 12 and 14. Knife 48 provides a similar welded edge. Knife 46 cuts through the layers 14, 20 and 22 at the gap 39 and provides a welded joint along the edge 26 of ribbon 10 and a similar edge on the ribbon 10'. Since the layers 12 and 12' are spaced from one another by way of the gap 39, the cutting and sealing action of knife 46 has no effect on the layers 12 and 12'. Thus, layer 12 of the ribbon 10 is joined to only one of the layers, namely layer 14 at the edge 16. In this manner, the layer 12 may independently expand or contract. Also, the layer 14 may expand or contract due to atmospheric conditions or the pounding effect of the keys of the office equipment. Thus, it will be noted that layers 12 and 14 are of different materials and react differently to environmental conditions as well as the fact that layer 14 will be subjected to forces which cause its width to change at a rate different from forces acting upon layer 12.

Thus, it will be seen that the method of making a multi-layer impression ribbon of the present invention is applicable to making ribbons one at a time or producing a plurality of ribbons simultaneously. The method of the present invention includes superimposing a first layer of flexible fabric such as nylon capable of having a transfer medium applied thereto such as ink over a second layer of ink impervious film in a manner so that the width of the film is greater than the width of the first layer. Thereafter, a third layer of ink impervious film is superimposed over a longitudinal half of the first layer and a fourth layer is superimposed over the third layer in a manner so as to provide an exposed edge portion on the third layer. Thereafter, sequentially or simultaneously, the first and second layers are welded to form a sealed fused joint along one side edge of the ribbon and a sealed fused joint is provided along the other side of the ribbon. The last-mentioned joint joins the second, third and fourth layers so as to provide a joint spaced from a free edge on the first layer. The free edge on the first layer is unattached so that the width of the layers may independently expand or contract.

For economic reasons, it is more practical to produce a plurality of the ribbons simultaneously as opposed to making the ribbons one at a time. The layer 12, and also layer 12', are preferably inked before they are mounted on spools 30 and 32. However, since edge 18 is not joined to any of the layers, ribbon 12 could be inked after the ribbon 10 has been manufactured. It is preferred to ink the layer 12 and layer 12' before they are unwound from their spools by the drive rollers 38 and 40. The exposed edge portion 24 acts as a barrier to prevent the transfer medium on layer 12 from contaminating the transfer medium on layer 22 and vice versa.

If desired, layer 22 may be eliminated so as to provide a novel ribbon having only one transfer medium. This will provide a ribbon wherein a typewriter key striking layer 14 opposite layer 20 will cause the impression to appear only on carbon copies but not on the original. This will permit a typist to type information which appears only on file copies with minimum effort such as pushing the key to shift the ribbon upwardly as is normally done with a two-color ribbon. In this manner, the file copies will not have to be separated and then separately processed through the typewriter so that the information desired could be typed thereon. Except for elimination of layer 22, all other steps would be performed as set forth above.

I claim:

1. A method of making an impression ribbon com-

5 prising superimposing a first layer of inkable nylon fabric over a second layer of ink impervious nylon film with the second layer being wider than the first layer, superimposing a third layer of ink impervious film substantially narrower than the first and second layers over a longitudinal half of said first layer so that the third layer projects beyond the adjacent side edge of the first layer, welding only the first and second layers to form a sealed joint along one side edge of the ribbon, welding the second layer to the third layer to form a sealed joint only along the other side edge of the ribbon, to thereby form a ribbon with the first layer being attached only to said second layer at the one side edge whereby the width of the layers may independently expand or contract.

10 2. A method of making an impression ribbon comprising superimposing a first layer of inkable fabric over a second layer of ink impervious film with the second layer being wider than the first layer, superimposing a third layer of ink impervious film narrower than the first and second layers over a longitudinal half of said first layer, superimposing a fourth layer having a transfer medium thereon over the third layer in a manner so as to expose an edge portion of the third layer, welding only the first and second layers to form a sealed joint only along one 15 side edge of the ribbon, welding the second layer only to the third and fourth layers to form a sealed joint along the other side edge of the ribbon, to thereby form a ribbon with the first layer being attached only to said second layer at the one side edge whereby the width of the layers may independently expand or contract.

20 3. A method in accordance with claim 2 for making a plurality of impression ribbons simultaneously wherein said step of superimposing a first layer over a second layer includes superimposing a pair of first layers over the second layer with the pair of first layers spaced from one another so as to provide a gap therebetween, said third and fourth layers being superimposed over the gap so as to be centrally orientated therewith, and the last-mentioned joint being formed by a hot knife passing through 25 the gap.

30 4. A method in accordance with claim 3 including the step of inking the layers of fabric before the layers of fabric are superimposed over the second layer.

35 5. A method in accordance with claim 3 including the step of spacing the pair of first layers from one another so that said gap is between .06 and .36 inch.

40 6. An impression ribbon comprising first and second layers joined together only along one longitudinal side edge by a weld, said first layer being an inkable fabric, said second layer being an ink impervious flexible plastic, said second layer being wider than the first layer with its other longitudinal edge projecting beyond the other longitudinal edge of the first layer by a distance of at least .03 inch, a third layer overlying the longitudinal half of said first layer remote from said weld and projecting beyond 45 said other edge of said first layer, said third layer being an ink impervious flexible plastic, said second and third layers being connected to each other by a weld parallel to and spaced from said other edge of said first layer whereby the width of said layers may independently expand or contract.

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