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INK RIBBON AND METHOD OR PROCESS OF MAKING THE SAME

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Fig.1.

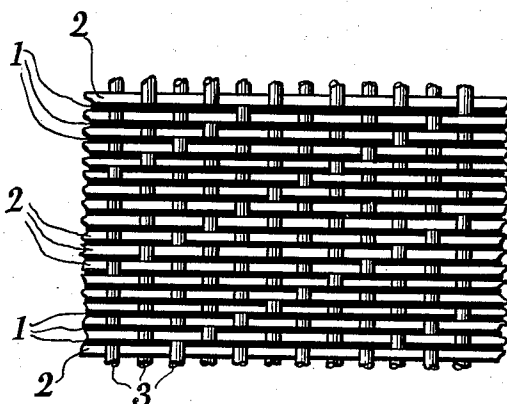


Fig.2.

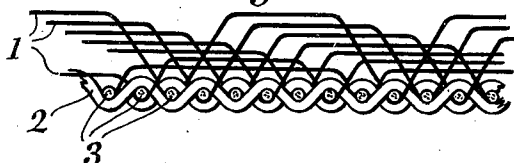
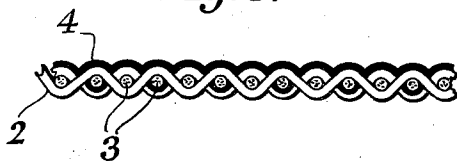


Fig.3.



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INK RIBBON AND METHOD OR PROCESS
OF MAKING THE SAMESamuel A. Neidich, Burlington, N. J., assignor to
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18 Claims. (Cl. 197—172)

This invention relates more particularly to coated ink supplying media and to a novel method or process of producing the same, for use in writing and printing mechanisms.

5 Inking ribbons of commerce for use in type-writing machines, for example, are generally graded with the heavily saturated ribbons, at one end of the series, followed by the medium, and the lightly saturated ribbons, there being usually 10 at least six "inking" grades, which should be carried in stock to satisfy the various requirements of the trade.

The heavily saturated ribbons, while retaining their ink transferring quality for a longer period 15 than the other grades mentioned, part with their ink very freely at first, as a consequence of which, the printing is heavy and the ink driven out of the ribbon onto the paper by the impact of the types, may even spread slightly, imparting a 20 smudgy blurred appearance to the printed work.

The lightly impregnated ribbons on the other hand, enable a fine, clearly outlined type impression to be made on the paper, but because of the 25 lesser ink content, the impressions become lighter more quickly, and the operator, noting such difference, drives the types against the platen with greater force, in an endeavor to produce darker impressions, thus tending to cut or damage the ribbon which, therefore, must be discarded long 30 before a more heavily inked ribbon.

Furthermore, ribbon fabrics are graded as to thickness, one custom of the trade being to utilize the thicker fabrics when heavily saturated ribbons are required, the thin weaves being lightly 35 saturated for those desiring clean-cut imprints irrespective of the life of the ribbon.

Also some types of writing machines tend to quickly cut or damage the ink carriers or ribbons, and with such machines, the life of a ribbon 40 formed of a thin fabric is much shorter than when such a ribbon is used on other machines.

Attempts have been made, heretofore, to devise a ribbon which, no matter how heavily saturated, 45 will feed out its ink supply in a stinted manner, under impact or pressure of the types, the objects being to enable the production of a clear, clean cut type impression with the deposit of a modicum of ink; and to enable the use of a ribbon of 50 fairly thick fabric having a maximum degree of absorbency to hold a comparatively large ink supply, and of maximum strength and durability under the stress of wear caused by the impact or pressure of the types thereagainst, to the end 55 that the physical characteristics of the fabric

may hold as long as, or longer than the supply of ink with which the ribbon is saturated.

A further object was to enable the manufacturer to reduce the number of grades of ribbon heretofore required to be kept in stock.

One such attempt consisted of spreading a 5 cellulose-like mixture or coating on that side face of the fabric which lies adjacent the paper, and drying the coating, after which the fabric was saturated with ink, the purpose for which the 10 ribbon is intended determining the number and thickness of the cellulose coats applied.

The cellulose-like coating, besides conserving the ink supply, does not materially reduce the ink-carrying capacity of the absorbent fabric, 15 and it should regulate the deposit of ink on the paper, so as to enable the production of even, uniform printing throughout nearly the entire life of the ribbon.

However, many difficulties presented themselves in the attempt to reduce this idea to practical commercial use, and even after a considerable financial expenditure, it was found that the 20 thickness or density of the cellulose-like coating could not be controlled with accuracy under the conditions incident to the quantity production of ribbons at a profit to the manufacturer.

For example, it developed that the permissible tolerance in the amount and character of the coating film, was closer than it was possible to 30 obtain in manufacturing the ribbons under commercially practical conditions, so that, regardless of the refinement of the coating process, some ribbons would give a perfect imprint, some would not print at all, and others would give a thick 35 blurred imprint, such as would be made by the use of an extra heavily saturated ribbon.

My invention is designed to rectify this and other disadvantages, and to retain all of the desirable features heretofore outlined as obtainable 40 by the use of an impression transmitting member coated on that side facing the record material.

By means of my invention, even coatings of various thicknesses or densities, may be formed 45 on the ink-supplying medium, in accordance with the particular uses for which the ink-supplying mediums are designed, and the impressions are all of even intensity of color.

Heretofore, a thick coating was obtained by 50 spreading successive films or layers of cellulose material on the fabric base, but such a coating was not of even density.

By the use of my invention, cellulose coatings of various desired thicknesses or densities, as 55

desired, may be formed at one operation on the fabric base, without necessitating repeated applications of layers of cellulose material.

According to the prior art, the coating was spread on the fabric in liquid form, in any known manner, and then dried. If more than one coating was to be applied, the coat previously mechanically spread, was dried before the next coating was applied, thereby adding to the expense of manufacture.

Also, in the prior art, the coating is held in place on the fabric solely by its adherence to the surface thereof.

By the method employed in my invention, the coating is anchored, tied or sutured to the fabric in such manner as, in effect, to form part of the fabric, for which reason I have used the word "integument" in referring to my coating, to distinguish it from a mere layer, such as illustrated in the prior art.

To these and other ends, my invention comprises certain novel features, more fully explained hereinafter and particularly pointed out in the claims.

In the drawing:

Figure 1 is a magnified plan view of a fragment of fabric showing the application thereto of a series of cellulosic threads, prior to their transformation into an integumentary coating;

Figure 2 is a magnified sectional view of the same, and

Figure 3 is a magnified sectional view of the fabric and integument, showing how the latter interlocks with the former, and conforms as to both its inner and outer surfaces to the irregular surface of the base fabric.

The ink-supplying or impression transmitting medium, as a ribbon for use in writing and printing machines, produced as a result of the process or method forming part of this invention, constitutes an improvement upon that shown in the prior U. S. Patents to Pelton, Nos. 1,732,187, October 15, 1929, and 1,830,620, November 3, 1931, to which reference is made for the purpose of illustrating the prior art.

It will be understood that the word "ribbon" as used herein is not to be strictly construed as a comparatively narrow tape-like member, but includes any flexible ink-carrying member of what ever width and of what ever material.

Thus, my invention, while primarily designed for use in connection with ink carriers formed of textile fabrics, is also effective in instances where the ink-carrier is made of paper, or other material suitable for use as an impression transmitting member.

As heretofore stated, one of the main disadvantages inherent in cellulose-coated ribbons of the prior art is the fact that they cannot be economically manufactured according to the systems heretofore used, and there is no uniformity of result in the production. Nor was there any way of insuring any great degree of accuracy in thickness or density of such coating of ribbons when commercially manufactured, as well as the production of ribbons, graded as to thickness or density of coatings, for different purposes.

To eliminate this disadvantage according to the simplest aspect of my method or process, I, first, intimately unite a suitable soluble cellulose material, of that group including acetate rayon, in the form of threads or filaments, with the desired base fabric, in such manner that the cellulose threads lie in parallel adjacent re-

lation, on one side of the fabric, after which I subject the composite structure to the action of a solvent of the ketone group, as acetone, either simultaneously with or prior to saturating the base fabric with a suitable ink or marking substance, after which the material is dried.

Subjection of the composite structure to the action of acetone dissolves or chemically fuses the parallel cellulose threads so that they flow or blend with each other both laterally and endwise to form an even film or integument uniformly distributed over that surface of the fabric on which they lie, and anchored to the fabric by reason of the intimate connection of the original threads therewith, which anchors, of course, are also acted upon by the acetone.

The fabric and its integument, assuming that the acetone treatment and the ink-saturating operation have occurred simultaneously, are then dried in the customary manner, as by being passed between heated rolls or through a drying oven, or in any other suitable manner, after which the ribbon is ready for packaging for sale.

Considering, now, the novel method or process in detail step by step, the base fabric in connection with which the invention is associated, may be of the usual kind used in the manufacture of typewriting ribbons, as cotton or silk, which is woven in the well-known square manner, that is, the warp and filler threads are woven alternately under and over each other.

Preferably, according to my method or process, the cellulose threads are woven in with the ink-absorbing material, simultaneously with the manufacture of the fabric base, that is during the weaving of the cotton or silk fabric, warp threads of a light denier acetate rayon yarn, such as Dupont's Acele, are also tied in to the absorbent fabric by the loom, at, say, every sixth pick, so as to lie against one face of the fabric, giving to such face a light satin finish of acetate rayon.

According to the example selected for illustration, it will be seen that the acetate rayon warp threads 1, (Fig. 1), alternate with the warp threads 2 of the absorbent base fabric.

Also, the successive acetate rayon threads 1 from bottom to top pass under the successive filler threads 3, as in a six-leaf twill in the illustrated form of the invention, though the number of filler threads skipped may be varied, and the cellulose threads might be alternated with the filler threads and skip groups of warp threads.

Referring to Fig. 1, the lowermost acetate rayon warp thread 1 passes beneath the third filler thread 3 from the lower left hand corner; the next adjacent acetate rayon warp thread passes beneath the fourth filler thread 3 from the left and so on.

It will also be observed that the warp threads of the base fabric, and of acetate rayon lie parallel and in interspersed or alternate relation.

While it might be possible to hook all of the acetate rayon threads under every sixth (or other) filler thread, a stronger and better composite structure results by tying the successive parallel acetate threads under the successive filler threads lying at substantial right angles to the acetate rayon threads.

Furthermore, this arrangement facilitates the formation of a uniform integument evenly distributed over one surface of the base fabric and tends to prevent the occurrence of voids in such integument.

Also, by weaving the acetate rayon threads into

the fabric, the integument, when formed, constitutes an integral part of the fabric rather than a layer applied superficially to the fabric, the integument being anchored to the fabric itself, as a result of looping the acetate rayon threads under the filler threads.

Nor does this looping of the non-absorbent acetate rayon threads interfere with the ink impressions in case it should ever be desired to use the ribbon with the uncoated side towards the paper, because of the slight area covered by such loops, and the fact that the ink from the much larger adjacent absorptive areas of the ribbon spreads over and covers the loops.

Instead of weaving the acetate rayon threads into the fabric simultaneously with the weaving of the the base fabric itself, these threads, formed wholly of acetate rayon, may be applied to the base fabric after the latter has been woven, or to a paper or felted material, as by tacking or basting in any suitable manner.

The steps of subjecting the cellulose threads to the action of acetone, and of impregnating or saturating the base fabric with ink may be performed either successively, or simultaneously, as preferred.

Thus, some manufacturers may find it desirable to pass the composite base fabric with its filamentous finish of acetate rayon through a short chamber to which acetone fumes are supplied in any convenient manner, which fumes operate to liquefy or dissolve the acetate rayon threads forming the satin finish on one side of the base fabric so that the threads flow or blend together laterally and endwise to provide a flexible film, indicated at 4 (Fig. 3), uniformly distributed over and covering that face or side of the fabric which bore the original threads now transformed into an integument or film, the film conforming to the irregularities of the surface of the base fabric, without being absorbed thereby to any material extent, due to the non-affinity of the absorbent base fabric for the liquefied acetate rayon or similar cellulosic material.

Furthermore, the film is anchored to the base fabric due to the twilling or tying of the acetate rayon threads therinto.

Obviously, the loops of acetate rayon threads passing under the separated filler threads are liquefied by the action of the acetone but, because of the space separating such loops, and the diagonal arrangement thereof, the loops, when hardened, do not prevent use of the ribbon with the uncoated face towards the record material.

Indeed, this reversal of the ribbon may be advantageous if it be desired to obtain heavier printing either when the ribbon is new, for special work, as mimeographing, for instance, or after the ribbon has been in use for such length of time that the ink content has been considerably reduced.

It will also be observed, that by the use of soluble cellulose threads of varying diameters or sizes, I can more accurately control the thickness of the film ultimately formed on one side of the fabric, according to the work for which the ribbon is designed, at one operation, thus avoiding the necessity heretofore resorted to, of applying successive coatings when additional thickness thereof is desired.

And this is the more readily accomplished since the permissible variations in thickness of the coating which will be permeable to the ink under pressure, is very slight.

After the fabric passes out of the acetone

treatment chamber, it may be thoroughly dried and then saturated with the desired ink in any usual manner, after which it is again dried and packaged for sale.

The drying action may be effected in any suitable and convenient manner, and serves to set or harden the liquefied cellulose coating as well as the anchors formed by the loops of cellulose passing under the filler threads, whereby the cellulose film is securely united to the ink carrier.

Such drying also serves to remove the excess moisture in the ink, with which the carrier is saturated, and evaporates any remaining acetone, it being understood that the ribbon is not bone dried, but retains a proportion of moisture in its ink content.

Instead of performing the steps of acetone treatment and ink impregnation, successively, some manufacturers may prefer to perform these steps simultaneously, in which event, ink with which the base fabric, bearing on one side or face thereof the acetate rayon finish, is impregnated, has mixed therewith a moderate amount of one of the ketones, as fluid acetone, which, as in the case of the acetone fumes, liquefies the acetate rayon or equivalent soluble cellulose material to form an integumentary coating of even thickness on one face of the ribbon.

In either case, the base fabric may be woven in ribbon widths or in wide pieces which may be subsequently cut or slit into narrower widths to form ribbons.

One reason for the failure of the prior art to produce a flexible, coated ink carrier or ribbon permeable to ink under pressure or impact, is that the fluid cellulose from which the coating is formed has been spread onto the face of the ribbon in a viscous state, the excess being removed by scraping or striking off, as by passing the ribbon beneath a stationary straight-edge.

As a result, the fluid cellulose has filled in the minute depressions in the fabric in masses, and the outer surface of the cellulose has been leveled off by the straight-edge so that the true thickness of the coating varies depending upon whether it is measured from the bottom of one of the depressions in the fabric or from the top of one of the "hills".

As illustrated in the accompanying greatly enlarged views, the fabric surface is a succession of minute "hills and valleys".

By my method or process of applying a coating to one face of the ribbon, the material which ultimately forms the coating conforms to the irregular fabric surface, and when liquefied to a degree somewhat short of extreme fluidity, spreads of itself, to form a uniform coating covering that face of the fabric evenly and of substantially the same thickness, whether measured from the top of a warp thread overlying a filler thread or from a filler thread under which a warp thread passes.

Also my method or process enables one to quite accurately control the thickness of the coating to be formed, by the use of soluble cellulose threads of the proper gauge.

Changes may be made in the material of which the base fabric is composed, and cellulose material other than acetate rayon may be used, as well as a suitable ketone other than acetone, without departing from the spirit and scope of this invention, the gist of which lies in the intimate application of soluble cellulose threads to a suitable base, and the subsequent treatment thereof with a suitable solvent, whereby the cellulose

threads, liquefied by treatment with the solvent, unite or blend to form a coating of even thickness conforming on its exposed face to the conformation of the base, and the material is subjected to a drying action to harden or set the cellulose into its new shape.

As a result, there is produced a ribbon having an integumentary coating which is practically imperceptible, but acts as a straining film to hold back the bulk of the ink in the ribbon, and yet permits the transmission, under the blow or pressure of a type, of a small portion of the ink through the film onto the record material.

Light acetate rayon threads of, say, 50 denier dissolve into a semi-fluid state on exposure to acetone fumes of the usual strength, for, say, about two seconds, more or less, the acetate rayon threads being transformed to a degree of semi-fluidity or paste form which clings to the surface of the base material.

What I claim as new, is:—

1. An impression transmitting medium, including a fabric base; and cellulosic threads woven into one face of the fabric base in an overshot manner, and thereafter liquefied to form an ink-retarding, permeable integument on one face of the fabric.

2. An impression transmitting medium, including a fabric base; and cellulosic threads woven into one face of the fabric base in an overshot manner, and thereafter chemically liquefied to form an ink-retarding, permeable integument on one face of the fabric.

3. An impression transmitting medium, including a fabric base; and cellulosic threads twilled into one face of the fabric base only, and thereafter liquefied to form an ink-retarding, permeable integument covering one face of the fabric.

4. An impression transmitting medium, including an absorbent fabric base having warp and filler threads; and cellulosic threads interspersed and parallel with the warp threads on one face of the fabric base, and passing under one filler thread and over a multiple number of successive filler threads alternately, the cellulosic threads being thereafter liquefied to form a continuous, permeable integument on one face of the fabric, and securely united thereto without materially affecting the absorbent capacity thereof, to serve as an ink-retarding coating.

5. An impression transmitting medium, including an absorbent fabric base having warp and filler threads; and cellulosic threads interspersed and parallel with the warp threads on one face of the fabric base, and passing under one filler thread and over a multiple number of successive filler threads alternately, in such manner that successive cellulosic threads pass under successive filler threads, the cellulosic threads being thereafter liquefied to form a continuous, permeable integument on one face of the fabric, and securely united thereto without materially affecting the absorbent capacity thereof, to serve as an ink-retarding coating.

6. An impression transmitting medium, including an absorbent fabric base having warp and filler threads; and cellulosic threads interspersed in parallel relation with the warp threads on one face of the fabric base, and passing under one filler thread and over a multiple number of successive filler threads alternately, the points at which the successive cellulosic threads pass beneath the filler threads lying in echelon on the fabric, the cellulosic threads being thereafter liquefied to form a continuous, permeable integu-

ment on one face of the fabric, and securely united thereto without materially affecting the absorbent capacity thereof, to serve as an ink-retarding coating.

7. A transfer medium, including a carrier and a marking material, one side of which carrier has a coating comprising a cellulose organic derivative formed in threads inter-engaging the carrier, the respective individual cellulosic threads lying in closely adjacent relation, and chemically liquefied to blend and form a uniform coating for one side of the transfer medium, having the characteristic of permeability to the marking material under pressure.

8. An ink impregnated member comprising an absorbent fabric body; and a coating for one face thereof, including threads of a cellulose organic derivative interengaging the fabric at intervals, and lying on one face thereof in juxtaposed relation, and chemically liquefied to blend and form a uniform, evenly distributed coating which, when set, is permeable to ink under pressure.

9. An ink supplying medium, including a base fabric; and a series of juxtaposed threads of a cellulose organic derivative tied into the base fabric at intervals so as to lie on one side thereof, during the formation of the base fabric, the adjacent threads subsequently uniting under the action of an acetone to form a coating on one side of the fabric closely adherent thereto by reason of the stitched or woven connection therewith, and permeable to ink under pressure.

10. The method or process of forming impression transmitting media, comprising the step of twilling into one face of a woven fabric, a set of cellulose acetate threads; and liquefying the cellulose acetate facing by passing the fabric through a chamber containing acetone fumes, to cause the liquefied cellulose acetate threads to blend and form a permeable integument for one face of the fabric.

11. The method or process of coating a fabric material designed for carrying ink, comprising stitching cellulose acetate yarns to one face of the fabric in juxtaposed relation; and subjecting the cellulose yarns to the action of an acetone to cause the individual threads to blend and form a coating on one side of the fabric.

12. The method or process of forming transfer mediums, comprising the weaving of a base fabric in the usual manner, and simultaneously therewith, twilling cellulose acetate threads into the fabric to lie on one face of the fabric; applying any desirable transfer material to the base fabric; and subjecting the woven fabric to the fumes of an acetone to liquefy the cellulose acetate threads which blend with each other to form a coating covering one side of the fabric, which coating, when set, possesses the characteristic of permeability to the transfer material under pressure.

13. The method or process of forming transfer mediums, comprising the weaving of a base fabric in the usual manner, and simultaneously therewith, twilling cellulose acetate threads into the fabric to lie on one face of the fabric; applying any desirable transfer material to the base fabric; liquefying the cellulose acetate threads to cause them to unite to form a coating covering one side of the fabric, which coating possesses the characteristic of permeability to the transfer material under pressure, and impregnating the base fabric with suitable transfer material.

14. The method or process of making transfer mediums comprising the weaving of a base or body fabric of absorbent material of warp and

filler threads, with which is carried additional warp threads of a cellulose organic derivative tied into the main fabric at intervals during the weaving process, so as to lie in juxtaposed relation on one side thereof; subjecting the compound fabric thus formed to the action of an acetone, and impregnating the base fabric with a transfer material, whereby the acetone dissolves the cellulose threads to cause them to form a coating covering one side of the fabric, which coating is permeable by the transfer material under pressure.

15. The method or process of making transfer mediums comprising tying at intervals into one face of a flexible ink carrier material, threads of acetate rayon yarn; applying ink to the carrier; and subjecting the acetate rayon yarn to the action of acetone; the acetate rayon yarn dissolving under the action of the acetone to form a coating of substantially constant density, evenly distributed over one face of the carrier, and permeable to the ink under pressure.

16. As an article of manufacture, an ink supply member comprising a base fabric of absorbent material, threads formed wholly of a soluble cellulose material twilled into the base fabric to lie on one face thereof, and subjected to the action of a solvent to liquefy the threads and

cause them to flow or blend into each other to form a uniformly distributed, flexible film covering that side of the fabric to which the threads were applied, of even thickness, and anchored to the fabric.

17. The method or process of making impression transmitting material, including the formation of a filamentous finish of cellulose threads on one face of suitable base; subjecting the base with its finish to the action of an acetone and applying ink to the base; and finally drying the material to harden the cellulose coating formed by the blending of the filamentous finish into an evenly distributed covering for one side of the base incident to the solvent action of the acetone.

18. The method or process of making impression transmitting mediums including the step of attaching to a suitable base, a filamentous finish wholly of cellulosic material, as acetate rayon in a non-fluid state; subjecting the base bearing such cellulosic material to the action of a ketone, as acetone, to liquefy the cellulosic material, whereby it automatically blends to form a coating for one side of the impression transmitting medium; impregnating the base with ink; and finally drying the base and its coating.

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