

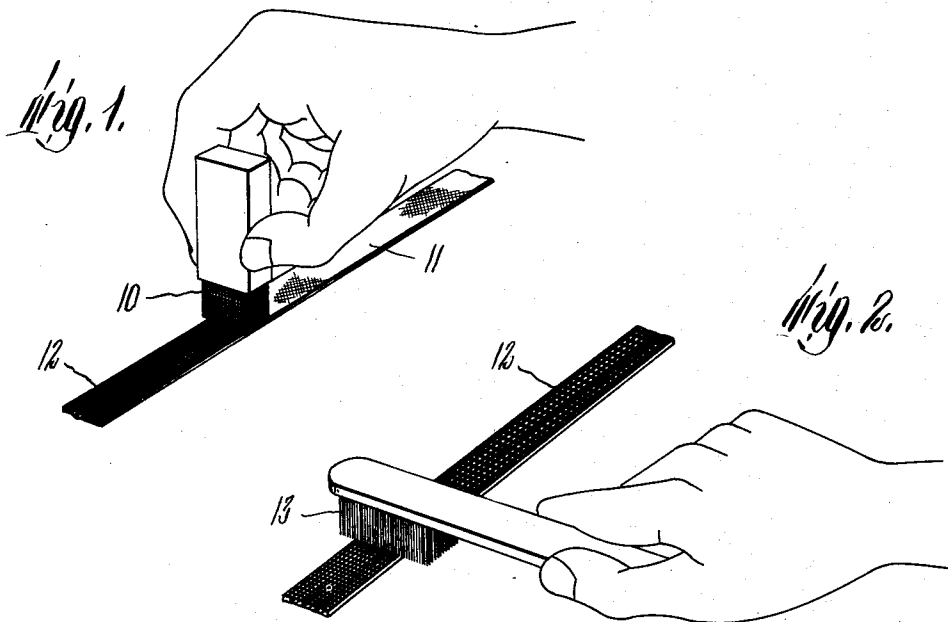
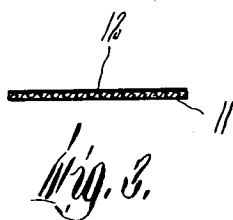
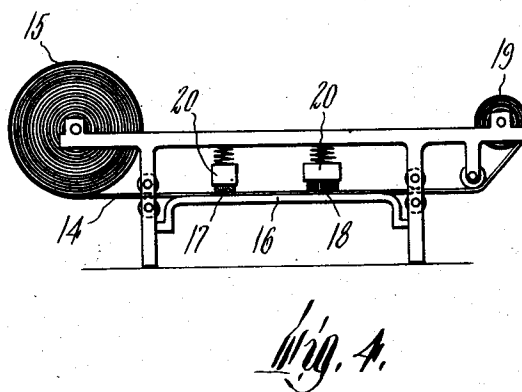
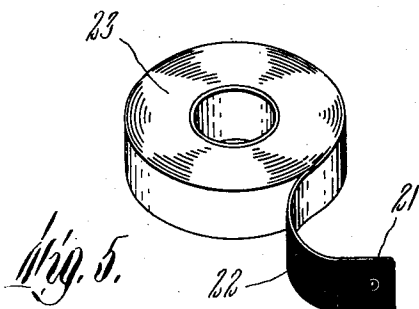
Dec. 28, 1937.

G. W. SCHAEFER

2,103,275

TYPEWRITER RIBBON AND INK COMPOSITION THEREFOR

Filed Nov. 22, 1934



Inventor
George W. Schaefer
By Knight, Brown, Lindsey & Tracy
attys.

UNITED STATES PATENT OFFICE

2,103,275

TYPEWRITER RIBBON AND INK COMPOSITION THEREFOR

George W. Schaefer, Quincy, Mass.

Application November 22, 1934, Serial No. 754,312

8 Claims. (Cl. 197—172)

A subject of this invention is a typewriter ribbon such as may serve in various machines wherein type or printing elements are caused to press or strike against the ribbon and effect a transfer of the printing medium carried by the ribbon in the form of letters, numbers, and various other signs or indicia against a paper or other base designed to receive the imprint or impression of the type or printing elements. Accordingly, the expression "typewriter ribbon" as used in the following description of my invention and in the appended claims is intended to comprehend a ribbon such as may be employed in typewriting machines, adding machines, multigraph machines, billing machines, addressograph machines, dupligraph machines, or other machines that operate with permanent typing or printing elements or with removable printing plates or other typing or printing members. Another subject of this invention is the printing medium or ink composition that is adapted to serve as an essential part of the typewriter ribbon of the present invention.

Typewriter ribbons as heretofore made are impregnated substantially uniformly throughout with a printing medium so that the printing medium occurs both on the face that contacts with the typing or printing elements as well as on the face that contacts with the paper or other base to which the printing medium is transferred by reason of pressure or impact exerted by the printing elements on the ribbon. Ribbons so made present the serious fault that the printing elements become soiled with the printing medium, in consequence of which the printing elements tend to become so fouled with the printing medium that the desired distinctness or sharpness of imprint or impression is not realized. Thus, in the case of such machines as typewriters, unless the type is frequently cleaned, it may become so badly fouled with printing medium, that blurred or indistinct impressions result. In the case of removable printing members, such as the printing plates used in dupligraph machines, addressograph machines, and department store charge-plate machines, although such members may be used so infrequently as not to impair the distinctness or sharpness of the imprint secured therefrom, nevertheless, inasmuch as the operator handles such removable members as they are inserted in and removed from such machines, the operator's hands are likely to become soiled with the thin film of printing medium that remains as a residue on such members and on their print-

ing elements and accordingly result in the soiling of the imprinted paper forms that the operator also handles at the same time.

A prime objective of the present invention is the provision of a typewriter ribbon that will function to transfer printing medium perfectly and for a long period of time to a paper or other base under the pressure or impact of type or printing elements in machines of the class already mentioned without, however, depositing any sensible or significant amount of printing medium on the type or printing elements. Generally stated, the typewriter ribbon of the present invention comprises the usual fabric base carrying on only one face thereof a coating of transferable printing medium of such character and consistency that it is readily transferred under the usual pressure or impact of type or printing elements to a paper or other suitable base while at the same time having substantially no tendency to migrate or bleed to the uncoated face of the fabric base. The coated face of the ribbon is, of course, the one that is to be brought next to the paper or other base to receive the imprint or impression, whereas the uncoated face of the ribbon is the one that is to receive the pressure or impact of the printing elements. Accordingly, the printing elements do not contact with the printing medium and are thus preserved in a clean condition conducive to perfect imprint or impression. The coating of printing medium carried by the typewriter ribbon of the present invention is further characterized by its good keeping quality, that is, its remaining unspoiled for a long period of time, by its substantial uniformity or even distribution over the ribbon surface, and by its extreme thinness, all of which qualities are necessary in attaining good impressions or clear imprints from the ribbon over a long period of time. Despite the extreme thinness of its coating of printing medium, the ribbon is further characterized by its high printing capacity, that is, its ability to give a large number of imprints and thus afford long service.

Although the printing medium constituting the coating on the typewriter ribbon of the present invention contains as ordinarily carbon black or other pigment particles of the desired color, unlike the printing media of typewriter ribbons as heretofore made, its pigment particles are kept properly lubricated and in a weakly aggregated or bonded condition by a soap binder which carries substantially uniformly entrained or dispersed therethroughout the oil necessary for ef-

fecting such lubrication. While various kinds of soaps, including sodium and potassium base soaps of various fatty acids, such as palmitic, stearic, etc., might be used as the soap binder for maintaining the desired weakly aggregated or bonded condition of the pigment particles in the coating of the typewriter ribbon of the present invention, I prefer to use the ammonium soaps and more especially ammonium oleate for this purpose, as I have found that the desired weak bonding or aggregating action on the pigment particles in the coating is had through the use of the ammonium soap and more especially ammonium oleate while at the same time substantially avoiding any stickiness or tackiness in the coating. So, too, while various oleaginous liquids may serve for lubricating the pigment particles so as to promote ready transfer or parting of such particles from the ribbon coating to a paper or other base, including many mineral, vegetable, and animal oils, I may to advantage employ oleic acid as the lubricant, for oleic acid is comparatively inexpensive, has the desired lubricating quality, and can be readily and perfectly introduced as the lubricating element of the printing medium at the very same time that the ammonium oleate soap is being produced therefrom as the weak or loose binder element of the printing medium.

I shall now give a specific example of procedure leading to a typical printing medium or ink composition such as I may advantageously employ as the coating on the typewriter ribbon of the present invention. To a suitable mixing or kneading machine, such as a Werner and Pfleiderer or Day mixer, is added four parts of lampblack or other suitable pigment, depending on the color of imprint desired to be had from the ribbon. When lampblack or other carbon black is the pigment employed, it is preferable to add to such pigment two parts of graphite. The graphite plays the role of both a pigment and a lubricant. The pigment charge is then subjected to the mixing or kneading action of the machine and, while such action is taking place, the pigment charge is treated with one-half part of oleic acid containing preferably a few drops of an essential oil, like oil of sassafras, that masks any malodor that may be associated with the oleic acid. After the pigment particles have been substantially uniformly wet or treated on their surfaces with the oleic acid, which result may require about fifteen minutes, ammonia water is added to the charge in amount designed to effect only a partial saponification of the oleic acid, that is, a saponification that winds up with considerable free or residual oleic acid dispersed throughout the charge. After considerable experimentation, I have found that it is distinctly preferable to add the ammonia water gradually to the charge as it is being mixed, since if the ammonia water is added all at once, the tendency is to form a discontinuous or granular mass from which the free oleic acid is apt to separate on the surface as large or visible drops of oil whereas, when the ammonia water is added gradually, the charge remains continuous and the resulting composition is one of substantially uniform consistency throughout which the free oleic acid is so finely dispersed that not even tiny oil particles appear therein. I have established empirically that when one-quarter part of ammonia water of 26% strength is gradually added to the mixed charge of pigment and oleic acid over a period of about four to five minutes, the resulting composition

contains ammonium oleate and free oleic acid in the desired proportions and state of interspersion and has a consistency nicely adapted for application to a typewriter ribbon fabric base. It should be observed that volumetric proportions of the various ingredients are hereinbefore given and that mixing of the ingredients is effected under prevailing room temperature, that is, without the application of heat. It should further be noted that upon the addition of the ammonia water to the charge, the charge undergoes a small rise in temperature on account of the heat evolved by the saponification of the oleic acid. A considerable fraction of the ammonia present in the ammonia water is volatilized and lost during the mixing operation by reason of the volatility of the ammonia and the increased tendency to expel ammonia under the heat of the saponifying reaction.

Upon completion of the saponifying reaction in the mixer, the reaction product or resulting printing medium or ink composition is a substantially uniform and continuous mass of a moldable, stiff, putty-like consistency. It is readily and smoothly smearable under pressure and deposits a substantially uniform but extremely thin coating on a fibrous surface, such as the surface presented by the usual typewriter ribbon fabric base. Before being applied to such a base, however, the composition is preferably molded into small cakes or cubes. The molding of the composition into cake or cube form is preferably done immediately upon its being removed in freshly prepared condition from the mixer. Inasmuch as the resulting cakes or cubes are still moist or wet with the water added as ammonia water to the mixer and inasmuch as the water detracts from the smoothness of smearability of the composition, it is preferable to dry the cakes before composition is smeared therefrom onto a typewriter ribbon fabric base. Drying of the cakes may be effected as by allowing them to stand under room temperature conditions for about twenty-four hours, assuming, for example, that the cakes are about $1\frac{1}{2}$ " long, about 1" wide, and $\frac{3}{8}$ " thick. It is, of course, obvious that cakes of various dimensions might be formed, depending upon the width of the ribbon to be treated therewith, and that the particular time of drying in a particular instance depends upon the particular dimensions of the cakes to be dried. In some instances, it may be desirable to mold cakes or cubes of a width somewhat greater than that of the typewriter ribbon fabric base so that when a cake is pressed down on such base, as the base is being moved relative to the cake, the entire surface of the base will become substantially uniformly smeared with the composition. As already indicated, such an operation results in the deposition or transfer of an exceedingly thin coating of composition onto the base; and the composition is both firmly adherent to the base and does not tend to stain or bleed through the base to any significant extent even though the uncoated surface of the base is subjected locally to the repeated pressure or impact of the usual type or printing elements. Evidently, the free oil component of the composition is largely dispersed in and held entrapped by the soap component of the composition and so is free in a chemical sense to lubricate the pigment particles but not in a mechanical sense to escape through the fabric base. Indeed, the coated face of the ribbon does not readily part with the composition, inasmuch that the type-

writer ribbon carrying the coating may be convoluted onto itself into roll form without causing the coated face of one convolution to soil to any appreciable extent the uncoated face of the adjacent convolution. In other words, it is only when printing pressure or impact is received by the ribbon, and more particularly by its uncoated face, that it tends to part with the composition or printing medium and transfer it to the paper or other base against which the coating is caused to press or strike.

Typewriter ribbons made in accordance with the present invention may be restored to the desired fresh or initially effective condition, after the coating of printing composition or printing medium thereon has become depleted or exhausted, by smearing the printing surface thereof, as hereinbefore indicated, with the composition applied under pressure from a cake or cube. Such cake or cube may, in fact, be a permanent fixture or adjunct in the machine in which the ribbon is employed, the cake being constantly pressed against the printing surface of the ribbon as the ribbon is moving therepast. Thus, for example, a typewriter machine may be equipped with such a cake at the region of the machine where the typewriter ribbon is being led into the wind-up cartridge from the zone of action of the type, the cake being caused to bear on the printing surface of the ribbon under a pressure designed to smear such surface constantly with an amount of printing medium that serves to keep such surface at the same high effectiveness at all times. If desired, only the central longitudinal zone of the ribbon, that is, its active zone, may be thus replenished with printing medium from a comparatively narrow cake serving as one of the machine fixtures. When a multicolor ribbon is being used, the differently colored zones may receive printing media of the appropriate colors from two or more independent cakes, each cake smearing inking medium of the appropriate color on each color zone of the ribbon. Machines other than typewriter machines may be similarly equipped with one or more cakes of printing medium.

It should be understood that I have hereinbefore described my invention in specific terms that admit of variation and modification. Thus, instead of using oleic acid as the lubricant for the pigment particles, it is possible to use suitable unsaponifiable oil, such as the mineral or hydrocarbon oils, for this purpose, the unsaponifiable oil being blended in suitable amount with the oleic acid and the oleic acid being saponified with the ammonia to completion so as to disperse and entrap the unsaponifiable oil in the resulting ammonium oleate. So, too, it is possible to vary the sequence of mixing the various ingredients that go to make up the resulting printing medium or ink composition, but I have found it distinctly advantageous to carry out the steps in the order hereinbefore given in arriving at the most satisfactory composition with minimum difficulties. In any event, the proportions of pigment, oil, and ammonia or other alkali employed are such as to conduce to a continuous mass of stiff, putty-like consistency and capable of being smeared under pressure readily and smoothly on a typewriter ribbon fabric base as a thin substantially uniform coating having substantially no tendency to stain through the fabric base or onto another surface by mere contact therewith but being transferable in small but sufficient amount to paper under printing pressure and impact. Gen-

erally stated, the pigment particles are by far the preponderant ingredient of the coating, the soap binder being present in comparatively small amount and even a smaller amount of free oil imparting ample lubrication to the pigment particles. Although the printing medium or ink composition of the present invention might be applied to paper or other transfer media or even to both faces of a typewriter ribbon fabric base, it is especially valuable for coating only one face of a typewriter ribbon fabric base, since it possesses the many important advantages already mentioned for this particular use.

On the accompanying drawing,—

Figures 1 and 2 illustrate diagrammatically and conventionally how the printing medium may be applied by hand to a typewriter ribbon fabric base.

Figure 3 is a section through the coated ribbon.

Figure 4 similarly shows apparatus for applying the printing medium.

Figure 5 depicts a conventional cartridge or roll of the typewriter ribbon of the present invention.

As shown in Figure 1, a small cake 10 of the printing medium may be pressed onto the usual typewriter ribbon fabric base 11 as either the ribbon is being moved past the cake or the cake is being moved over the ribbon. Only a fragment of ribbon appears in the drawing, but it will be understood that a full length ribbon is being subjected to such treatment. The fabric base is preferably the usual thin, finely woven, and highly flexible fabric of low porosity containing yarns of silk, Sea Island, Egyptian or other high grade cotton, linen, or similar fibers used in typewriter ribbons for the purpose of getting clean-cut or nice impressions practically unaffected by the woven pattern of the fabric. Once the ribbon has had a thin coating 12 of the printing medium smeared thereon, it may be put to use, but, as shown in Figure 2, it is preferable to act upon the coating with a brush 13 whose bristles are dense and extremely fine and thus even out such surface irregularities or non-uniform thickness localities as may exist in the coating.

The same operations as are shown being done by hand in Figures 1 and 2 are shown being performed by apparatus in Figure 4, according to which a ribbon 14 may be progressively withdrawn from a roll 15, passed over a bearing surface or table 16, be appropriately smeared with printing medium from a cake 17 and then be brushed by a brush 18 as it is being supported by the table, and finally be rewound as a roll 19. The cake 17 and the brush 18 are each shown as being held by a holder 20 equipped with a compression spring that may be designed to exert the requisite working pressure on the cake and on the brush.

A finished typewriter ribbon 21 carrying a coating 22 on only one face thereof, in accordance with my invention, appears in Figure 5 convoluted as a roll 23 as is customary practice. When the ribbon is convoluted under the tensions heretofore employed, the coating of one convolution, even when fresh, does not become transferred in any noteworthy or significant amount to the uncoated face of an adjacent convolution, for as already indicated, transfer of the coating takes place only under printing pressure and impact.

I claim:—

1. A printing medium especially adapted for

application as a coating to typewriter ribbons consisting of a continuous mass of stiff, putty-like consistency and smoothly smearable under pressure as a thin substantially uniform coating onto a typewriter ribbon fabric base, said mass comprising pigment particles, a soap weakly bonding together said particles, and an oil lubricating said particles and finely dispersed throughout and entrapped by said soap, said oil lubricant being present in such small amount relative to said pigment particles as merely to wet or lubricate said particles and hence being substantially unavailable in free condition.

2. A printing medium especially adapted for application as a coating to typewriter ribbons consisting of a continuous mass of stiff, putty-like consistency and smoothly smearable under pressure as a thin substantially uniform coating onto a typewriter ribbon fabric base, said mass comprising pigment particles, a comparatively much smaller amount of soap weakly bonding together said particles, and an oil lubricating said particles and finely dispersed throughout and entrapped by said soap, said oil lubricant being present in such small amount relative to said pigment particles as merely to wet or lubricate said particles and hence being substantially unavailable in free condition.

3. A printing medium especially adapted for application as a coating to typewriter ribbons consisting of a continuous mass of stiff, putty-like consistency and smoothly smearable under pressure as a thin substantially uniform coating onto a typewriter ribbon fabric base, said mass comprising pigment particles, an ammonium soap weakly bonding together said particles, and an oil lubricating said particles and finely dispersed throughout and entrapped by said ammonium soap, said oil lubricant being present in such small amount relative to said pigment particles as merely to wet or lubricate said particles and hence being substantially unavailable in free condition.

4. A printing medium especially adapted for application as a coating to typewriter ribbons consisting of a continuous mass of stiff, putty-like consistency and smoothly smearable under pressure as a thin substantially uniform coating onto a typewriter ribbon fabric base, said mass comprising pigment particles, ammonium oleate weakly bonding together said particles, and an oil lubricating said particles and finely dispersed throughout and entrapped by said ammonium oleate, said oil lubricant being present in such small amount relative to said pigment particles as merely to wet or lubricate said particles and

hence being substantially unavailable in free condition.

5. A small cake of printing medium especially adapted for application as a coating to typewriter ribbons consisting of a continuous mass of stiff, putty-like consistency and smoothly smearable under pressure as a thin substantially uniform coating onto a typewriter ribbon fabric base, said mass comprising pigment particles, a comparatively much smaller amount of ammonium oleate weakly bonding together said particles, and free oleic acid lubricating said particles and finely dispersed throughout and entrapped by said soap.

6. A typewriter ribbon consisting of a thin, closely woven, highly flexible fabric base having one face thereof coated with a transferable writing medium made up largely of pigment particles and an oil lubricant therefor, said oil being present in such medium in small proportion relative to said pigment particles and in amount sufficient only to lubricate said particles and to provide an adherent coating penetrating into said ribbon less than the full thickness thereof, whereby a transfer or writing face is provided on only one face of said ribbon.

7. A typewriter ribbon consisting of a thin, closely woven, highly flexible fabric base having one face thereof coated with a transferable writing medium made up largely of pigment particles, a soap weakly bonding together said pigment particles, and an oil lubricant for said pigment particles, said oil being present in such medium in small proportion relative to said pigment particles and in amount sufficient only to lubricate said particles and to provide an adherent coating penetrating into said ribbon less than the full thickness thereof, whereby a transfer or writing face is provided on only one face of said ribbon.

8. A typewriter ribbon consisting of a thin, closely woven, highly flexible fabric base having one face thereof coated with a transferable writing medium made up largely of pigment particles, a much smaller amount of ammonium soap weakly bonding together said particles, and an oil lubricant for said pigment particles, said oil being present in such medium in small proportion relative to said pigment particles and in amount sufficient only to lubricate said particles and to provide an adherent coating penetrating into said ribbon less than the full thickness thereof, whereby a transfer or writing face is provided on only one face of said ribbon.

GEORGE W. SCHAEFER.