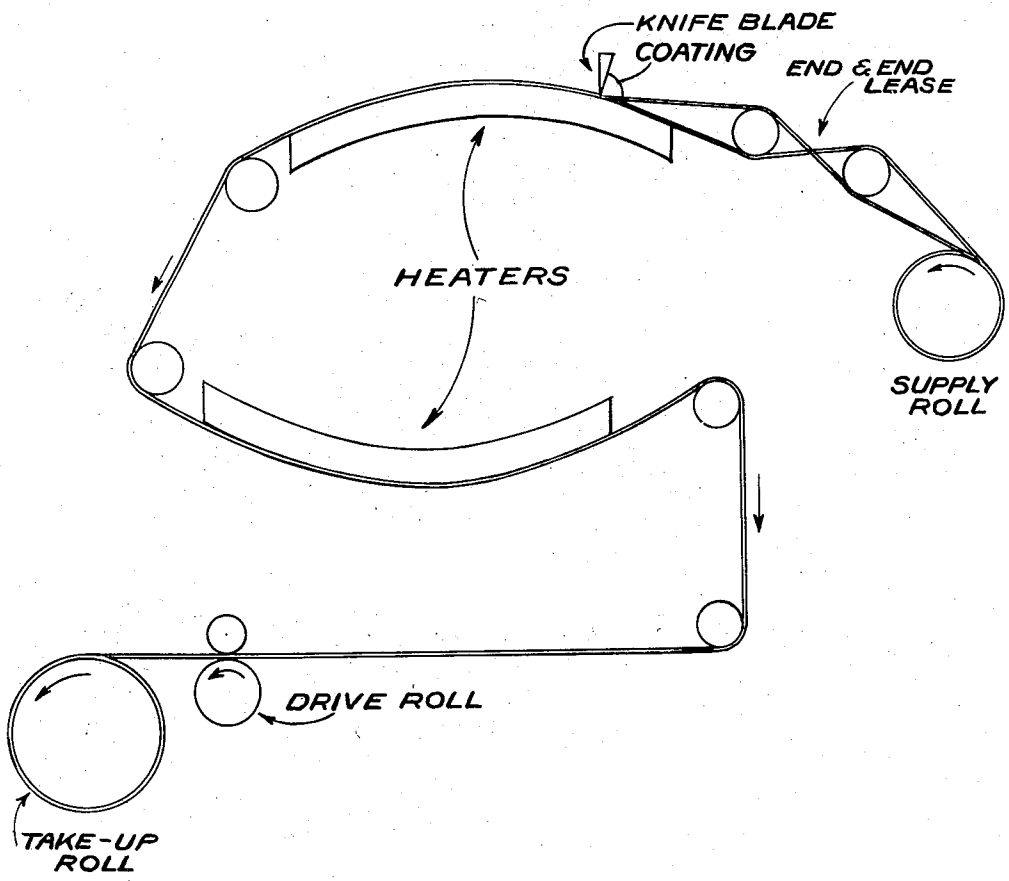
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PROCESS FOR FORMING WEFTLESS RIBBON

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Charles H. Coney
William L. Rumgay
INVENTORS
BY Daniel J. Wayne
Henry E. Byers
ATTORNEYS

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PROCESS FOR FORMING WEFTLESS RIBBON

Charles H. Coney and William L. Rumgay, Kingsport, Tenn., assignors to Eastman Kodak Company, Rochester, N. Y., a corporation of New Jersey

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This invention concerns non-woven ribbon. More particularly, it concerns non-woven ribbon made from cellulose acetate threads.

Non-woven ribbon has been prepared in the past by various methods such as by laminating cellulose acetate threads to a flexible sheet. However, this can be an expensive process since a flexible sheeting material must be provided to which the non-woven threads are made to adhere. Adhesive tapes of non-woven fibers have been made by mixing thermoplastic fibers such as cellulose acetate with non-binder fibers such as cotton and then uniting the mixtures through the action of heat to bond the mixture together. Similar mixtures have also been united by treating with a solvent which softened the cellulose acetate fibers and caused the adherence of the fibers to each other. Other non-woven fabrics have been made by extruding the filaments together longitudinally while still sticky from containing a certain amount of an organic solvent which caused the filaments to be adhesive and, consequently, to stick together.

Cellulose acetate fibers provide a rich smooth ribbon when used to make a non-woven ribbon by laminating to flexible sheeting, and this texture is particularly attractive, since the surface of the ribbon has not been marred by heat or solvent action which might possibly occur using some other method. However, the use of solvent or other methods to unite the fibers into a ribbon has not been feasible due to the ready solubility of cellulose acetate in such solvents and the consequent alteration of the fiber structure.

We have discovered a method of providing a non-woven ribbon without the expensive step of laminating to a flexible sheeting.

One object of this invention is to provide a non-woven ribbon of cellulose acetate threads. Another object is to provide a process of coating cellulose acetate threads with a coating which will bind the threads together into a non-woven ribbon. A further object is to provide an inexpensive non-woven ribbon suitable for gift wrapping.

Specifically this invention provides a non-woven ribbon which is obtained by applying a plasticized cellulose acetate butyrate coating from a solution to the back of a strip of cellulose acetate threads. Our preferred coating consists of the following:

	Percent by weight
Cellulose acetate butyrate	17.0
Alkyd Resin (22% phthalic anhydride and 38% oil acids of castor oil)	11.4
Toluene	57.9
Ethanol	13.7

In our preferred embodiment the coating is applied by knife and is dried under tension on heated, curved plates to prevent curling. The ribbon, after drying, may be calendered to increase flexibility and to produce a very smooth surface on the coated side.

The figure illustrates a suitable method of applying the coating mixture of our invention to the cellulose acetate threads.

The threads leave the supply roll to pass through an end-and-end lease to minimize crossing of the threads. As the threads begin to cross the first heater, the coating is applied using a knife coater and the coated material passes over curved heaters through suitable rollers to the take-up roll.

We have found that the components in our coating composition may be substituted to a slight extent. For instance, other alkyd resins may be used such as a non-oxidizing alkyd containing 43% phthalic anhydride and 34% of an oil such as coconut oil. In addition since the alkyd resin functions as a plasticizer, the plasticizing action may be obtained with other common plasticizers such as dioctyl phthalate, dibutyl sebacate, other alkyds and the like. The plasticizing component may vary from 0–60% depending on the type of plasticizer used and the degree of flexibility desired. However, our preferred embodiment contains 60% cellulose acetate butyrate and 40% of the alkyd given in our preferred embodiment (on a non-volatile basis).

For optimum coating application, it was found that a total non-volatile of 28–30% was preferred. However, this may vary from 20–35% total non-volatile.

The temperature is not critical and would vary somewhat with the type of equipment used and on the speed of the operation, but high temperature is desirable to speed drying. However, the temperature must not be increased to the point where it will cause the coating to bubble on rapid evaporation of the solvents.

The following example illustrates but is not meant to limit our invention:

Example I

A one-inch wide beam of red Chromspun cellulose acetate with 120 ends to the inch was run through an end-and-end lease to minimize crossing of the threads on the apparatus shown in Fig. 1. Tension was maintained on the ribbon so that the threads did not cross over. A cellulose acetate butyrate coating containing the following proportions was coated on the fibers using a knife coater on the forepart of a curved plate (170–200° F.) approximately four feet long. The curved ribbon then passed at approximately 8 feet per minute over another curved heated plate (three feet long) at 200–270° F. and onto a take-up roll. The following is the formula for the coating composition:

	Percent by weight
Cellulose acetate butyrate	17
Alkyd Resin (containing 22% phthalic anhydride and 38% oil acids of castor oil)	11.4
Toluene	57.9
Ethanol	13.7

Example II

A ribbon prepared according to Example I was passed through calendering rolls following complete drying of the coated ribbon. The calendered ribbon was improved in texture and flexibility over the coated ribbon which had not been calendered.

Similar ribbons may be prepared from such filaments as viscose, cotton, polyesters, and the like. However, the particular advantage of our invention lies in its applicability to cellulose acetate filaments. With other fibers there is considerably less problem of solubility in organic solvents. Moreover, the solvent composition for such a coating must be carefully compounded in order to avoid having the fibers distorted or altered by

solvent action. Consequently, by using our coating composition, the fabric-like appearance of the ribbon is preserved.

Cellulose acetate filaments for use in our invention are preferably composed of cellulose acetate having a degree of hydrolysis corresponding to an apparent percent acetyl of 39–40% acetyl. These filaments may have a small proportion of a higher acetyl such as propionyl. The cellulose acetate butyrate which we prefer is an ester having about 37% butyryl content and about 13% acetyl content.

The plasticizer used in the coating composition must first be compatible with the cellulose acetate butyrate and further must be capable of promoting adhesion between the coating and the filaments and imparting flexibility to the coating. The phthalic anhydride—cocoanut oil resin described above is highly satisfactory for our invention; however, we prefer to use as a plasticizer alkyd resins prepared from phthalic anhydride and oil acids of castor oil reacted with glycerine, such as that manufactured and sold by the General Electric Company as Glyptal 2556.

We claim:

1. A process for forming a weftless ribbon comprising bonding together the yarns of a warp consisting of parallel yarns of cellulose acetate to form a self-supporting web, by means of a coating comprising 15–20% cellulose acetate butyrate, 46–64% toluene and 10–20% ethanol by weight and drying at elevated temperatures under tension on heated drying plates.

2. A process for forming a weftless ribbon comprising bonding together the yarn of a warp consisting of parallel yarns of cellulose acetate to form a self-supporting web, by means of a coating comprising 15–20 percent cellulose acetate butyrate, 46–64 percent toluene and 10–20 percent ethanol by weight and drying at elevated temperatures under tension.

3. A process for forming a weftless ribbon comprising bonding together the yarns of a warp consisting of parallel yarns of cellulose acetate to form a self-supporting web, by means of a coating comprising 15–20 percent cellulose acetate butyrate, 46–64 percent toluene and 10–20 percent ethanol by weight and drying at elevated temperatures on heated drying plates.

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