

UNITED STATES PATENT OFFICE

2,031,636

MANUFACTURE OF ARTIFICIAL RIBBONS,
STRAW, AND THE LIKE

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No Drawing. Application August 7, 1930, Serial
No. 473,779. In Great Britain October 3, 1929

2 Claims. (Cl. 18—54)

This invention relates to the manufacture of ribbons, tapes, straw, or the like material of flattened cross-section (hereafter referred to as "ribbons") from artificial filaments, yarns, or threads. U. S. application S. No. 406,356 dated November 11, 1929 describes a process of making such ribbons by applying a solvent or softener to a plurality of artificial filaments, causing the filaments to adhere to each other, and submitting them to the action of pressure. U. S. application S. No. 361,832 dated May 9, 1929, describes a similar process of forming ribbons, the artificial filaments or yarns to which a solvent or softener has been applied being, however, subjected to the action of heat in addition to the action of pressure.

These processes are particularly applicable to the treatment of artificial filaments having a basis of cellulose acetate or other cellulose derivatives, for example, cellulose esters, such as cellulose formate, propionate, and butyrate, thiocarbamic and alkoxy-alkacyl esters of cellulose, and nitro-cellulose; cellulose ethers, such as methyl, ethyl, and benzyl cellulose; and the corresponding condensation products of cellulose and glycols or other polyhydric alcohols.

It has now been found that thermoplastic artificial filaments, yarns or threads, such as those above-mentioned can be formed into ribbons without the use of a softener or solvent by the application of such conditions of heat and pressure as produce a melting effect on the filaments and cause them to unite, the pressure giving the product a flattened cross-section. The degree to which heat and pressure are applied may vary according to the extent of union desired, and to other qualities of the finished product, as will appear hereafter. Further, the conditions of heat, pressure and duration of pressure are interdependent and may be varied as desired. For example, the higher the temperature employed the less need the pressure or the duration of the pressure be to give the same results. Similarly, with the same conditions of temperature and pressure, differences in the duration of the pressure will give different results.

The invention is not restricted to the production of flat ribbons, only, but may be applied to the formation of ribbons which are crinkled, embossed, or otherwise formed. The flattening may also take place intermittently along the length of the filaments, and may also vary in degree at intervals along their length. Further, various coloured, metallic, or other effects may be ob-

tained simultaneously with the formation of the ribbons.

The invention may be applied continuously with the production of the filaments, whether by the dry or evaporative method, or by the wet or coagulation method, or subsequently thereto.

The manner in which the invention can be carried into effect will now be given in greater detail, but it is to be understood that the following description is given by way of example only, and is in no way limitative.

A number of filaments in the form of twisted or untwisted yarn or yarns corresponding in total denier to the size of ribbon to be produced is drawn from any suitable source, for example, from the spinning machine in which they are produced or from any form of yarn package; alternatively filaments which have already been wound in the form of yarns or threads and are in the form of twists or cord may be used as a primary material. Woven or knitted narrow strips of fabric or knitted tubes may also be employed.

The pressure may be applied in any suitable manner, a convenient method being to pass the filaments between one or more pairs of rollers. At least one of the rollers of each pair is positively driven, but preferably the drive is given to both rollers. Means are preferably employed to enable the pressure between the rollers to be adjusted, and for this purpose means may be suitably arranged to press one roller against the other. Plain rollers enable a simple ribbon to be obtained, while embossed, corrugated, or fluted rollers, or pressing devices, may be used to produce crinkled or embossed ribbons. Similarly, ribbon material having alternately narrow and wide portions along its length may be produced. The ribbon may be passed successively through two or more pairs of rollers which reduce its thickness in turn.

At least one roller of each pair is heated, as by means of steam, hot water, or electric resistances, the filaments being caused to pass between the rollers, whereupon the heat and pressure applied melt the substance of the filaments and cause the filaments to unite into a ribbon which may be plain or have any other form depending on the type of rollers employed. From the rollers the ribbon proceeds to any suitable winding or collecting device. The degree of heat and pressure may be sufficiently high to coalesce the filaments into a clear product, while at other temperatures and pressures a somewhat opaque

product in which the form of the filaments is still discernible may be obtained.

Instead of employing several separate pairs of pressure rollers, one roller, preferably that which is heated, may be made of larger diameter, and two or more rollers, preferably of smaller diameter, associated with this larger roller, the filaments being drawn round a considerable part of the circumference of the large roller, and passing under the other rollers in turn. This arrangement is particularly suitable for obtaining very thin ribbons, a reduction in thickness being obtained at each successive pressing. If desired, coloured, metallic or other effects may be obtained by applying suitable dyes, metallic powders and the like. These may be impressed at any suitable stage, and may be arranged to form any desired pattern on the ribbon, for example, one of the pressing rollers may be used as a printing roller which is fed with a printing paste, so as to apply the paste simultaneously with the heat and pressure treatment. Alternatively a separate printing roller may be arranged to operate on the already formed ribbon. Other ornamental effects may be obtained by introducing into the filaments which are to be united, other materials, such as yarns or threads or other filaments or fibres or fine material tapes or wires. Thus, there may be introduced into a ribbon of cellulose acetate, yarns or threads of cotton, or reconstituted cellulose, such as viscose, nitrocellulose, or cuprammonium artificial silk, it being possible, by suitable dyeing of the product formed to obtain cross-dyed or multi-coloured effects. Further striped effects may be obtained by employing filaments or threads which have been coloured previously to the ribbon forming treatment, such filaments or threads being either wholly composed of cellulose acetate or other organic derivatives of cellulose, or partly of such materials and partly of cotton, reconstituted cellulose and the like, having different affinity for the dyestuffs from the cellulose derivative. Further colour effects may be formed on the ribbon by the intermittent application of dyestuffs either to the filaments before pressing or to the ribbon

itself. The dyestuff is preferably applied in the form of a solution in an organic solvent.

In addition to the crinkled, embossed, or other effects mentioned above, a ribbon having a very pleasing appearance can be obtained by subjecting a thermoplastic material to the process in the form of knitting cord or twist, and applying heat and pressure to such a degree that the ribbon preserves to a greater or less extent the initial twist in the cord, and so has a crinkled or twisted appearance. Similarly, when woven or knitted strips or knitted tubes are employed as the primary material, the heat and pressure may be adjusted so that the woven or knitted character is not altogether destroyed, but is retained to some extent in the ribbon to impart a distinctive appearance thereto.

A high lustre, as well as improved waterproof properties, may be given to the ribbons by passing them, after or during coalescence of the filaments, between pressing rollers which apply waxes, such as carnauba wax or beeswax, to the ribbons.

What I claim and desire to secure by Letters Patent is:—

1. Process for the production of artificial materials of flattened cross-section, said process comprising subjecting a plurality of substantially parallel, separate filaments of a thermoplastic derivative of cellulose to the action of heat and pressure so as to produce a melting effect upon the filaments, and to cause them to unite to form a product of flattened cross-section and applying to the flattened product a wax-like substance to produce a lustrous effect.

2. Process for the production of artificial filamentary materials of flattened cross-section, said process comprising the continuous operations of spinning a solution, associating a number of filaments thus obtained, subjecting them to the action of heat and pressure so as to produce a melting effect upon the filaments, and to cause them to unite to form a product of flattened cross-section and applying a wax-like substance to produce a lustrous effect.

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