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PRODUCTION OF ARTIFICIAL TEXTILE YARNS OR THREADS

Filed Nov. 11, 1929

FIG. 1.

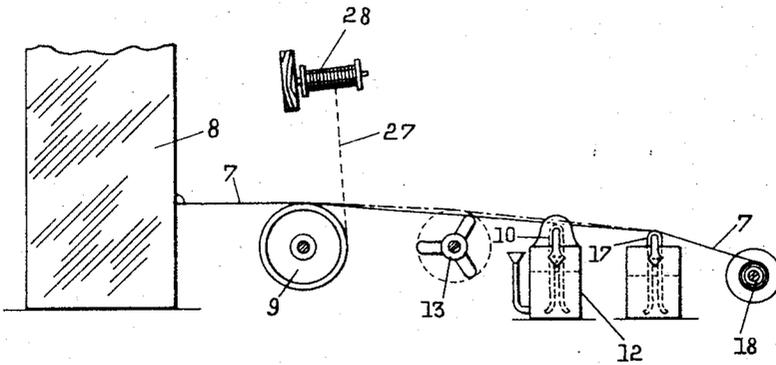


FIG. 2.

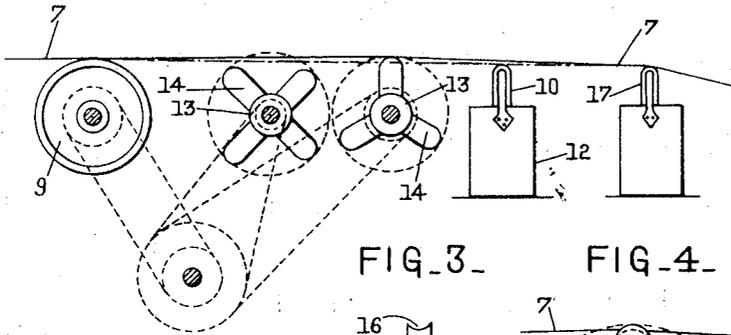


FIG. 3.

FIG. 4.

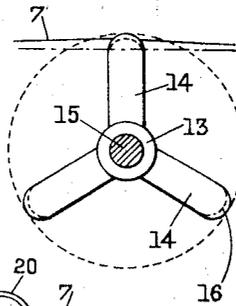
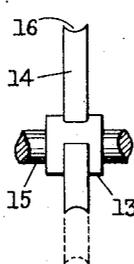


FIG. 6.

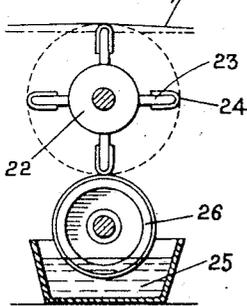
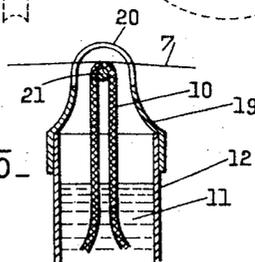


FIG. 5.



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PRODUCTION OF ARTIFICIAL TEXTILE YARNS OR THREADS

Application filed November 11, 1929, Serial No. 406,355, and in Great Britain November 21, 1928.

This invention relates to the production of artificial silk or like yarns or threads and has for its object a process and apparatus for the production of artificial yarns or threads having different physical and other characteristics from those hitherto produced, the new filaments or threads being capable of wide and varied application in the textile industry. The invention also includes within its scope fabrics or articles made of or containing the new yarns or threads.

U. S. patent specification S. No. 393,287 filed 17th September, 1929 describes a process and apparatus for physically uniting by adhesion continuous filaments or threads to form a single larger filament (a "unitary filament") or a yarn or thread consisting either of several of such unitary filaments or of one or more unitary filaments in association with one or more individual or primary filaments. The union of the filaments is effected by applying a substance or material that exerts a solvent or softening action on the filaments, the filaments being caused to adhere to each other or even to merge or coalesce to form the unitary filaments, which are then allowed to harden.

The invention contemplates a similar treatment of the filaments, but instead of effecting their union along the whole of their length to form a continuous unitary filament or filaments, consists in physically uniting them or some of them at intervals along their length. The yarn or thread thus formed (hereafter referred to as "thread") consists of alternating or recurring lengths of unitary portions separated by lengths of independent filaments. Union of the filaments is effected by the application of a substance or material having a solvent, a restricted solvent, or a softening action on the filaments, any suitable means being employed to apply the solvent or softener at the parts required to be united.

By varying the lengths of the united portions and/or of the remaining free portions an endless variety of threads can be obtained, enabling a very wide range of effects to be produced in fabrics or articles produced from or containing the threads. When the

filaments composing the threads are divided into groups, some or all of which have portions of their length united as above described, or when several groups of treated filaments are afterwards associated as a thread, it is not necessary that the same arrangement of united and free portions shall obtain in each group, but by means of different arrangements in the several groups, the range of effects may be further increased. Further, one or more of such groups may be completely formed into unitary filaments as described in U. S. patent specification S. No. 393,287, the resulting thread thus comprising one or more unitary filaments associated with one or more filaments comprising united portions at intervals along their length, and, if desired, the thread may contain one or more individual primary filaments.

The treated filaments may be wound, with or without twisting or otherwise collected in any suitable manner.

The solvent or softener may conveniently be applied by means of a wick or other absorbent material, and the intermittent application may be effected by moving the applying means into contact with the filaments or by causing the filaments to be displaced into contact with the applying means. Thus, one or more wicks or the like may be so mounted and operated as to come into contact with the filaments by rotation, reciprocation, or oscillation, the frequency and duration of contact of the each wick or the like determining the lengths and arrangement of the unitary portions along the length of the filaments or groups of filaments. Similarly, one or more rotating, reciprocating, or oscillating devices may be actuated to bring the filaments into contact with one or more wicks or other solvent or softener applying devices.

It is preferred to apply the solvent or softener in quantities only just sufficient or not substantially exceeding the amount necessary to secure adhesion of the several filaments to each other. When restricted amounts of solvents or softeners are used, the product rapidly hardens, and economy is effected

in the quantity of solvent or softener used. Further, stickiness after adhesion is reduced to a minimum, thus facilitating subsequent handling, such as winding or reeling. Any residual stickiness may be easily counteracted by treating the product with suitable substances, such as lubricants after adhesion has taken place.

After receiving the solvent or softener, the united filaments may be submitted to the action of pressure, with or without crinkling or embossing, to give them a flattened cross-section, in the manner described in British patent application No. 34,175/28 filed 21st November, 1928, the resulting product thus consisting of alternating lengths of free filaments and flattened, crinkled, or embossed portions of united filaments.

The filaments may be treated during a bobbin-to-bobbin or other winding operation, but the invention is particularly applicable to the treatment of artificial filaments in the course of their production, especially by the dry or evaporated method. For instance, the invention may be applied to the treatment of filaments or threads of cellulose acetate continuously with their production by the dry or evaporative method, in which case solvents or softeners such as acetone (commercially pure or mixed with water), triacetin, ethyl lactate, diacetone alcohol, and mixtures of diacetone alcohol with water or alcohol are especially suitable. When a volatile solvent such as acetone is employed, means may be employed to assist or accelerate its evaporation from the filaments after the treatment, such means being associated if desired with an apparatus for the recovery of the solvent.

The invention is particularly applicable to the treatment of artificial filaments having a basis of organic derivatives of cellulose, whether produced by the dry or evaporative method or by the wet or coagulation method, and whether during the course of their production by either of such methods or subsequently thereto. Examples of cellulose derivatives which may form the basis of the filaments are cellulose esters, e. g. cellulose acetate, formate, propionate, and butyrate, (and nitro-cellulose; cellulose ethers, e. g. methyl, ethyl and benzyl cellulose; thiocarbamic or alkoxy-alkacyl esters of cellulose, and the condensation products of cellulose and glycols and other polyhydric alcohols.

The yarns or threads consisting of portions of united and free filaments alternating along their length may be twisted or doubled with similar or other yarns or threads and may be formed, either alone or in association with such twisted or doubled threads and/or with other yarns or threads

into fabrics or articles by any suitable textile operation.

Several methods of carrying out the invention will now be described with reference to the accompanying drawing, but it is to be understood that the following description is given by way of example only and is in no way limitative.

Referring to the drawing:—

Fig. 1 is a diagrammatic elevation of one form of apparatus which may be employed; Fig. 2 is a detailed elevation of a further form of apparatus;

Figs. 3 and 4 are end and side elevations of details of Figs. 1 and 2;

Fig. 5 is a view of a further detail; and Fig. 6 is an alternative device.

A bundle of filaments 7 produced in a spinning cell 8 is led round a feed roller 9 and proceeds to a wick 10 which is moistened with solvent 11 from a container 12. Arranged between the roller 9 and the wick 10 is a device 13 comprising any suitable number of arms 14 mounted on a hub arranged for rotation on a shaft 15. The ends of the arms 14 are adapted to engage the filaments during the rotation of the device, and lift the filaments out of contact with the wick 10. The ends of the arms 14 are preferably hollowed or grooved, as shown at 16, to ensure proper engagement with the filaments. The filaments thus receive intermittently an application of the solvent from the wick 10, and lengths of the filaments receiving the solvent are caused to adhere together. A further wick 17 supplied with olive oil intercepts the treated filaments on their way to a bobbin 18 or other winding device in order to remove any residual stickiness.

In Fig. 2, two devices 13 are employed, one having three arms 14 and the other four. The two devices are preferably driven at different speeds, and the peripheral speed of each, moreover, is greater than the peripheral speed of the roller 9. The operation of both devices on the filaments results in a more complex arrangement of the united and free portions of the filaments than is possible by the use of a single device.

Instead of the devices 13 being arranged to remove the filaments from contact with the wick 10, the filaments may normally pass out of contact with the wick and be pressed against the wick by the rotation of the devices 13.

By rotating the device or devices 13 at a suitable speed or by suitably disposing arms of the rotating device in a regular or irregular manner, the frequency of application of the filaments to the wick may be arranged to produce any desired pattern or arrangement of united portions on the filaments. The lengths and/or peripheral widths of the arms 14 may also be chosen

so as to give greater or smaller intervals during which the filaments are in contact with the wick.

By dividing a number of filaments into 5 groups and causing each group to come separately under the action of the rotating device or devices 13, each group may independently receive the softening material, and also by employing a number of rotating 10 devices (which may have a different arrangement of arms and/or may rotate at different speeds) each group may be given any desired arrangement of united portions. Further one or more groups may be kept 15 constantly in contact with the wick, so as to be formed into one or more unitary filaments. One or more of the filaments may be arranged to avoid the wick altogether and so escape treatment.

20 Treatment of groups of filaments as described in the previous paragraph is more particularly applicable to bundles of untwisted filaments, such bundles being readily separated into groups. Separate groups or 25 threads of filaments may be treated in the manner indicated above, and afterwards associated to form a thread.

In order to retard the evaporation of the solvent 11, the container 12 may be provided with a cover 19, a slot 20 at the top of the cover allowing the filaments to come into contact with the wick 10. The wick is suitably supported on a rod 21 carried by the container 12.

35 It will be understood that in place of a wick, any other arrangement, such as, for instance, a roller rotating in a trough supplied with a liquid to be applied, may be employed.

40 A further means for applying the solvent or softener is shown in Fig. 6, a device 22 having any desired number of arms 23 which apply the material directly to the filaments 7 when the arms are brought into contact 45 with the filaments by the rotation of the device. The arms 23 are provided with wicks 24 that come into contact with the filaments, and receive the material from a roller 26 rotating in a trough 25. The wicks 50 24 may, however, be supplied with solvent or softener from a container inside the device 22 itself. The arrangement of the arms of the device, their length of contact with the filaments, and the speed of rotation of 55 the device are determined by the form of thread to be produced. One or more of such devices may be employed simultaneously in a manner similar to that described with reference to Fig. 2.

60 By dividing a number of filaments into groups and using a plurality of movable solvent or softener applying devices, each group can be given any desired arrangement of unitary portions, and, if desired, one or 65 more filaments may be guided out of the

path of the applying means or otherwise prevented from receiving the solvent or softener.

Other material, such as other yarns, filaments, or threads, coloured or otherwise, or 70 metallic wires or tapes, such as tinsel, may be incorporated in the product. As shown in Fig. 1, this other material 27 may conveniently be withdrawn from a bobbin 28 75 by means of the feed roller 9 and submitted to the same treatment as the filaments 7.

Dyes or other colouring matter or metallic 80 powders may be added to the solvent or softener and applied therewith to the filaments.

Instead of the filaments being treated continuously with their production as described above, they may be taken from one or more bobbins or other packages, filaments of different colours and/or of different materials 85 being used if desired.

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

1. Process for the production of artificial 90 yarns, comprising applying at intervals along the length of a number of filaments of an organic derivative of cellulose a substance having a softening action on the filaments, and causing the filaments to adhere together to form a yarn consisting of lengths of independent filaments alternating with lengths 95 of filaments united together.

2. Process for the production of artificial 100 yarns comprising applying at intervals along the length of a number of filaments of cellulose acetate a substance having a softening action on the filaments, and causing the filaments to adhere together to form a yarn consisting of lengths of independent filaments alternating with lengths of filaments 105 united together.

3. Process for the production of artificial 110 yarns, comprising applying at intervals along the length of a number of artificial filaments of an organic derivative of cellulose a substance having a softening action on the filaments, causing the filaments to adhere together to form a yarn consisting of lengths of independent filaments alternating with lengths of filaments united together, and treating the product with a substance such as a lubricant to remove stickiness due to the softening substance. 115

4. Process for the production of artificial 120 yarns, comprising applying at intervals along the length of a number of filaments of cellulose acetate a substance having a softening action on the filaments, causing the filaments to adhere together to form a yarn consisting of lengths of independent filaments alternating with lengths of filaments united together, and treating the product with a substance such as a lubricant to remove stickiness due to the softening sub- 125 stance. 130

5. Process for the production of artificial yarns, comprising dry spinning a plurality of filaments of cellulose acetate, applying at intervals along the length of the filaments a substance having a softening action on the filaments, and causing the filaments to adhere together to form a yarn consisting of lengths of independent filaments alternating with lengths of filaments united together. 75
6. Process for the production of artificial yarns, comprising applying at intervals along the length of a number of artificial filaments of an organic derivative of cellulose a substance having a softening action on the filaments, in quantity just sufficient to render the filaments sticky, and causing the filaments to adhere together to form a yarn consisting of lengths of independent filaments alternating with lengths of filaments united together. 80
7. Process for the production of artificial yarns, comprising applying at intervals along the length of a number of artificial filaments of an organic derivative of cellulose a substance having a softening action on the filaments, causing the filaments to adhere together and pressing the filaments to form a yarn consisting of lengths of independent filaments alternating with lengths of filaments united together in flattened cross-section. 85
8. Process for the production of artificial yarns, comprising applying at intervals along the length of a number of filaments of cellulose acetate a substance having a softening action on the filaments, causing the filaments to adhere together and pressing the filaments to form a yarn consisting of lengths of independent filaments alternating with lengths of filaments united together in flattened cross-section. 90
9. Process for the production of artificial yarns, comprising applying at intervals along the length of a plurality of different component materials at least some of said materials comprising an organic derivative of cellulose a substance having a softening action on at least one of the organic derivative of cellulose materials and causing the whole of the materials to adhere together at these intervals to form a yarn consisting of lengths of independent materials alternating with lengths of materials united together. 95
10. Artificial yarns comprising lengths of independent artificial filaments alternating with lengths of filaments united together. 100
11. Artificial yarns comprising a plurality of filaments of cellulose acetate in the form of lengths of independent filaments alternating with lengths of materials united together. 105
12. Artificial yarns comprising a plurality of groups of artificial filaments twisted together, at least one of the groups comprising lengths of independent filaments alternating with lengths of filaments united together. 110
- In testimony whereof I have hereunto subscribed my name. 115
- WILLIAM IVAN TAYLOR. 120
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