

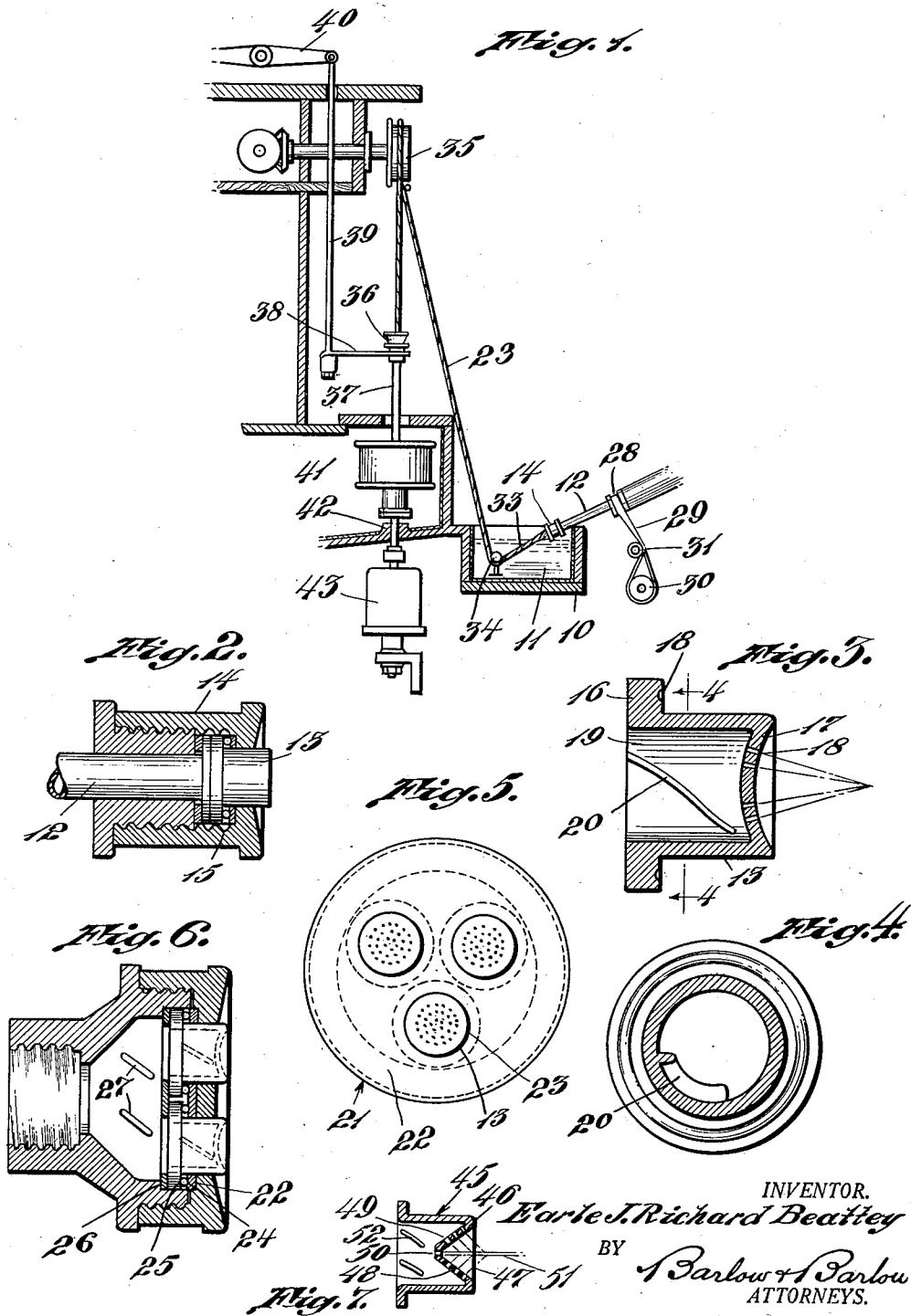
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MAKING OF RAYON

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MAKING OF RAYON

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8 Claims. (Cl. 18—8)

This invention relates to the production of a rayon thread formed of a plurality of filaments and has for one of its objects the provision of a thread which when woven into a fabric and the fabric creased will tend to straighten out so that the crease will disappear from the fabric and the fabric will have the same action as fabrics formed of silk or wool.

Another object of the invention is to mechanically manipulate the filaments as formed so as to cause the filaments to be better supported one with the other that each of the components thereof will tend to straighten out after a fabric formed of such thread has been creased.

Another object of the invention is to attain this strengthening of the filaments one with the other by twisting them together in a coagulating bath while in a soft and gelatinous state that the density of the thread may be increased at such points as will better support the thread to acquire the result desired.

Another object of the invention is the provision of an arrangement and method by which the pressure upon the viscose or extruded material, and a movement thereof, will cause the rotating movement of the spinneret or nozzle by which this twisting action may occur.

Another object of the invention is the provision of means by which a plurality of threads each consisting of a multiplicity of filaments may be twisted one about the other while also being twisted about its own axis to acquire this desired result.

Another object of the invention is the provision of a spinneret which will have a suitable formation to cause it to rotate as the extruded material is forced out of it.

A further object of the invention is to also combine with this spinning the directing of the filaments toward each other that they may be more concentrated and in a condition to better support each other in the finished thread formed.

With these and other objects in view, the invention consists of certain novel features of construction, as will be more fully described, and particularly pointed out in the appended claims.

In the accompanying drawing:

Fig. 1 is a side elevation partly in section and largely diagrammatic illustrating the layout of the portion of a machine for forming rayon filaments.

Fig. 2 is a sectional view thru the mounting for the spinneret showing means for holding the same in position.

Fig. 3 is a sectional view thru the spinneret illustrating the fin therein of my new design.

Fig. 4 is a sectional view on line 4—4 of Fig. 3.

Fig. 5 is a modified view of a group of spinnerets mounted in a rotatable disk or carrier.

Fig. 6 is a sectional view showing the mounting of this rotatable disk in position to receive material to be exuded thru the different spinnerets.

Fig. 7 is a sectional view of a modified form of spinneret.

In garments using rayon, which is a cellulose product usually formed by the viscose process using wood pulp as the supply of cellulose, it is found that the garment becomes creased through wear and that whereas when the garment is made of silk or wool the hanging of the same upon a form or suitable support usually causes these wrinkles or creases to come out of the garment, that with the use of rayon these creases remain set to a far greater extent and will not disappear from the garment under such similar treatment, and I have attributed this to the air spaces present in any rayon thread between the filaments thereof which occur to a far greater extent in a rayon thread than they do in a silk thread, and I find that by manipulating the filaments of these rayon threads by twisting or the like after formed I do not materially reduce this air space to any effective extent as the filaments seem to be set in a certain spaced relation after they emerge from the coagulating bath and attain their finished or hardened state. This possibly may be by reason of the fact that the coagulating bath which contains other sulphate salts as well as sulphuric acid causes the indentation of these filaments and an irregular formation and thus provides a multiplicity of air pockets. Further, the individual rayon filaments possess but a relatively small amount of elasticity and thus in this spaced relation they cannot support themselves against creasings of a fabric when they are woven into this form and the fabric formed into a garment, and in order that this effect may be minimized to a material extent I have provided a spinneret which will rotate about its own axis so as to provide a twisting action of the filaments during coagulation and before the same have become fully set by the coagulating bath and in cases where a strand or a twisted number of threads is provided I may twist these together in the coagulating bath, and in order that this may be accomplished without the necessity of providing additional mechanism I have formed fins upon the spinneret and upon the carrier for the group of revolving spinnerets so that as the exuded material is forced outwardly

the spinneret will be given a turning action to cause the desired twisting in a controlled fashion dependent upon the speed of discharge and have held the twisted thread that the twist may occur at a point prior to full setting by coagulation and thus one by which the air spaces between the filaments may be materially reduced that these filaments may support each other to better acquire the results of combined elasticity for straightening out after being creased such as is realized in fabrics formed from fibers of an animal nature such as silk or wool, and the following is a more detailed description of the present embodiment of this invention illustrating the preferred means by which these advantageous results may be accomplished.

With reference to the drawing I have illustrated in Fig. 1 a portion of an apparatus which is used in the viscose process of making rayon. This apparatus includes a tank 10 having a coagulating bath 11 therein which contains largely sulphuric acid, although it usually contains other sulphate salts which are found of advantage in providing the desired coagulating effect upon the viscose or exuded cellulose mixture which has been properly aged in an accustomed manner. This viscose mixture is forced by a suitable pump in the usual manner through a filter and thence through glass tube 12 and outwardly through a spinneret nozzle 13 which is mounted upon the end of the tube 12 by means of a coupling 14 engaging a ball bearing or anti-friction means 15 in which the flange 16 of this spinneret is mounted, the flange 16 being provided with a groove or ball race 17 for the reception of the balls through which the thrust occurs.

The end wall of the spinneret is provided with a multiplicity of openings 18 directed in such a manner as to focus at a point and thus cause the threads to come together assisted by a twist placed therein. Along the inner bore 19 of this spinneret there is provided a fin 20 which follows a helical path so that the fluid passing this spinneret will cause it to rotate in an amount dependent upon the speed with which the exuded material is ejected. Thus as the exuded material is ejected it will be twisted so that its different fibers, in addition to being focused toward a certain point, will be twisted to cause the same to lie closely together before setting by coagulation and cause less air spaces between the filaments than is customary in the usual process of forming rayon thread.

In some cases it may be desirable to provide a plurality of spinnerets 13, each rotatably mounted in a carrier 21, there being illustrated in Fig. 5, three, although any desired number may be had. This carrier comprises a plate 22 having three openings 23 therein about each of which a groove 24 is provided to receive the balls 25 of the bearing which also run in the raceway 18 of the flange of the spinneret. A cover plate 26 engages the opposite side of the flange to maintain the spinneret in assembled relation. The carrier 21 may itself be rotated in a suitable manner such as by fins 27 to cause the group of three threads to twist one about the other to form a strand as desired. In some cases where friction is great I may rotate the structure of Fig. 6 by a pulley 28 driven by belt 29 from a suitable source of power 30 and tensioned by pulley 31.

The coagulated product 33 is conducted beneath a glass rod guide 34 and thence upwardly out of the bath 11 and over a guide pulley 35, thence into the funnel portion 36 of a traverse tube 37

which is reciprocated by means of an arm 38, rod 39, and rocker 40 for depositing the product in a centrifuge 41 in the form of an annular or hollow cylindrical cake which may be readily removed therefrom if desired. This centrifuge is rapidly rotated through shaft 42 by electric motor or pulley 43 in a direction opposite to the rotation of the spinneret in order that this action may take place.

The coagulating bath which is usual in the viscose process of forming rayon causes the filaments to assume shapes different from the shapes in the holes of the spinneret which openings are circular in cross-section, and these filaments are found to be indented or so formed, and they do not lie close together but have air spaces between them and by reason of the twisting of the filaments together at a point where coagulation is complete when the filaments are in a gelatinous state the air spaces are reduced to a material extent so that by this twisting action they are brought into close relationship and support one another by which a greater elasticity of the thread is provided and the thread is better able to straighten out after sharp bends are placed therein such as occur by creasing of the fabric and also the thread is better able to withstand the strains of knotting or sharp bending such as occur in knitting or other fancy fabric formation.

In Fig. 7, I have illustrated another modification 45 in which the end wall 46 of the spinneret is cupped inwardly as at 47 to a greater extent with its walls 48 on an incline and the openings 49 in these walls directing the filaments toward each other, while at the innermost portion of the cupped recess an opening 50 of larger size is formed. The filament 51 exuded therefrom, coming in contact with the coagulating bath prior to the other filament, and thus being set to a greater extent before contacting with the other filaments directed toward it. Fins 52 are formed thereon for rotation in the manner above mentioned.

The foregoing description is directed towards the method and construction illustrated, but I desire it to be understood that I reserve the privilege of resorting to all the equivalent changes to which the construction and method are susceptible, the invention being defined and limited only by the terms of the appended claims.

I claim:

1. In the method of making rayon thread, the step of twisting the filaments together in the coagulation bath by rotating a spinneret and using the movement of the exuded material out of said spinneret for causing said rotating action.
2. In an apparatus for making rayon, a coagulating bath, a spinneret therein, and a fin provided on said spinneret for actuation by the exuded material for rotating said spinneret.
3. In an apparatus for making rayon, a coagulating bath, a carrier in said bath, a plurality of spinnerets rotatably mounted in bearings in said carrier, and a fin on each of said spinnerets for rotation thereof by the movement of said exuded material.
4. In an apparatus for making rayon, a coagulating bath, a carrier in said bath, a plurality of spinnerets rotatably mounted in bearings in said carrier, a fin on each of said spinnerets for rotation thereof by a movement of said exuded material, and means for rotating said carrier.
5. In an apparatus for making rayon, a coagulating bath, a carrier in said bath, a plurality of

spinnerets rotatably mounted in bearings in said carrier, and a fin on said carrier for rotation thereof by the movement of said exuded material.

- 5 6. In an apparatus for making rayon, a coagulating bath, a carrier in said bath, a plurality of spinnerets rotatably mounted in bearings in said carrier, a fin on each of said spinnerets for rotation thereof by the movement of said exuded material, and a fin on said carrier for rotation there-
10 of by the movement of said exuded material.

7. A spinneret having an inwardly inclined generally conical end wall with openings along said conical wall for directing the exuded filaments toward each other.

8. A spinneret having an inwardly inclined 5 generally conical end wall with openings along said conical wall for directing the exuded filaments toward each other, and an opening at the vertex of said end wall of a size larger than the openings along said conical wall. 10

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