Oct. 27, 1936. E. J. R. BEATTEY 2,058,551

MAKING OF RAYON

Filed June 5, 1933

Fig. 1.

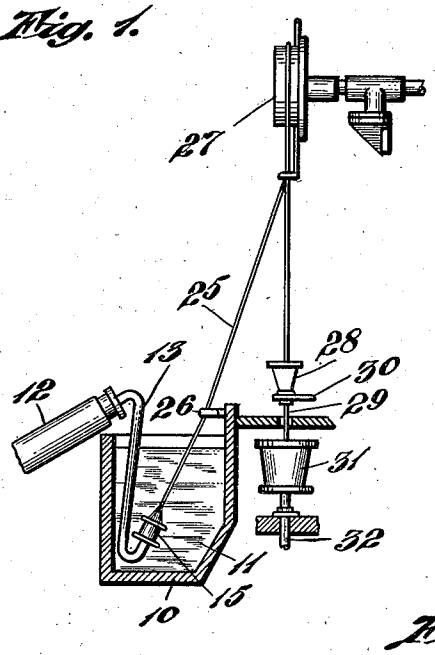


Fig. 2.

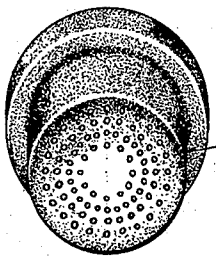


Fig. 3.

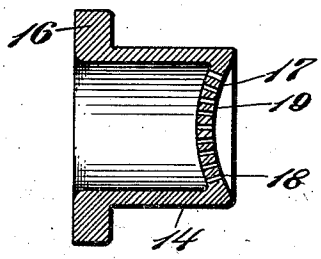


Fig. 4.

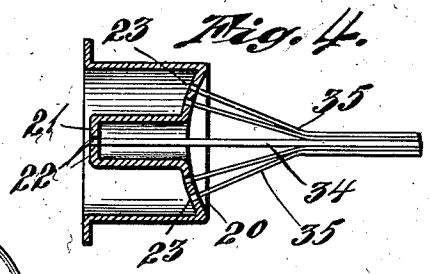


Fig. 6.



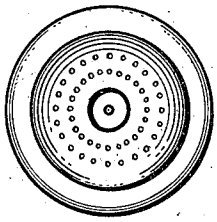


Fig. 5.

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MAKING OF RAYON

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Application June 5, 1933, Serial No. 674,351

6 Claims. (Cl. 18—8)

This invention relates to a thread formed of rayon filaments and has for one of its objects the provision of such a thread which, when woven into a fabric which becomes creased, will tend to straighten out and diminish the creases in a manner such as occurs in fabrics of woolen or silk.

Another object of the invention is the arrangement of the rayon filaments in such a manner as to bring about a strengthening result in the thread that there may be a sufficient elasticity of the thread to cause the same to straighten out when folded or creased.

Another object of the invention is the formation and coagulation of certain of the threads prior to that of the coagulation of other threads and the provision of threads of different size with the coagulation of the larger threads prior to the coagulation of the smaller threads that these larger threads may act to stiffen and support and cooperate with the smaller threads to increase their elasticity.

A further object of the invention is to direct the exuded filaments toward each other prior to coagulation so that as they coagulate they may be closely assembled one with reference to the other to better support each other and provide a greater elasticity for the thread which is of importance when the thread is woven into a fabric and the fabric used as a garment.

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 of certain parts of a machine for forming rayon filaments.

Fig. 2 is a perspective view of my improved spinneret.

Fig. 3 is a sectional view through the spinneret illustrating the concave wall in which the openings are formed.

Fig. 4 is a sectional view of a modified form of spinneret showing a means by which certain of the filaments may contact with the coagulating bath prior to the exuding and coagulating of other cooperating filaments.

Fig. 5 is an end view of the spinneret of Fig. 4.

Fig. 6 is a perspective view greatly enlarged of the thread formed.

In the use of rayon, which is a cellulose product usually formed by the viscose process using wood pulp as the supply of cellulose, when formed into a garment, it is found that the garment becomes creased through wear and that whereas when a 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 baths which contain other sulphate salts as well as sulphuric acid cause the drawing in and indentation of these filaments and an irregular formation and thus provide 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 has its openings so shaped that they tend to force the exuded filaments together while in a rather gelatinous moldable state in the coagulating bath and at this time permit of their being set closer together and the air spaces about the filaments somewhat reduced.

Also I may provide a spinneret by which a larger filament may be formed at the center and contact with the coagulating bath earlier and during a longer period of time than the surrounding filaments which assists in better supporting the finer filaments and yet giving a softer feel and desirability of fine filaments while supporting these, that their combined elasticity may be had to resist the strains of folding or creasing and to a better extent tend to straighten out after such action in the same manner as do the fibers of an animal nature such as silk or wool, and the following is a 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 generally in the viscose process of making rayon. This apparatus consists of a tank 10 hav-

ing a coagulating bath 11 therein which contains largely sulphuric acid, also it usually contains other sulphate salts which are found of advantage for providing the desired coagulating effect upon the viscose or exuded cellulose mixture which has been properly aged in an accustomed manner.

This viscose or cellulose mixture is forced by a suitable pump in the usual manner through a candle filter 12 thence through glass tube 13 and outwardly through a spinneret or nozzle 14 of a modified form and which is held in place by a suitable coupling 15 to the end of a glass tube in the usual manner. The coupling 15 engages the flange 16 on the spinneret which is formed of the noble metals in order to prevent detrimental action of the coagulating bath thereon and also to permit cleaning the same by burning out any cellulose in the openings as desired.

The exuded material is forced through a wall 17 of the spinneret having a multiplicity of openings 18 therein. These openings, as illustrated in Fig. 3, are directed to converge at a point closely adjacent the spinneret and at a point which is substantially the radius of the arc 19 of the surface of the wall 17. The openings 18 extend in a direction at right angles to a tangent to this arcuate surface and are spaced closely together. By this arrangement in bringing the filaments into close relationship before they are set to their full extent in the coagulating bath I am able to mold these filaments so they will lie closer together and reduce the air space between the filaments and about the thread which is desirable for the better supporting of the filaments each with the other and by reason of their combined elasticity which will tend to straighten them out if doubled sharply upon themselves such as occurs in the creasing of a fabric woven therefrom.

After the filaments are coagulated, the thread 25 is carried up through guide 26 over pulley 27 and onto a flaring portion 28 of a traverse tube 29 reciprocated by mechanism 30 to deposit the thread in a centrifuge 31 in the form of an annular or hollow cylindrical cake. This centrifuge is rapidly rotated through a suitable shaft 32 and causes some twist to be placed in the thread.

In some instances I may shape the spinneret as illustrated in Fig. 4 in which the central portion 20 of the spinneret is cupped inwardly to provide a wall 21 in which I have formed an opening 22 of a larger diameter than any of the openings 23 in the wall 24 thereof. This enables the filament exuded through the opening 22 to contact with the coagulating bath 11 earlier than the contacting with coagulating bath of the remainder of the filaments and as it is larger in size and coagulation will not occur quite as quickly, it is desirable that this take place where a single large filament is used in order that a more stiffened structure may be had against which the finer filaments, which are directed toward it through the wall 24, whereby a compact relation of the structure is provided and each of the filaments is well and sufficiently supported to give to the rayon thread the desired quality of tending to straighten itself out after creased in a fabric and be better supported in knitting or the like.

This thread is shown in Fig. 6 in which the layer core is designated 34 surrounded by the smaller filaments 35 in close contact therewith.

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 comprising a core and filaments thereabout, consisting of causing of a larger core filament to be formed than the surrounding outer filaments, and the causing of the larger core filament to first contact with the coagulating bath.

2. A spinneret having a concave discharge face and provided with openings in a direction radial to its outer surface, and a common passage to all of said openings.

3. In a rayon making apparatus, a coagulating bath, a spinneret therein having a plurality of openings, means for discharging a solution containing cellulose through the spinneret, the discharge wall of said spinneret being inwardly cupped for causing the middle of the exuded material to pass through a greater length of the said bath than the outer filaments thereof.

4. A spinneret having a wall provided with discharge openings, the wall having central innermost discharge openings surrounded by other discharge openings beyond with reference to the direction of flow of the material, and a common conduit connected to all of said discharge openings.

5. A spinneret having a wall provided with discharge openings, a passage common to all of said discharge openings, the central portion of said wall projecting inwardly and provided with a discharge opening.

6. A spinneret having a wall provided with discharge openings, a passage common to all of said discharge openings, the central portion of said wall projecting inwardly and provided with a larger discharge opening.

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