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H. P. BASSETT

MANUFACTURE OF ARTIFICIAL SILK

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Fig. 1.

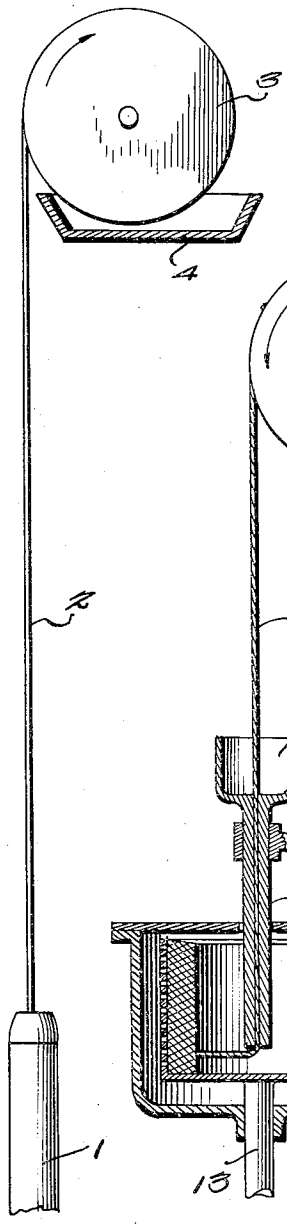
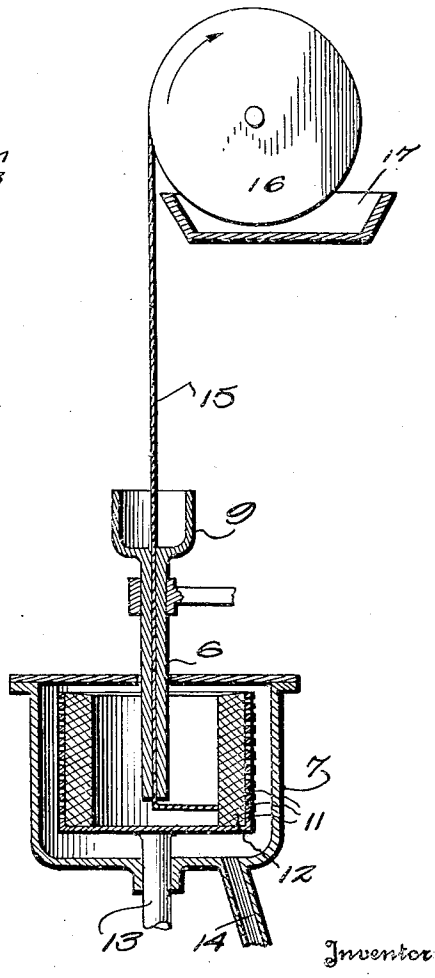


Fig. 2.

Fig. 3.



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MANUFACTURE OF ARTIFICIAL SILK.

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This invention relates to the manufacture of artificial silk, and more particularly to improvements in methods of washing the strands or filaments or artificial silk, horsehair, straw, and the like, to remove the alkali employed in the precipitating bath.

In the manufacture of artificial silk by the cuprammonium process, cellulose is dissolved in a solution of copper hydroxid and ammonium hydroxid and spun through a precipitating bath of sodium hydroxid or potassium hydroxid.

The spun strands or filaments are then washed to remove the alkali and finally treated with an acid solution to remove the last traces of copper and alkali.

I have found that the process may be more economically practiced and better results obtained if the spun silk is washed with a plurality of solutions of sodium hydroxid or potassium hydroxid of progressively decreasing strength instead of attempting to remove all of the alkali in a single washing.

By submitting the spun silk to a plurality of washings with sodium hydroxid of progressively decreasing strength, the alkali may be more uniformly removed from the silk and a material saving in the amount of caustic soda used may be effected.

In the accompanying drawings, I have shown an assembly of apparatus elements suitable for use in practicing the process. In this showing:

Figure 1 is a diagrammatic side elevation of a spinneret and reel associated therewith on whch the spun silk is wound,

Figure 2 is a similar view of a reel and centrifuge basket showing the strands passing from the reel to the basket and being twisted, and,

Figure 3 is a similar view showing the twisted thread being removed from the basket and submitted to the final acid washing.

Referring to the drawings, the reference numeral 1 designates a spinneret from which a strand or plurality of strands 2 of artificial silk are spun through a precipitating bath (not shown) surrounding the spinneret. A reel 3 is mounted over the spinneret in alinement therewith and is adapted to be rotated in a clockwise direction, as indicated by the arrow. This reel is arranged over a pan or receptacle 4. In Figure 2 of the drawings I have shown the reel revolving in the opposite direction to unwind the strands, as indicated at 5, and the strands are delivered downwardly through the guide member 6 to a centrifuge basket 7. The guide member is provided with an extending arm 8 which may be connected to the usual reciprocating mechanism for operating the guide in the basket in the usual manner. A funnel 9 is arranged at the top of the guide. As shown, the centrifuge machine consists of an outer casing having a rotating basket 10 arranged therein. The basket is provided with perforations 11 in its side wall so that the liquid in the silk will pass outwardly through these openings and cause the threads to form in a cake, as indicated at 12. Any suitable means may be employed for rotating the basket. As shown, a shaft 13 extends through the bottom of the casing and is connected to the bottom of the basket. The casing is provided with the usual outlet 14.

In Figure 3 of the drawings, I have shown the twisted thread 15 being removed from the centrifuge and wound upon a reel 16 arranged over a pan or receptacle 17.

In practicing the process, the cellulose is first purified in any desired manner and is then dissolved in a solution of copper hydroxid and ammonium hydroxid. The strength of the solution depends upon the character of silk being spun and considerable variation in the proportion of copper hydroxid and cellulose is possible. As a general rule, I employ about 3 parts of copper hydroxid to 4 parts of dry cellulose, but this proportion may vary from about 1 part of copper hydroxid to 2 parts of cellulose, and equal parts of each. The ammonium hydroxid employed is generally of a strength of from 20° to 26° Baumé. This solution is delivered from the spinneret 1 into a precipitating bath (not shown), surrounding the outlet of the spinneret. Either sodium hydroxid or potassium hydroxid may be employed in the precipitating bath and I prefer to employ a solution of sodium hydroxid of 40° Baumé. The strands formed by the precipitating bath are carried upwardly and rolled, under tension, on the reel 3. The first washing is effected in the pan or receptacle 4 during the rolling of the strands on the reel and for this purpose, I preferably employ a solution of sodium hydroxid of from 15° to 20° Baumé strength. This reduces the alkali content of the silk in a uniform manner.

The strands either prior to or after twisting may then be submitted to any desired number of washings with caustic soda solution of progressively decreasing strength prior to the final washing with acid. As shown, the reel 3 may be revolved in a counter-clockwise direction to remove the strands and deliver them to the centrifuge 7. A washing solution may be passed over the strands as they pass through the guide 6 by means of the funnel 9 and in practice, I employ a solution of sodium hydroxid of substantially 5° Baumé. Within the centrifuge basket, the twisted threads may be submitted to a washing solution of caustic soda of from 1° to 3° Baumé strength or may be washed with clear water.

After the cake has been formed in the centrifuge, the machine is rotated in the opposite direction to remove the threads and they are wound on the reel 16. During this removal, the strands may be washed with an acid, such as sulfuric acid or acetic acid of 5 per cent strength by passing the acid solution downwardly through the funnel 9. It will be apparent that the strands will be maintained under tension as they are being removed from the centrifuge and wound on the reel 16. This is an important feature since the step of washing the strands with an acid is preferably carried out while the strands are maintained under tension in order to insure strength and luster in the finished thread and to prevent it from becoming chalky. The threads on the reel 16 may then be submitted to a final washing with water in the pan or receptacle 17.

As stated, the number of washings with sodium hydroxid is optional, the essence of the invention being the use of a plurality of solutions of sodium hydroxid of progressively decreasing strength, the first washing solution being of less strength than the solution employed in the precipitating bath whereby the alkali content of the thread is progressively but uniformly decreased until it reaches the minimum when the threads are finally washed with water and then washed with acid to remove the final traces of alkali and copper.

While I have described in detail the preferred practice of my process, it is to be understood that the details of procedure and proportions of ingredients may be widely varied, and that known chemical equivalents may be employed in place of the materials mentioned, without departing from the spirit of the invention or the scope of the subjoined claims.

I claim:

1. The herein described process which comprises dissolving cellulose and copper hydroxid in ammonium hydroxid, precipitating the solution through a bath of caustic alkali of substantially 40° Baumé strength, washing the precipitating material in a bath of caustic alkali of from 15° to 20° Baumé strength, and then washing it in a bath of caustic alkali of less strength.

2. The herein described process which comprises dissolving cellulose and copper hydroxid in ammonium hydroxid, precipitating the solution through a bath of caustic alkali of substantially 40° Baumé strength, washing the precipitating material in a bath of caustic alkali of from 15° to 20° Baumé strength, then washing it in a bath of caustic alkali of less strength, and submitting the material to a final washing with an acid solution.

In testimony whereof, I affix my signature.

HARRY P. BASSETT.