

UNITED STATES PATENT OFFICE

2,142,801

COMPOSITION FOR SIZING YARNS

James T. Power, Wilmington, Del., and Ernest G. Almy, Tamaqua, Pa., assignors to Atlas Powder Company, Wilmington, Del., a corporation of Delaware

No Drawing. Application October 9, 1934,
Serial No. 747,648

1 Claim. (Cl. 134-23)

This invention relates to compositions for sizing yarns, threads, filaments, etc., hereinafter referred to generically as yarns. The invention has for its object the provision of a sizing material which, when applied to the yarns, possesses a high degree of softness and pliability and which, at the same time, has an extremely slight susceptibility to changes in properties under varying conditions of atmospheric humidity. Further objects and advantages of the invention will be set forth in the following description and appended claim.

A compound, to be suitable for sizing yarns, must be satisfactory for weaving, must be capable of being easily removed in finishing and must be readily absorbed by the yarn. For example, in the weaving of rayon it is essential that the sizing material bind the filaments comprising the yarn and uniformly coat the yarn with a film resistant to chafing. The film of sizing material must be sufficiently soft and pliable to insure good running conditions and must at the same time possess toughness and elasticity to withstand strain of the various operations in weaving. The term "yarn" as used in this specification and in the appended claim relates to the material in strand form and prior to weaving. In this form, the several strands are coated by the binder to prevent damage to the yarns by the chafing incident to the passage of the yarns through fabricating machines such as weaving machines and the like.

The sizing used in weaving is usually removed from the fabric prior to the steps of dyeing and finishing. It is therefore essential that the sizing be removable from the woven goods. Owing to the relatively low wet strength of artificial silk or rayon, the sizing must be removable therefrom with minimum treatment.

In view of the high speed at which the yarns pass through the fabricating machines in modern practice, it is necessary that the sizing material be readily absorbed by the yarn and it must, after being applied to the yarn, dry quickly so that the threads will not adhere to one another.

In sizing materials, especially those containing gelatin as a binder, glycerine has found application as a softening agent. However, glycerine has certain properties which make its use in such sizing composition not wholly satisfactory. Principal among these is its great tendency to absorb an excess of moisture, especially under conditions of high humidity. Consequently, the sizer is not able to take advantage of the full softening effect of glycerine in gelatin sizing compositions be-

cause the sized yarn, if subjected to highly humid conditions will absorb an excess of moisture and will lose its good running properties. However, limited amounts of moisture are desirable for good running properties.

Now we have found that sorbitol is an excellent softening agent for sizing compositions. It has the distinct advantage that while it absorbs approximately as much moisture as does glycerine in atmospheres of low relative humidity yet in atmospheres of high relative humidity it absorbs much less moisture than does glycerine. Furthermore, sorbitol produces a greater softening effect than does glycerine. As a result, the sizer is able to impart to the sized yarn a much greater softness and pliability and at the same time be free from the difficulties experienced heretofore due to varying humidity conditions.

Furthermore, sorbitol is exceedingly soluble in water and can be washed from the yarn without having to resort to vigorous treatment. We have also found that sorbitol is readily absorbed by yarns, even more so than is glycerine. A suitable sizing material for rayon warp is illustrated in the following example.

Example I

A very satisfactory prepared size containing sorbitol is produced by soaking 28.7 lbs. of a binder, such as gelatin, in 57.8 lbs. of cold water. The mixture is heated to 140° F. to render the mixture fluid and thus facilitate mixing. To this mixture is added with thorough mixing, a warm syrup (temperature 140° F.) containing 10.2 lbs. or sorbitol, 1.3 lbs. glucose, and 2 lbs. water. On cooling, the mixture sets to a firm jelly. In order to prepare a bath for sizing rayon warps this jelly is dissolved in warm water. A suitable proportion is 100 lbs. of the prepared size to 75 gallons of water.

In compounding such a prepared size, we may use for the sorbitol-glucose syrup a crude sorbitol syrup, such as is obtained by reduction of glucose. It may contain in addition to sorbitol, moisture and glucose, small amounts of ash and organic impurities.

We have found that sorbitol is compatible with other softening agents used in sizing compositions. In some cases it may be desirable to substitute other softening agents such as sulfonated oils or saponified oils, for a part of the sorbitol. A formula for a sizing bath which we have found to be satisfactory and in which sulfonated castor oil is substituted for part of the sorbitol is shown in Example II.

Example II

	Pounds
Sorbitol	4.6
Sulfonated castor oil	4.0
5 Gelatin	20.0

The gelatin is soaked in about 30 gallons of water. The mixture is heated to 140° F. to effect solution. The sorbitol and sulfonated castor oil are dissolved therein and an additional amount of water is added to adjust the volume to 50 gallons. Furthermore, it should be pointed out that part or all of the gelatin may be replaced by other binding materials such as starch, dextrin, gum arabic and other soluble gums and waxes. In Example III we illustrate a formula for a sizing bath in which a part of the gelatin is substituted by soluble starch and British gum.

Example III

	Pounds
20 Gelatin	4.8
Soluble starch	4.0
British gum	11.2
Sorbitol	4.6
25 Sulfonated castor oil	4.0

The gelatin, soluble starch and British gum are soaked together in about 30 gallons of water. The mixture is heated to 140° F. to effect solution. The sorbitol and sulfonated castor oil are dissolved therein and an additional amount of water is added to adjust the volume to 50 gallons.

A suitable sizing material for rayon filling yarns is illustrated in the following example:

Example IV

	Pounds
Gelatin	4.7
Sorbitol	20.0
40 Water to make 50 gallons.	

The gelatin is soaked in about 30 gallons of cold water. The mixture is heated to 140° F. to effect solution, the sorbitol dissolved in the mixture and water added to bring the total vol-

ume to 50 gallons. The sorbitol employed in the above examples and in other sizing mixtures need not be chemically pure sorbitol but may be a syrup such as is obtained by the reduction of glucose, containing besides sorbitol small amounts of moisture, ash, sugar and other impurities. We find it convenient to employ a syrup containing 15% or 20% of moisture to facilitate the mixing.

While we have shown specific compositions of sizing materials containing sorbitol we wish it to be understood that we do not limit ourselves to the concentrations mentioned therein nor to the ingredients mentioned, other than sorbitol. It is to be understood, likewise, that the incorporation or mixing of sorbitol with any of the other ingredients prior to introduction into the sizing bath comes within the purview of this invention. Those skilled in the art will readily appreciate that other ingredients and different concentrations and different orders of mixing may be employed for special purposes without departing from the spirit of this invention which relates to sizing compositions containing sorbitol. While we have indicated the desirable characteristics of sorbitol as a substitute for glycerine in the softening of sizing compositions, we wish to make it clear that mixtures of sorbitol and glycerine may be employed and are within the purview of the invention.

Having described our invention, what we claim is:

A warp sizing for rayon yarns comprising an aqueous mixture containing substantially from 3.9 to 4.6 per cent by weight of a water-miscible binder selected from the group consisting of gelatin, soluble starch, dextrin and gum arabic and substantially from 1 to 1.4 per cent by weight of a softening agent consisting essentially of sorbitol, said sorbitol acting as a softener for said binder.

JAMES T. POWER.
ERNEST G. ALMY.