

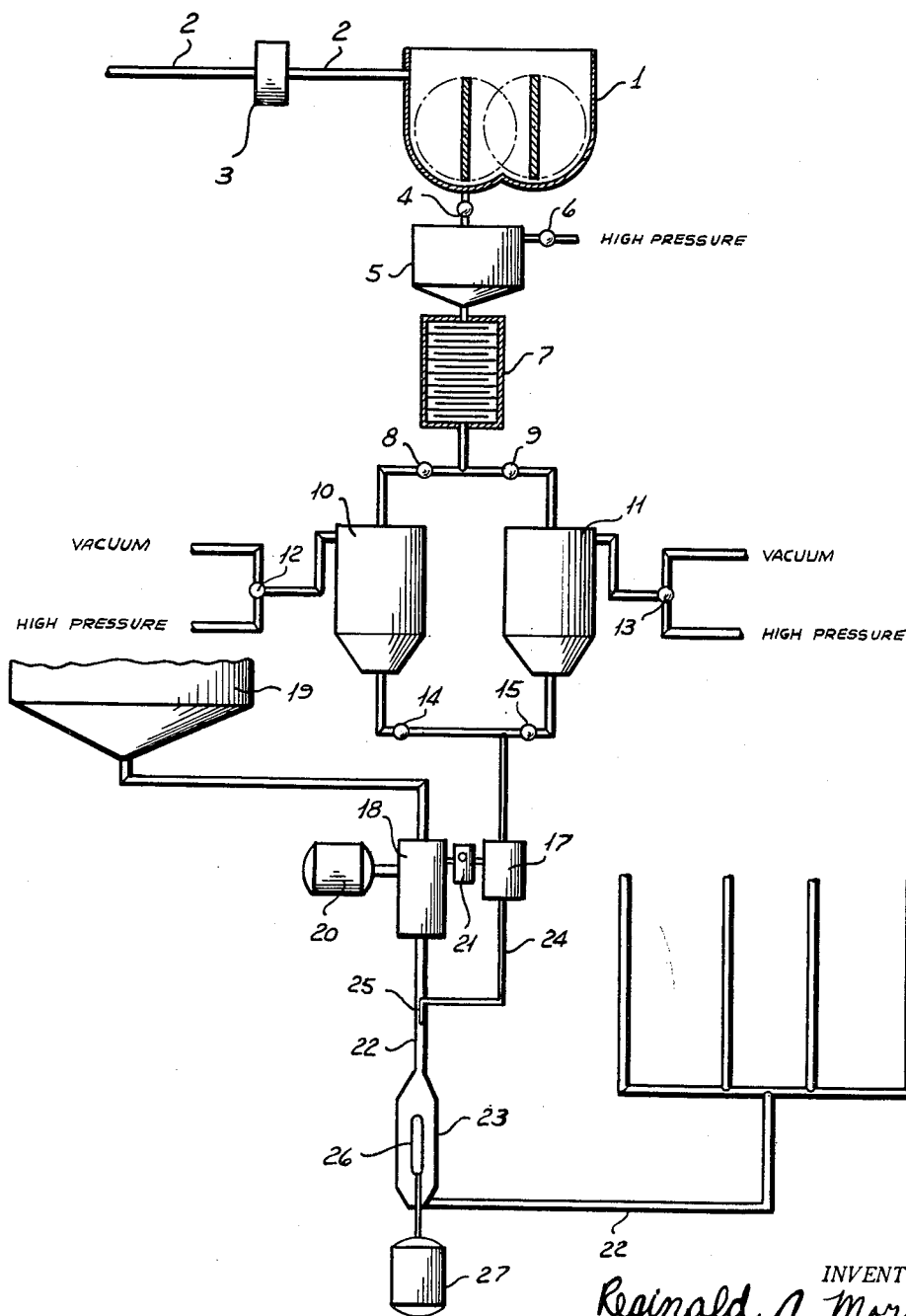
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METHOD FOR THE PRODUCTION OF PIGMENTED RAYON

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METHOD FOR THE PRODUCTION OF
PIGMENTED RAYON

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The present invention relates to an improved method for manufacturing cast and extruded products such as rayon or the like, and it relates more particularly to an improved method for producing delustered or pigmented rayon.

In the manufacture of dull or pigmented rayon, according to methods now generally employed, a pigment or a delustering agent, preferably of high refractive index, is dispersed in extremely fine powdered form in the spinning solution. This is almost universally accomplished by forming an aqueous creamlike slurry of the powdered delustering agent. For example, finely powdered titanium dioxide, a highly satisfactory delustering agent, is mixed with a weak alkaline solution and treated in a ball mill for several hours. In order to insure a stable and uniform dispersion of the titanium dioxide in the slurry it is necessary to employ titanium dioxide of predetermined surface characteristics and to maintain the slurry at a predetermined pH. Moreover the surface electrical characteristic of the ball mill may often inhibit the desired dispersing of the titanium dioxide thus rendering the equipment inadequate.

The titanium dioxide slurry is then introduced as a batch into a batch of the spinning solution, for example viscose, and the mixture is continuously stirred. The mixing of the titanium dioxide slurry and the viscose is performed in the tank containing the viscose which is either ready or being prepared for spinning. In the normal rayon installation which generally includes many spinning machines it is necessary to spin either pigmented, dull or bright yarn throughout the installation to the total exclusion of the other types of yarn.

The drawbacks of the methods heretofore employed in the production of delustered or pigmented rayon yarn are numerous and obvious. The time consumed is great, and the methods lack versatility. They require very close and rigid process control, any wide deviation resulting in a poor product often unsuited for the purpose desired, because of the resulting non-uniformity and poor quality of the product. Moreover, in most cases it is not practically feasible to employ these methods in part of a rayon installation while the remainder of the installation is engaged in the manufacture of a lustrous product. It is therefore an object of the present invention to provide an improved method for the manufacture of delustered or pigmented rayon.

Another object of the present invention is to provide an improved method for uniformly dispersing a powdered pigment or delustering agent,

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such as titanium dioxide, in a rayon spinning solution.

Still another object of the present invention is to provide an improved method for the production of pigmented delustered rayon by the viscose method characterized by the flexibility and ease of application.

A further object of the present invention is to provide an improved method for the production of pigmented or delustered rayon, wherein any desired number of spinning units may be selectively adjusted to spin either bright, dull or pigmented rayon without any interruption in the operation of the individual spinning units.

Still a further object of the present invention is to provide an improved method for the production of pigmented or delustered rayon, which method may be easily applied to existing rayon producing installations, without any appreciable interference in the continued output of the installation.

The above, and other objects of the present invention, will become apparent from a reading of the following description taken with the accompanying drawing, which diagrammatically illustrates a preferred embodiment of the present invention.

The present invention contemplates forming a stable slurry of a pigment or delustering agent, and injecting the slurry in metered amounts into the spinning solution during its travel from the spinning solution tank to the spinnerettes or extruding devices. The rate of injection of the pigment or delustering agent slurry into the spinning solution is controlled by the flow of the spinning solution to the spinning units.

Another feature of the present invention comprises the improved method of forming a stable slurry of a pigment or delustering agent, such as titanium dioxide, wherein the powdered pigment or delustering agent is first uniformly dispersed in an amount of spinning solution to produce a mass of very stiff dough-like consistency, in which the pigment or delustering agent is uniformly dispersed. This mass of stiff dough-like consistency is then gradually diluted to a point where it may be readily mixed in the spinning solution.

More specifically, the finely powdered pigment or delustering agent, for example, titanium dioxide, is uniformly dispersed by means of any suitable mechanism in an amount of spinning solution, for example, viscose, sufficient to form a stiff dough-like mass. Thereafter, viscose is slowly added to the dough-like mass while it is

being kneaded by the dispersing mechanism, until the mass assumes an easily metered and flowing consistency of predetermined proportions of viscose and titanium dioxide. The resulting slurry is then suitably filtered and deaerated and injected into the spinning solution on its way from the spinning solution tank to the extruding devices. The rate of injection of the slurry into the spinning solution is controlled by the rate of flow of the spinning solution, so that the proportion of titanium dioxide to spinning solution is constant and independent of the rate of flow of the spinning solution. The spinning solution and the injected titanium dioxide are subjected to a mixing operation prior to the extrusion of the spinning solution.

Reference is now made to drawing wherein 1 designates a dispersing type of kneader of any well-known design, which communicates by way of conduits 2 and a relatively slow metering device 3 to a source of spinning solution, for example, viscose. The outlet of the kneader 1 is connected through a valve 4 to a tank 5; which tank 5 communicates through the valve 6 to a source of high pressure air. Further, the tank 5 is connected to an inlet of a suitable filter press 7 the outlet of which is connected through valves 8 and 9 to the tanks 10 and 11 respectively. Moreover, each of the tanks, 10 and 11, may be selectively connected through corresponding valves 12 and 13 to a source of air under pressure, or to an evacuating pump. The outlets of the tanks 10 and 11 are connected through valves 14 and 15 respectively to the inlet of a suitable metering device 17, which may be a gear pump or any other desired type.

A second and relatively larger metering device 18, which may likewise be of a gear pump or similar type, has its inlet connected to a main reservoir 19, containing a solution ready for spinning, the spinning solution being under pressure. The metering device 18 is driven by a low power electric motor 20, which has its drive shaft connected through an adjustable speed reduction unit 21 to the drive shaft of the metering device 17. The outlet of the metering device 18 is connected through a conduit 22 having an enlarged portion 23 to the spinning units, not shown, each of which may consist of a multiplicity of spinning machines or spinnerettes immersed in a suitable setting bath.

Further, the outlet of the metering device 17, is connected through a conduit 24 and through a jet 25, to the conduit 22 posterior to the enlarged portion 23 of the conduit 22. A paddle or other stirring member 26, is disposed within the enlarged portion 23 and is driven by an electric motor 27.

Considering now the present improved process and the operation of the apparatus above described and illustrated in the accompanying drawing, a predetermined amount of spinning solution, for example, viscose and a predetermined amount of powdered pigment or delustering agent, for example, titanium dioxide, are deposited in the kneader 1, the proportions being between approximately 65% and 85% titanium dioxide and 65% and 35% viscose preferably between 73% and 80% titanium dioxide and 20% and 27% viscose, for example 75% titanium dioxide and 25% viscose. It should be noted that the relative proportions of the pigment or delustering agent and the spinning solution is determined by the characteristics of

the pigment or delustering agent and the spinning solution employed. The kneader is driven for a period of a few minutes, until the titanium dioxide is uniformly dispersed in the viscose and the mixture becomes a very stiff dough-like mass. Thereafter, the metering device 3 is actuated, slowly introducing an additional predetermined amount of viscose into the kneader 1, which continues in its operation.

When the dough-like mass has been transformed into a uniform flowable slurry, preferably not containing an excess of 50% titanium dioxide, for example 25% titanium dioxide and 75% viscose, the valve 4 is opened, and when the slurry has completely drained from the kneader 1 into the tank 5, valve 4 is closed and the valve 6 is opened, admitting compressed air into the tank 5, which urges the slurry through the filter press 7 and into one of the tanks 10 or 11, depending upon which of the valves, 8 or 9, is open. Upon the slurry being completely filtered and being disposed in, for example tank 10, the valves 8 and 14 being closed, the valve 12 is adjusted so as to connect the interior of the tank 10 to a vacuum source where the slurry is exposed for a time sufficient to substantially deaerate the same.

After the slurry in tank 10 has been deaerated, the valve 12 is switched, so that the tank 10 is connected to a source of high pressure air. The valve 14 is then opened, thereby introducing the slurry into the metering device 17, which accurately meters the slurry into the spinning solution. More particularly the spinning solution from the reservoir 19 and the slurry from the tank 10 are respectively metered by the metering devices 18 and 17, which are cooperatively driven by the motor 20 and the speed reduction unit 21. The relative proportions of the slurry and the spinning solution may be suitably adjusted by means of the variable ratio speed reduction unit 21, thereby controlling the degree of delustering. Furthermore, the pressure on the spinning solution in the reservoir 19 and the slurry in the reservoir 10, is just short of sufficient to pass through the metering devices 18 and 17 of the gear pump type, so that the low power electric motor 20 is all that is necessary to drive the metering devices 18 and 17. Moreover, the speed of the metering device 18 and hence of the metering device 17 is controlled by the rate of flow of the spinning solution, which in turn is controlled by the consumption of spinning solution by the spinning units. The slurry and the spinning solution are mixed at the point where the slurry nozzle 25 enters the conduit 22, and the slurry is then uniformly dispersed in the spinning solution in the enlarged portion of the conduit by means of the stirrer 26. The spinning solution containing the pigment or delustering agent is then spun, extruded or cast in any well-known manner. It should be noted that while one of the tanks 10 or 11 contains the slurry dispersed pigment or delustering agent which is being injected by way of the metering device 17 into the spinning solution, the other of the tanks 10 or 11 is being deaerated, so that the slurry may be continuously available.

An important advantage gained by employing the present method of mixing a pigment or delustering agent with the spinning solution, is that the concentration of the pigment or delustering agent in the spinning solution is independent of the rate of flow of the spinning

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solution. Another advantage is that any number of spinning units may be employed or may be discontinued at will, without interfering with the optimum operation of the other spinning units. A further advantage gained by the present process of forming a slurry is that the time consumed in making the slurry is a few minutes, as compared with several hours where other methods are employed. Moreover, the degree of process control required is small, as it has been earlier pointed out, and the number of operations has been reduced.

While there has been described and illustrated a preferred embodiment of the present invention, it is obvious that numerous alterations and omissions may be made without departing from the spirit thereof.

I claim:

1. Method of producing a pigmented extruded cellulosic product comprising uniformly dispersing by kneading a predetermined amount of a powdered pigment in a predetermined amount of viscose spinning solution to form a mass of stiff dough-like consistency, diluting said mass while kneading with additional viscose spinning solution to produce a flowable slurry of said pigment in said viscose and continuously injecting said slurry into a flowing viscose spinning solution to produce a spinning solution having uniformly dispersed therein said pigment at the desired concentration.

2. The method of producing delustered rayon, comprising uniformly dispersing a predetermined amount of a powdered delustering agent in a predetermined amount of viscose spinning solution to produce a mass of dough-like consistency, adding a further predetermined amount of viscose spinning solution to said dough-like mass while kneading the same to produce a slurry, and introducing said slurry into a viscose spinning solution in predetermined proportions prior to the spinning thereof.

3. The method of producing delustered rayon

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by the viscose method comprising uniformly dispersing finely powdered titanium dioxide in viscose to form a dough-like mass, slowly adding additional viscose to said mass while kneading the same to produce a uniform slurry of titanium dioxide of heavy cream-like consistency, deaerating said slurry, injecting said slurry into deaerated viscose in a condition for spinning at a rate controlled by the rate of flow of the viscose to the spinning system, and continuously and uniformly dispersing the titanium dioxide in said slurry in said viscose spinning solution.

4. The method of producing delustered viscose type rayon comprising the steps of mixing between 65% and 85% titanium dioxide and between 15% and 35% viscose, kneading said mixture until a plastic doughlike mass is produced having the titanium dioxide uniformly dispersed in the viscose, thereafter adding to said mixture while continuing said kneading operation additional viscose until a uniform flowable slurry results containing not in excess of 50% titanium dioxide and introducing said slurry into a viscose spinning solution at a predetermined rate prior to the spinning thereof to produce a spinning solution having uniformly dispersed therein said titanium dioxide at the desired concentration.

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