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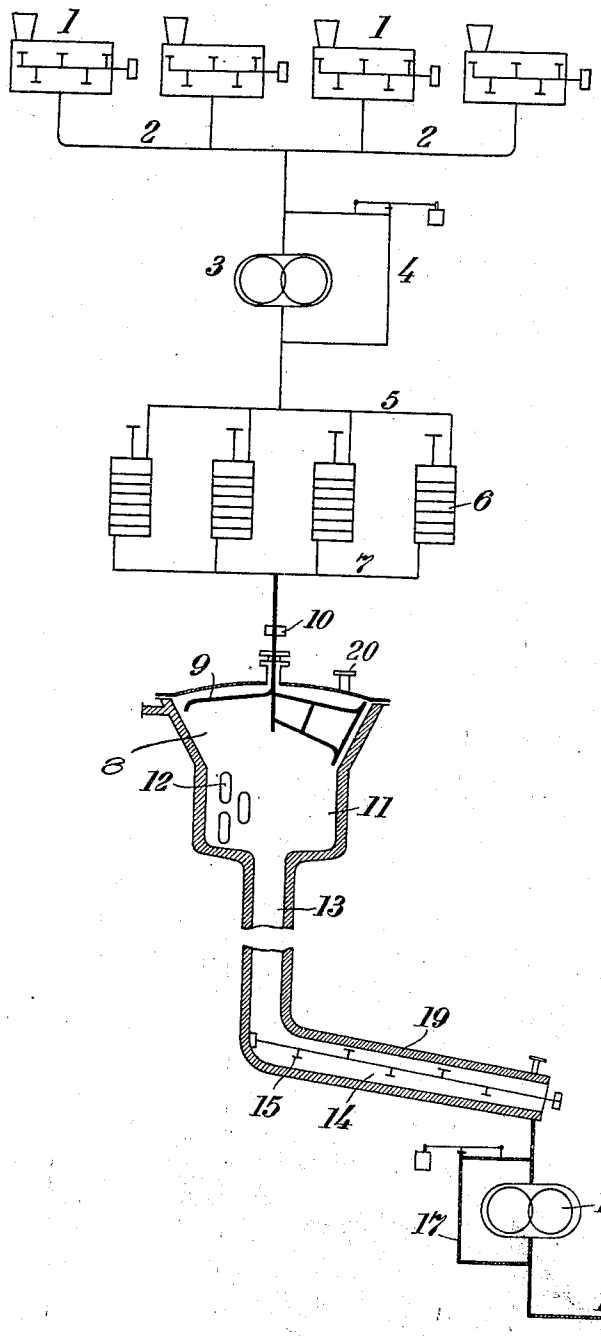

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APPARATUS FOR PREPARING HIGHLY UNIFORM SOLUTIONS FOR THE MANUFACTURE OF ARTIFICIAL PRODUCTS

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Our present invention relates to a process of preparing spinning solutions as used in the manufacture of artificial threads, fibers or films and more particularly to such a process carried out on a large scale in which the said solutions prepared in a continuous manner and in a plurality of dissolving vessels are filtered, deaerated and made ready for the coagulation process. Another object of our invention is a device for carrying out the said process.

The injuries to which spinning solutions, especially viscose, are exposed when forwarded by means of compressed air or of another gas through the different containers and apparatus necessary in filtering and deaerating, are well known. It is difficult to exclude gasses completely, especially air, in the course of manufacture of viscose on account of the different steps which are to be performed.

Furthermore, in spinning artificial silk, especially viscose silk, the periodical working-up of single batches of spinning solutions does not lead to uniform products even if the use of compressed air or the like is avoided, as far as this is practically possible, during the manufacturer of the spinning solution. Due to the inevitable changes of the numerous important factors which give rise to constantly occurring greater or smaller differences between the single batches, it is difficult to obtain a uniform end-product and these difficulties rise when working-up a viscose solution to be spun with as low a degree of ripeness as possible.

By our present invention these disadvantages are avoided by making use essentially of two expedients.

(1). The batches of viscose dissolved more or less at the same time in several dissolving vessels, are not filtered individually each through a separate filter but all of the spinning solutions, ready for filtration, are pumped in known manner without using compressed air, into a collecting piping which delivers the solution to a suitable number of filter presses arranged in parallel. Preferably, at least one filter press should be provided in excess of the number required for treating the solution, so that at any time a press may be cleaned and provided with a new filter bed, without interrupting the process. The spinning solutions flowing away from the filter presses simultaneously in operation, are collected in the same manner as when leaving the dissolving vessels to a common duct where they are combined into a single stream. In this manner, the single batches prepared in different dissolving vessels are already mixed to a large extent in the filtering operation.

(2). The filtered spinning solution is not separated as hitherto usual, into batches each of which is charged into different collecting vessels from which the solution is withdrawn as required for deaeration and further treatment, but it is continuousy introduced into a common homogenizing or equalizing vessel from which at the opposite end it is withdrawn, continuously and in as uniform a manner as possible, to the spinning device.

The said common vessel serves three essential purposes:

(*a*). It serves to compensate the unavoidable irregularities in the rate of supply of filtered spinning solution to the vessel.

(*b*). The spinning solution is freed from gas in the homogenizing vessel.

(*c*). The spinning solution is continuously subjected to a mechanical agitation during its passage through the vessel.

For the purpose indicated under (*a*) the vessel is suitably dimensioned, correspondingly with the quantity of spinning solution which is to pass through it.

With respect to the feature of the process outlined under (*b*) for freeing the spinning solution from gas on its way through the homogenizing vessel, the following particular measures may be adopted.

Since the spinning solution is to be stirred in the vessel and withdrawn from the outlet to the spinning machine by means of a pump, it may happen that air may be drawn through the stuffing boxes and the bearings of the driving and tubular shaft and absorbed by the spinning solution kept under a vacuum.

In order to avoid this danger, the vessel is provided with a vertical tubular extension

piece of such a height that at the lower part of the vessel—at which part the stirring mechanism is arranged—the reduced pressure is approximately compensated by the hydrostatic pressure of the column of liquid in the tube. When operating, for instance, under a reduced pressure of 150 mm. of mercury, the pressure due to the head of the spinning solution must correspond with the pressure of about 600 mm. of mercury for viscose, having a specific gravity of 1.15 this would require a tubular portion having a height of about 7 meters.

In order that the spinning solution entering the vessel, may remain therein for the period necessary for a complete removal of gas, the vessel bears on the tubular extension piece a funnel-shaped or conical head piece. Now, at the upper rim of the funnel, which may have a diameter of several meters, the current of filtered spinning solution is poured, by means of a rotary distributing pipe, onto the inner surface of the funnel in such a rate, that the time during which the spinning solution flows downwards in a thin layer over the inner wall of the funnel is sufficient for completely liberating the spinning solution from air or gas; if required, there may be provided in addition to the rotary distributing pipe a scraper which is caused to travel over the conical surface, thus preventing viscose from remaining on the wall of the funnel for too long a period. It is a question of the quantities produced whether between the tubular and the conical member a widened cylindrical part is provided which forms the real homogenizing room of the vessel.

Referring to purpose (*c*), the vessel shall further serve for mechanically agitating the spinning solution. For this purpose, the lower part of the vessel is provided with a longitudinal shaft carrying mixing arms, so that the spinning liquid flowing through the lower part of the vessel is continuously mixed by stirring. Preferably the said lower part is not mounted horizontally but somewhat inclined to the discharge pipe.

In working-up an unripened viscose, it is desirable to use a homogenizing vessel which is not excessively large, in order that the viscose may not remain for too long a period in the vessel and ripen in an undesired degree. In using ripened viscose, the buffer vessel may be of a correspondingly larger size. At the outlet of the buffer vessel the spinning liquid is received, as above stated, by a pump forwarding it in known manner to the spinning machine.

An essential feature of the invention consists in the continuous removal of gas and mixing of the spinning liquid.

The annexed drawing illustrates diagrammatically by way of example a device suitable for executing the invention.

The spinning solution prepared in the dissolving vessels 1 flows under its own weight through the common pipe 2 to the eccentric pump 3 by which the crude spinning solution is forwarded through the common connecting pipe 5 to the filter presses 6. In order that the filtration may be conducted under constant pressure, a return-flow pipe 4 is provided by which any liquid deliverel by the eccentric pump 3 in excess of the quantity capable of passing through the filter presses, is returned to the sucking side of the pump.

The filtrates from the several presses are combined in the common pipe 7 and flow through a rotary swivel-tube 9 driven at 10, which delivers the solution to the upper conical portion of the surface of an exhausted equalizing vessel 8. The solution flows in the form of a thin layer downwardly on the inner wall of the funnel, is removed therefrom by a scraper 21 and collects in the cylindrical part 11 and the tubular portion 13.

In order to permit observation of the level of the spinning solution, the wall of the cylindrical portion 11 is provided with a series of thick panes of glass 12 arranged stepwise. If necessary, the interior of the vessel may be illuminated from outside. The cover of the homogenizing vessel 8 bears a branch 20 through which the air is exhausted.

The spinning solution is slowly but continuously mixed by means of a stirring device 15 in an extension 14 of the portion 13, slightly inclined to the horizontal. From the lowest point of the extension 14, the spinning solution passes the feeding eccentric pump 16 having a return flow-pipe 17 provided with a pressure regulator, and is forwarded under constant pressure through the piping 18 leading to the spinning machines.

It is recommendable to provide all the parts 11, 13 and 14 of the buffer vessel 8 and, if required, also the feed pumps 3 and 16 with a jacket as indicated at 19 for the purpose of maintaining the solution in the vessel at a constant temperature.

Obviously, our present invention is not limited to the foregoing statements.

As known in the art, spinning solutions may also be deaerated, for instance, by admixing volatile solvents and by evaporating the same. In this case, it is preferable to operate without evacuation of the homogenizing vessel, but to heat feebly the wall of its conical part.

Numerous other embodiments are possible and we contemplate as included within our invention all such modifications and equivalents as fall within the scope of the appended claims.

What we claim is:—

1. In a machine for producing highly uniform solutions for the manufacture of artificial products consisting of cellulose derivatives a homogenizing and deaerating means comprising a vessel with a funnel-shaped head part, a circularly rotary swivel-tube

adapted to distribute the spinning solution in the form of a thin layer on the funnel-shaped head part, means to evacuate the said vessel, a cylindrical collecting part, a tubular extension piece of substantial height, a slightly inclined almost horizontally mounted receptacle and in the latter a mixing device.

2. In a machine for producing highly uniform solutions for the manufacture of artificial products consisting of cellulose derivatives a homogenizing and deaerating means comprising a vessel with a funnel-shaped head part, a circularly rotary swivel-tube adapted to distribute the spinning solution in the form of a thin layer on the funnel-shaped head part, means to evacuate the said vessel, a cylindrical collecting part, a tubular extension piece of a height balancing when filled with spinning solution by the hydrostatic pressure of the latter the action of the vacuum on the parts mounted on its lower end, a slightly inclined almost horizontally mounted receptacle and in the latter a mixing device.

3. A machine for producing highly uniform solutions for the manufacture of artificial products consisting of a cellulose derivative comprising a plurality of dissolving vessels, a pump provided with a return flux, a plurality of filter presses, a common piping through which the contents of the dissolving vessels is forwarded to the pump and from the pump to a plurality of filter presses, a second common pipe collecting the filtrates of the different filter presses, a homogenizing and deaerating means comprising a vessel provided with a funnel-shaped head part, a circularly rotary swivel-tube adapted to distribute the spinning solution in the form of a thin layer on the funnel-shaped head part, means to evacute the said vessel, a cylindrical collecting part, a tubular extension piece of a height balancing when filled with spinning solution by the hydrostatic pressure of the latter the action of the vacuum on the parts mounted on its lower end, a slightly inclined almost horizontally mounted receptacle and in the latter a mixing device, and a second pump provided with a return flow and adapted to forward the solution under constant pressure to the spinning machine.

In testimony whereof, we affix our signatures.

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