Oct. 19, 1943. H. D. HALEY 2,332,314

SPINNING MACHINE CONTROL APPARATUS

Filed Dec. 11, 1941

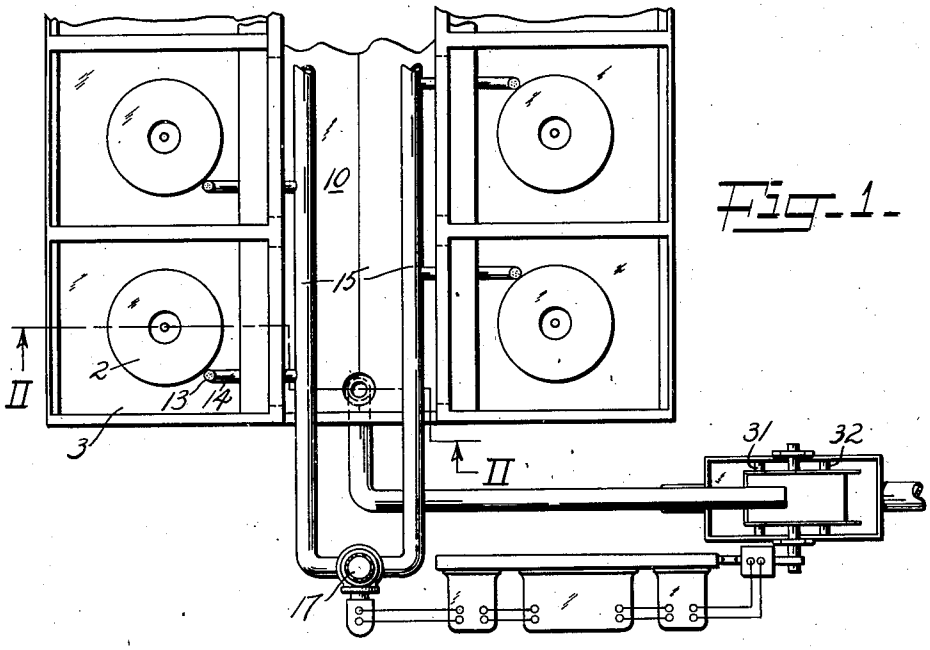


Fig-1-

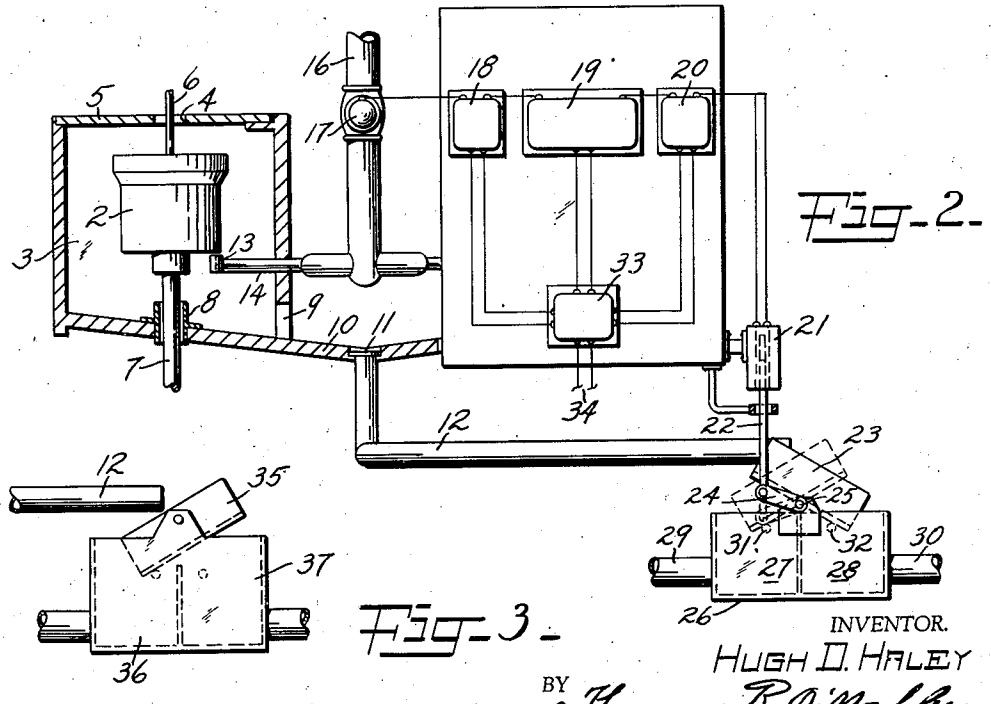


Fig-2-

Fig-3-

INVENTOR.
HUGH D. HALEY
BY Thomas R. O'Malley
ATTORNEY.

Patented Oct. 19, 1943 2,332,314

UNITED STATES PATENT OFFICE

2,332,314

SPINNING MACHINE CONTROL APPARATUS

Hugh D. Haley, Drexel Hill, Pa., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application December 11, 1941, Serial No. 422,497

13 Claims. (Cl. 18—8)

This invention relates to apparatus for handling certain liquids employed in manufacturing artificial filaments, especially from viscose, and it more particularly concerns an arrangement of apparatus adapted to facilitate the recovery in an economical manner of the liquids or of the constituents therein thrown off by the artificial silk while centrifuged, and especially while being collected in centrifugal spinning buckets immediately after spinning. It is well known that the filaments carry some of the spinning bath solution into the spinning buckets and that crystals of salt, largely of sodium sulfate, form upon the outside surface of the spinning buckets as a result of the rapid evaporation of solvent from the solution which is forced through the perforations in the bucket to the exterior surface thereof by centrifugal force. The high velocity of the spinning bucket relative to the air in the bucket chamber causes this rapid evaporation and the building up of crystals upon the bucket increases the load upon the motor driving the spinning bucket. It has heretofore been suggested to spray a crystal-dissolving liquid, such as steam, water, or dilute sulfuric acid, into the bucket chamber or more particularly against the outside surface of the spinning bucket in order to remove the crystals formed thereon and thus to reduce the load upon the electric motor driving the bucket.

In accordance with this invention, a crystal-dissolving liquid, such as water, is sprayed against the exterior surface of the bucket for short periods at frequent intervals, and means are provided whereby the drainings, which are in the form of liquid solutions or suspensions, from the chambers surrounding the buckets are diverted to a waste outlet or to a separate storage or recovery system during the intervals when the drainings are enlarged or diluted by the crystal-dissolving liquid.

It is an object of the invention to provide an arrangement of apparatus for controlling the discharge of the spinning bucket drainage so that the drainings obtained while the sprays are operating are kept separate from those obtained while the sprays are not in operation. Further objects of the invention will be apparent from the drawing and the description hereinafter.

In the drawing, illustrative of the invention,

Figure 1 shows a plan view, with parts removed, of the drainage end of a spinning machine employing centrifugal buckets,

Figure 2 is an elevational end view with parts in cross-section of the apparatus of Figure 1, and

Figure 3 shows a modification of the discharge separating device.

In the arrangement of Figures 1 and 2, the drainage end of a spinning machine comprising two rows of centrifugal buckets 2 within which the freshly spun filaments are collected, is shown. No attempt has been made to show the arrangement of spinning baths, spinnerets, or godets leading from the spinnerets to the centrifugal buckets since such features are well known in the art and are no part of this invention. Each spinning bucket chamber 3 is provided with an opening 4 in its cover 5 within which operates the funnel 6 for guiding the artificial filaments into the centrifgual bucket 2 which is driven by the spindle 7 extending through a suitable collar 8 fitting within the bottom sloping surface of the bucket chamber 3. The collar 8 may be of any suitable design and is adapted to prevent liquids thrown outwardly from the spinning bucket from gaining access to the spindle 7 and the electric motor therebelow (not shown). Each bucket chamber 3 is provided for drainage such as by means of the drainage opening 9 connecting it to the central drainage channel 10 extending between the two rows of bucket chambers. This drainage trough may be coextensive and integral with the bottoms of the bucket chambers or it may be a separate element joined to the bottoms of the bucket chambers by means of suitable liquid-tight joints. The drainage channel 10 is provided at one end with the drainage outlet 11 which is connected with the pipe 12.

Each bucket chamber 3 is provided with a spray nozzle 13 attached to a short branch pipe 14 extending from a header 15 extending along the length of the machine. The nozzle 13 directs a spray vertically along the surface of the rotating bucket. Each header, or each pair of headers associated with a given machine as shown in Figures 1 and 2, is connected by a pipe line 16 to a supply of crystal-dissolving liquid, such as water. The supply line 16 connecting the spray headers 15 to the source of crystal-dissolving liquid (which is water in the preferred case in accordance with this invention) is provided with a solenoid-, motor-, or thrustor-operated valve 17 whose action is controlled by the relay 18 which in turn is controlled by means of the time switch 19. A second relay 20 is associated with the time switch 19 for operating the solenoid 21 thereby drawing the solenoid core 22 upward and tilting the trough 23 to the position shown by

solid lines in Figure 2 by means of the connection 24. The trough 23 is open at both ends and supported by trunnions 25 within bearings upon the opposite sides of the separator box 26 which is partitioned into two chambers 27 and 28 each provided with separate discharge pipes 29 and 30 respectively. Cross-bars 31 and 32 limit the extent of tipping of trough 23.

The master switch 33 connects the two relays 18 and 20 and the time switch 19 to a source of electric power 34. The time switch 19 may be any of those available on the market which regularly close a circuit at repeated intervals for definite times, or which close a plurality of circuits at set interval with a predetermined delay between the closing of one circuit and that of the next. For example, in the first and simplest case, the time switch may be provided with a synchronous motor driving a disk whose outer periphery is composed entirely of insulating material except for a short segment of conducting material. A pair of brush contacts may constantly bear against the periphery of the disk and serve to close a relay circuit when the conducting segment passes beneath them. The space between the brushes and/or the length of the segment of conducting material may be adjusted with relation to the speed of rotation of the disk in order to give the desired interval of contact. Thus, in its simplest form, the operation of the time switch causes an intermittent operation of the relays 18 and 20 simultaneously which connect the solenoid, thrustor or motor of the valve 17 and the solenoid 21 respectively to the power source 32, thereby operating the valve 17 and trough 23 simultaneously. As soon as the segment passes out of contact with one of the two contact brushes, the relays are de-energized and the valve 17 and trough 23 return to normal position until a repetition of the cycle occurs. In operation, beginning with the normal portion of a cycle when the sprays are not operating, valve 17 is closed, and the trough 23 is in the dotted-line position (in Figure 2) draining into the left chamber 27 the highly concentrated solution coming from the spinning machine. The drainings then flow through discharge pipe 29 to any desired storage or recovery system. Upon operation of the time switch 19, the relays 18 and 20 simultaneously cause the opening of valve 17 and the retraction of the core 22 into the solenoid 21, thus tipping the trough 23 into the solid-line position of Figure 2 and draining the diluted solution from the spinning machine into the right chamber 28 which may be connected by means of pipe 30 to a separate recovery system or, if desired, to a waste discharge or sewer outlet. Upon breaking of the circuit by the time switch 19, the relays 18 and 20 are de-energized and the valve 17 closes while the trough 23 returns, by virtue of gravity, to the dotted-line position of Figure 2. The time switch 19 may be adjusted and set to give any desired period of spraying at any desired frequency. For example, a spray may operate for ten to thirty seconds every hour or it may operate for a half a minute to a minute every two or three hours. Preferably, however, operation for a shorter period of time at shorter intervals is employed as this reduces the amount of spray liquid needed to remove the crystals and, as a result, less of the drainage fluid need be diverted to a separate recovery system or to the waste system.

As stated generally above, the time switch 19 may be designed to delay operation of the relay 20 so that tipping of the trough 23 will not occur until the volume of the solution pouring from pipe 12 into the trough is substantially increased by the gathering of the spray-swollen drainings from the more remote bucket chambers in the machine. Since the sprays all operate simultaneously, the volume of liquors discharging from pipe 12 will increase gradually from the moment of opening the sprays until a maximum is reached, which obtains when the spray-diluted liquids from the remotest bucket chambers reach the discharge opening of pipe 12. The delay in tipping of the trough 23 may be predetermined to coincide with any desired percentage increase in volume of the liquids pouring into it, but preferably the delay is adjusted to terminate considerably before the maximum discharge rate is attained. Likewise, the return to the dotted-line position may be delayed until substantially the greater part of the spray-liquid-diluted solution, which continues to drain from the system even after the sprays have been turned off, has been diverted to the right chamber 28 of the separator box. This modification of the time switch may be readily provided for by supplying it with two disks of type described above, one disk controlling the relay to the valve in the spray line and the other, rotating simultaneously at the same speed as the former, controlling the relay for operating the solenoid associated with the trough. The conductive segment of the second disk may, for example, be somewhat offset so that it lags with respect to the conductive segment of the other disk in coming into contact with its respective contact brushes, a separate pair of brush contacts being provided for controlling each relay 18 and 20 individually.

In accordance with Figure 3, a simplified form of device is provided for automatically tipping the trough in the appropriate direction at the proper time. In this arrangement, the trough 35 is mounted on its pivots in such a manner that it normally tilts to the left (as shown) when there is no discharge and the opening of the discharge pipe is positioned to the left of the pivot so that the small volume of normal flow of liquid will largely land in the trough to the left of the pivot. However, an increase of the flow from the pipe 12 as a result of the operation of the sprays causes the discharge stream to strike the trough 35 sufficiently to the right of the pivot and with sufficient impact to overbalance the weight of liquid still flowing down the left side of the pivot and the normal gravitational tendency of the trough and thereby to cause the trough to tilt and divert the solution into the right chamber 37 of the separator box. Upon reduction of the flow of the discharge pipe 12, the stream strikes the trough to the left of the pivot which when added to the returning moment of the center of gravity of the trough is sufficient to overcome the weight of liquid flowing over the right half of the trough to tilt the trough back to the position shown in Figure 3.

In accordance with the invention, the apparatus provides for automatic control of the drainage from the spinning bucket chambers to separate storage, recovery or discharge systems. While the invention provides an effective means for making considerable savings when operating the sprays with water as the fluid for dissolving the crystals, recovering the constituents from the drainings which are undiluted with the water,

and discarding the portion of the drainings which are diluted by the spray water, the arrangement of the apparatus also provides a means for obtaining economies when employing other crystal-dissolving liquids, such as dilute sulfuric acid or other solvents, the preferred procedure in such event involving returning the spray-diluted portion of the discharge liquors to a separate recovery system.

While a preferred embodiment of the invention has been disclosed, the description is intended to be illustrative only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the invention as defined by the appended claims.

What I claim is:

1. An apparatus for processing filamentary material comprising a centrifugal bucket, means for draining liquid solutions or suspensions from the immediate surroundings of the bucket into a drainage channel, means for intermittently spraying said bucket during operation, and means for automatically directing the effluent from the drainage channel during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system.

2. An apparatus for processing filamentary material comprising a centrifugal bucket, means for draining liquid solutions or suspensions from the immediate surroundings of the bucket into a drainage channel, means for intermittently spraying said bucket during operation, means for automatically directing the effluent from the drainage channel during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system, and means for controlling said automatic means to cause its operation to begin simultaneously with that of said spraying means.

3. An apparatus for processing filamentary material comprising a centrifugal bucket, means for draining liquid solutions or suspensions from the immediate surroundings of the bucket into a drainage channel, means for intermittently spraying said bucket during operation, means for automatically directing the effluent from the draining channel during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system, and means for controlling said automatic means to cause its operation to begin at such a time after that of said spraying means that the volume of drainage liquid at the point of diversion is substantially increased by said spray but has not reached a maximum.

4. An apparatus for processing filamentary material comprising a centrifugal bucket, means for draining liquid solutions or suspensions from the immediate surroundings of the bucket into a drainage channel, electrically operated means for intermitently spraying said bucket with water during operation, and means for automatically directing the effluent from the drainage channel during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system.

5. An apparatus for processing filamentary material comprising a centrifugal bucket, means for draining liquid solutions or suspensions from the immediate surroundings of the bucket into a drainage channel, means for intermittently spraying said bucket during operation, and means dependent on the change in volume of the effluent from the drainage channel for automatically directing the effluent during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system.

6. An apparatus for producing artificial filaments comprising centrifugal buckets for collecting the freshly spun filaments while still wet with the precipitating bath, walled casings forming chambers about said buckets for collecting liquid solutions or suspensions thrown from said buckets and means for draining said liquids from the chambers, means for intermittently spraying said buckets with water, and means for automatically directing the drainings during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system.

7. An apparatus for producing artificial filaments comprising centrifugal buckets for collecting the freshly spun filaments while still wet with the precipitating bath, walled casings forming chambers about said buckets for collecting liquids thrown from said buckets and means for draining said liquids from the chambers, means for intermittently spraying said buckets with water, means for automatically directing the drainings during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system, and means for controlling said automatic means to cause its operation to begin simultaneously with that of said spraying means.

8. An apparatus for producing artificial filaments comprising centrifugal buckets for collecting the freshly spun filaments while still wet with the precipitating bath, walled casings forming chambers about said buckets for collecting liquid solutions or suspensions thrown from the buckets and means for draining said liquids from the chambers, means for intermittently spraying said buckets with water, means for automatically directing the drainings during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system, and means for controlling said automatic means to cause its operation to begin at such a time after that of said spraying means that the volume of drainings at the point of diversion is substantially increased by said spray but has not reached the maximum.

9. An apparatus for producing artificial filaments comprising centrifugal buckets for collecting the freshly spun filaments while still wet with the precipitating bath, walled casings forming chambers about said buckets for collecting liquid solutions or suspensions and means for draining said liquids from the chambers, electrically operated means for intermittently spraying said buckets with water, and means for automatically directing the drainings during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system.

10. An apparatus for producing artificial filaments comprising centrifugal buckets for collecting the freshly spun filaments while still wet with the precipitating bath, walled casings forming chambers about said buckets for collecting liquid solutions or suspensions and means for draining said liquids from the chambers, means for intermittently spraying said buckets with water, means for automatically directing the drainings during spraying intervals to one discharge system and during non-spraying intervals to a different discharge system, and means dependent on the change in volume of the drainings for automatically diverting the drainings during spraying to a separate discharge system.

11. An apparatus for producing artificial fila-

ments comprising centrifugal buckets for collecting the freshly spun filaments while still wet with the precipitating bath, walled casings forming chambers about said buckets for collecting liquid solutions or suspensions and means for draining said liquids from the chambers, means for spraying said buckets with water, a double-chambered box for receiving the drainage from said draining means, a tiltable trough for deflecting the drainings alternately into the two chambers of the box, means for tilting said trough, and means for simultaneously and intermittently operating said tilting means and said spraying means.

12. An apparatus for producing artificial filaments comprising centrifugal buckets for collecting the freshly spun filaments while still wet with the precipitating bath, walled casings forming chambers about said buckets for collecting liquid solutions or suspensions and means for draining said liquids from the chambers, means for spraying said buckets with water, a double-chambered box for receiving the drainings from said draining means, a tiltable trough normally deflecting the drainings into one of said box chambers, means for tilting said trough to deflect the drainings into the other box chamber, and means for simultaneously and intermittently operating said spraying means and said tilting means.

13. An apparatus for producing artificial filaments comprising centrifugal buckets for collecting the freshly spun filaments while still wet with the precipitating bath, walled casing forming chambers about said buckets for collecting liquid solutions or suspensions and means for draining said liquids from the chambers into a discharge channel, means for intermittently spraying said buckets with water, a double-chambered box for receiving the drainings from said draining means, a tiltable trough pivoted on an axis below, transverse of, and in advance of the discharge opening of said channel and so balanced upon its pivots as to normally deflect the drainings into one of said box chambers when the sprays are not operating but to be tilted by an increase in the volume of drainings upon operation of the sprays to deflect the drainings into the other box chamber.

H. D. HALEY.