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SPINNING APPARATUS

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Fig. 1

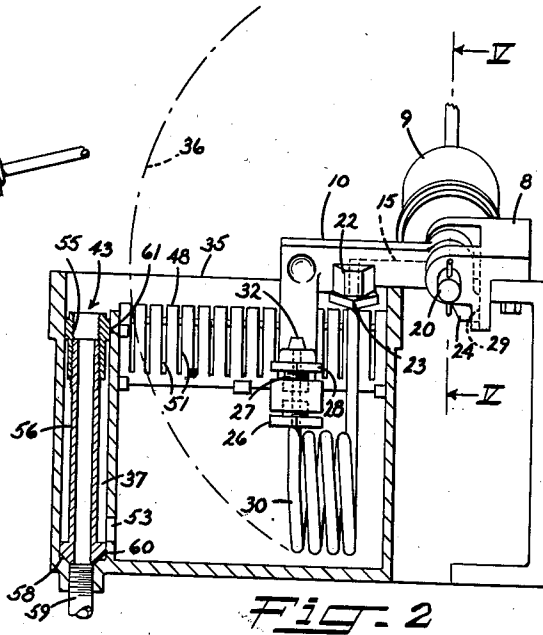
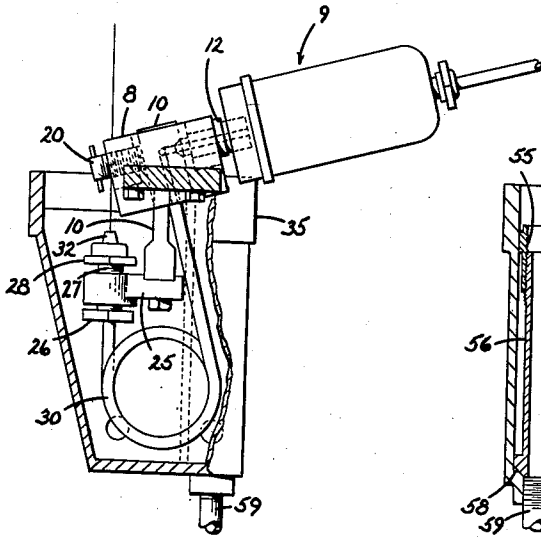


Fig. 2

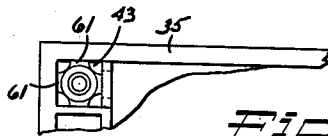


Fig. 3

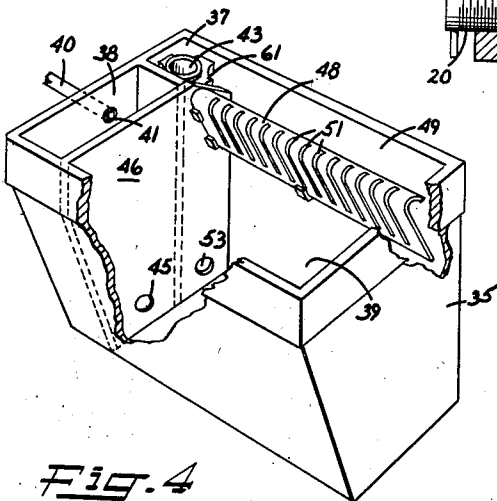


Fig. 4

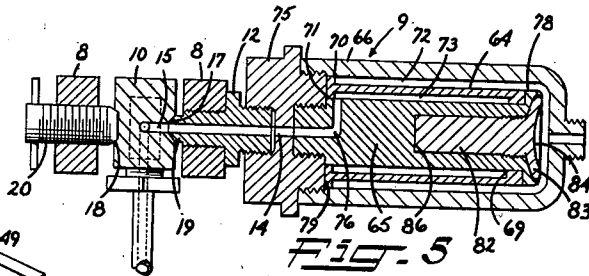


Fig. 5

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SPINNING APPARATUS

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This invention relates to apparatus for spinning artificial filaments in which a coagulable liquid material is passed through a filtering medium and extruded into a coagulating medium to form a filamentary material therein. The invention has particular applicability to the spinning of viscose rayon and may be substituted for corresponding portions of the conventional apparatus.

It is an object of the present invention to provide spinning apparatus in which the separate portions may be detached without removing or disturbing the adjustment of the remainder of the apparatus. It is another object to provide a spinning bath container which may be readily drained. It is also an object to provide a spinning bath container having an overflow means that is easily and precisely adjustable and that is self locking. Still another object is to prevent waste coagulated material from leaving the spinning bath container while permitting oily material to escape from the container through the coagulant return line. It is an object to provide equipment in which the interior passages are free from any corners or zones through which spinning solution does not flow freely and in which it may linger and undergo stagnation and ageing. One of the specific objects is to provide a spinneret, a rounder, and a filter which are separately detachable without removing the adjacent parts. Other objects, features and advantages of the invention will become apparent from the following description and the drawing relating thereto in which

Fig. 1 is an elevation end view showing a compartment and a portion of its wall broken away to better illustrate other portions of the apparatus supported therein;

Fig. 2 is an elevation side view in section of the apparatus;

Fig. 3 is a fragmentary top view of the drainage portion of the apparatus;

Fig. 4 is a pictorial view of the liquid container of the apparatus with portions of the walls broken away to illustrate parts thereof; and

Fig. 5 is a section view of apparatus taken along lines V-V of Fig. 2.

The apparatus of the invention comprises generally an assembly for extruding fine streams of a spinning liquid into a bath. The assembly includes a container for the liquid bath, a spinneret and a rounder swingable out of the container with respect to a pivot, from a position of submersion within the bath, and a stationary filter for the spinning liquid, said spinneret, rounder,

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and filter being separately detachable from the assembly. The invention further includes an arrangement within the container by which the liquid of the bath may be deaerated as it enters the chamber, the level of the bath is regulated to a desired height, and buoyant material formed within the container is prevented from passing out of the container with bath liquid discharged therefrom. All passages of the apparatus through which the spinning solution passes, and particularly those of the filter, are shaped to obtain vigorous and positive flowing of the solution.

In Figs. 1 and 2, a fixed bifurcate member 8 is illustrated which provides support for a filter unit 9 and pivotable support for a swingable bracket 10. The filter 9 is attached to the member 8 by a fitting 12 which has annular threaded portions which extend in threaded relationship with portions of the filter and the member. The fitting 12 has a central passageway which is contiguous with the discharge passageway 14 of the filter, best shown in Fig. 5, and contiguous also with a passageway 15 provided within the bracket 10. Pivotable support for the bracket 10 is obtained by clamping an end portion thereof having conical or spherical recesses 17 and 18 between an extension 19 of the fitting 12 having a surface complementary to the recess 17, and the end of a clamp screw 20.

The passage 15 of the bracket 10 extends from the pivotal portion of the bracket to an enlarged portion 22 interiorly threaded to accommodate a coupling 23. The bracket terminates in an extension 25 having an internal passageway or conduit recessed and threaded from opposite sides to receive the coupling 26 and a nipple 27. A conduit or pipe 30, commonly known as a rounder, is secured to the bracket 10 by the couplings 23 and 26. A spinneret 32 is attached to the nipple 27 independently of the rounder or pipe 30 by the coupling 28. Continuous passages for liquid material from the filter 9 through the bracket, the rounder, and the spinneret, is thus provided. The dimensions of the bracket 10 and the rounder 30 are correlated with those of the container 35 so the bracket and the rounder may be swung completely out of the container along the arc indicated by numeral 36. The bracket 10 is positioned within the container 35 by engagement of an extension 24 of the bracket with a surface 29 of the bifurcate member 8.

Fig. 4 illustrates in greater detail the container 35 having three separate cells or compartments 37, 38 and 39. The liquid enters the container 35 from tube 40 and through the port 41 situated

substantially below the top of a vertical overflow tube 43 in the cell 37. By this arrangement, liquid flows out of the cell 38 into 39 through an aperture 45. The aperture 45 is located near the bottom of the wall 46 so that any air or other gas mixed with the liquid flowing into the cell 38 may rise to the surface of the liquid while de-aerated liquid flows downward and through the hole 45 into the coagulating region of cell 39.

It often happens that the yarn leaving the spinneret breaks and the spinning solution continues to be extruded through the spinneret into the coagulating solution. The coagulated material consequently produced has a lower density than the coagulant and collects at the surface thereof in a flat mass. It is highly desirable to prevent any of the coagulated material from overflowing into the coagulant return system on account of the likelihood of clogging overflow lines and possibly causing the overflow of the container 35. Another problem attendant to the operation of spinning apparatus at relatively high bath temperatures is the separation and decomposition of oily materials from the bath solution into solid or curdy masses which affect the quality of the yarn and also that of the coagulant which is to be reclaimed. It is thus desired to have the oily material leave the cell 39 before it decomposes into undesirable solid matter. However, on account of a lower specific gravity than the aqueous spinning bath, the oily material tends to be concentrated in the top portion of the spinning bath liquid. Consequently, passage for spinning bath liquid to the overflow is preferably provided near the top of the chamber so that oily materials may be promptly carried out of the cell. Consequently, a screen or strainer 48 completely separates a region 49 of the cell through which the liquid leaving the cell must pass. The strainer is provided with vertical slots or apertures 51 which permit liquid materials and primarily the oil contained by the spin bath solution to leave the coagulating region while retaining the coagulated or other buoyant solid material.

The tube 43 may be readily lifted from contact with its seat in the bottom of the cell 37 to facilitate the draining of the container 35. An aperture 53 through the wall between the cell 37 and 39 is located near the floor of the container approximately at the level of aperture 45, so that upon removal of the tube 43, substantial drainage of the entire container is accomplished. The drain tube 43 comprises two members 55 and 56. To accomplish precision adjustment of the liquid level of the container 35, member 55 has an inner surface in threaded relationship with an outer surface of the member 56 and may be adjusted longitudinally with respect to member 56 to establish the overflow level for the container 35. The lower end of the member 55 terminates in an exteriorly tapered or conical portion 58 which seats on a complementary surface surrounding a threaded drain aperture of the container into which the threaded end of a drain pipe 59 extends. The lower portion of the member 56 is provided with radially extending lugs 60, similar to the lugs 61 provided on the member 55, to provide lateral support for and to prevent relative rotation between the members 55 and 56. The chamber 37 is square with respect to a plane normal to the axis of the tube. The members 55 and 56 of the tube 43 may be removed and turned through increments of 90 degrees with respect to each other when adjusting the length of the tube. Since it is desired to be able to make changes of

0.01 of an inch in the liquid level in the container 35, the thread of the members has a fineness such that twisting one member with respect to the other through 90 degrees does not change the length of the tube 43 more than approximately 0.01 of an inch. The tube 43 may be readily lifted from the cell for draining the container or for adjusting the members to secure a desired change in the liquid level.

To maintain the passages of the spinning apparatus free from obstruction and to promote the quality of the filamentary material extruded therefrom, the filter 9 is constructed so that liquid is positively propelled through all passages thereof, and cannot collect in pockets in which it might undergo changes of viscosity or set-up as a result of ageing. This result is obtained by providing an annular filter element 64 supported between a core 65 and an outer cover 66 for the filter. The filter element is preferably a rigid structure which may comprise a porous metal such as sintered stainless steel, or other noncorrosive material. The desired spacing of the element between the cover 66 and the core 65 is obtained by the thickness of flanges 69, 70, and 71 which may, as shown, be a portion of a unitary structure including both the flanges and the element, or if preferred, independent rings which support an unflanged element between the shell 66 and the core. Clearances 72 and 73, exteriorly and interiorly of the element, respectively, are sufficiently small to insure appreciable velocity of liquid traversing these passages and to minimize the possibility for liquid to set up or to accelerate the clogging of the filter element 64. To avoid pockets in which the liquid would not readily circulate, the clearances 72 and 73 are such that neither clearance extends longitudinally further toward the end of the filter than the juncture of the other clearance with a duct or passage leading to the exterior of the filter.

The core 65 and the cover 66 of the filter are supported in concentrically threaded relationship on a base portion 75. Passageway 14 of the filter base 75 extends between a passageway 76 of the core 65 and the passageway of the fitting 12.

The core 65 is preferably formed with an annular shoulder 78 for longitudinal positioning of the filter element 64 between the shoulder and the surface 79 of the filter base when the core is screwed into the base 75. The cover, core, and base of the filter may be fabricated from a non-corrosive metal or, as employed in the conventional filter of rayon spinning equipment, from a rubber composition which may be molded and vulcanized into rigid non-resilient articles. When the filter is constructed principally of non-magnetic materials, a magnetic member 82, press-fitted or molded within the core 65 may be employed to further aid the removal of magnetically attracted material such as iron sulfide particles which are able to pass through the filter element. The magnet 82 is preferably cylindrical and may be provided with end portions having a flange such as the flange 83 so as to provide a greater area to which magnetically attracted particles may become attached. The end surface of the magnet may be slightly concave to provide a depression 84 into which magnetically attracted impurities of the liquid to be filtered may collect. The end portion 86 of the magnet being surrounded by a substantial thickness of non-magnetic material comprising the core, will have no appreciable effect on any material in the liquid being filtered either before or after the liq-

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uid passes through the filter. While a simple bar magnet is illustrated, the magnetic member may take any form or shape which adapts it to the structure of the filter, whether of the permanently magnetized or the electromagnetic type. If desired, a magnetic member may surround or be included within the structure of the cover 66. Access to the magnetic member 82 for cleaning is obtained by removal of the filter cover 66.

While preferred embodiments of the invention have been shown and described, it is to be understood that changes and variations may be made without departing from the spirit and scope of the invention as defined in the appended claims.

I claim:

1. Apparatus for spinning filamentary material comprising a container, a swingable bracket having a passageway, a stationary mounting for pivotably supporting the bracket, a filter in fixed relationship with the mounting and in communication with one end of the passageway, an extension to the bracket, a conduit attached to the bracket and communicating with the other end of the passageway and attached by its other end to the extension of the bracket, a spinneret, means for attaching it to said extension, and a passageway through the extension of the bracket connecting the conduit and the spinneret.

2. Apparatus for spinning filamentary material comprising a container, a bracket, means for pivotably supporting the bracket so that a portion thereof is swingable into and out of the container, a spinneret secured to said portion, a conduit secured by both ends to the bracket, a passageway in said portion connecting the spinneret and one end of the conduit, a second passageway in the bracket connecting the other end of the conduit with an outer surface of the bracket, and means for supplying a liquid to an end of the passageway terminating in the bracket surface.

3. Apparatus for spinning filamentary material comprising a container, a bracket, means for pivotably supporting the bracket so that a portion thereof is swingable into and out of the compartment, a spinneret secured to said portion, a conduit secured by both ends to the bracket, removable means for securing the spinneret and each end of the conduit, a passageway through said portion connecting one end of the conduit and the spinneret, a passageway within the bracket connecting the other end of the conduit and an outer surface of the bracket in contact with the supporting means of the bracket, and a passageway through the supporting means contiguous with the second passageway of the bracket.

4. Apparatus as in claim 3 wherein a stationary filter having inlet and outlet portions is attached to the supporting means with the outlet portion in communication with the passageway of the supporting means.

5. Apparatus as in claim 3 wherein the pivotal supporting means has bifurcate members and an adjustable screw through one of the members for clamping the pivoting portion of the bracket between the members.

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6. In a container for a spinning bath, overflow means for adjusting the liquid level in the container comprising a compartment, an upwardly-facing seating surface surrounding and defining a drain port in the bottom of the compartment, an overflow tube comprising two longitudinally relatively adjustable sections having portions in threaded telescopic relationship, said tube being loosely supported within said compartment and having an upper overflow surface and a lower terminal surface which is complementary to the seating surface, and exterior laterally-projecting portions on each section which engage the side walls of the compartment to prevent rotation of the section within the compartment and to align the tube within the compartment with said terminal surface in engagement with the seating surface, a wall of the compartment having a passageway disposed below the overflow surface of the tube for connecting the region within the compartment and another region within the container.

7. In a container for a spinning bath, overflow means for adjusting the liquid level in the container comprising a compartment of non-circular horizontal cross-section, an upwardly-facing seating surface surrounding and defining a drain port in the bottom of the compartment, an overflow tube comprising two longitudinally relatively adjustable sections having portions in threaded relationship, said tube being loosely supported in said compartment and having an upper overflow surface and a terminal surface which is complementary to the seating surface, and exterior projecting portions on each section extending radially and approximately in a plane in several directions distributed about the axis of the tube into close clearance with the compartment walls for preventing the rotation of either section within the compartment and to align the tube substantially vertically with said terminal surface in engagement with the seating surface, a wall of the compartment having a passageway disposed below the overflow surface of the tube for connecting the region within the compartment and another region within the container.

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