Dec. 14, 1954 H. J. McDERMOTT 2,696,636

FILTERING AND SPINNING APPARATUS

Filed Feb. 23, 1950

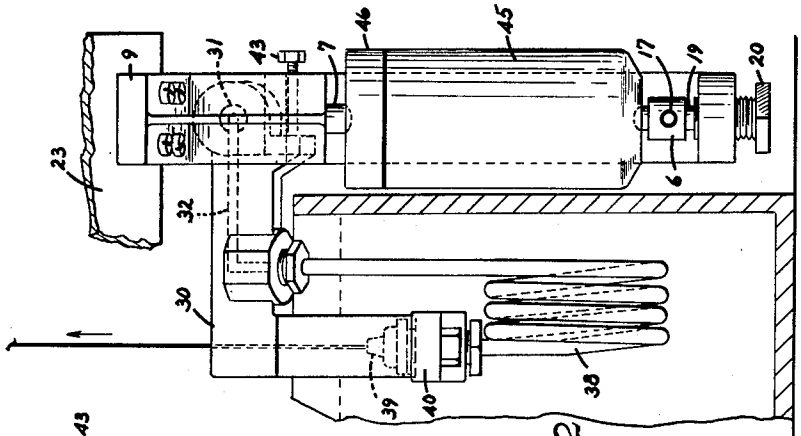


FIG. 2

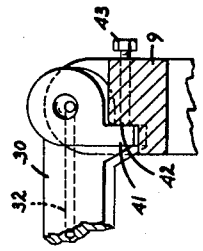


FIG. 3

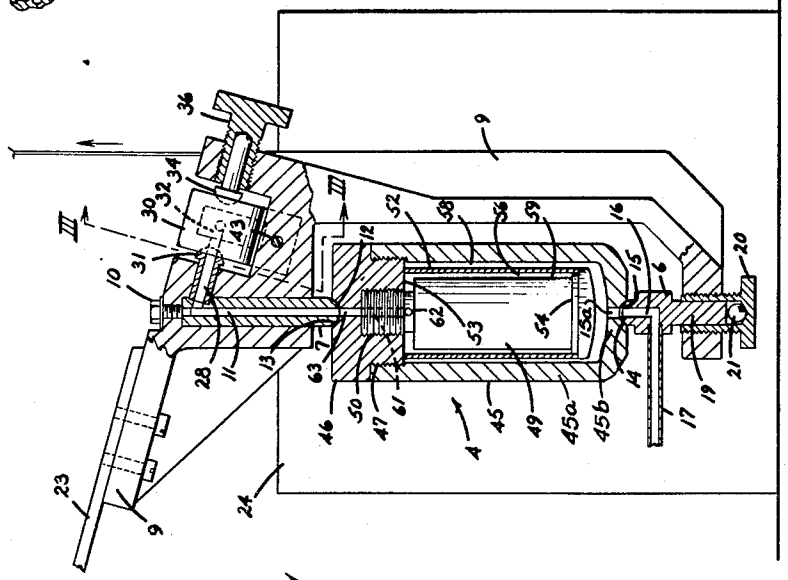


FIG. 1

INVENTOR.
HENRY J. McDERMOTT
BY
Thomas R. O'Malley
ATTORNEY.

United States Patent Office 2,696,636 Patented Dec. 14, 1954

2,696,636

FILTERING AND SPINNING APPARATUS

Henry J. McDermott, Collingdale, Pa., assignor to American Viscose Corporation, Wilmington, Del., a corporation of Delaware

Application February 23, 1950, Serial No. 145,880

7 Claims. (Cl. 18—8)

This invention relates to equipment for spinning artificial filamentary material and particularly to apparatus used to filter a filament-forming liquid prior to its passage through a spinneret.

In a conventional type of spinning apparatus for viscose rayon yarn production, an assembly of spinning equipment is used which comprises a filter, a rounder, and a spinneret in series connection, the assembly being pivotable with respect to a clamp fixture in which the rounder is pivotably supported. To remove any one of the parts just named and particularly to remove the filter, necessitates the careful adjustment of all the parts of the assembly with respect to each other to obtain a proper position for spinning when they are again assembled. Considerable labor is thus expended in servicing and adjusting the hundreds of separate assemblies which are used to produce yarn in the usual plant installation.

It is an object of the present invention to provide a unit for filtering viscose or other spinning liquids which may be readily detached from other spinning equipment. It is another object to provide a filtering unit which is detachable from spinning equipment without changing the position of other portions thereof connected with the unit for fluid communication. Still another object is to provide a filter unit of such construction that no gas pockets can be formed in the passages of the material by gaseous materials carried with the unfiltered liquid filament-forming material, and that gaseous substances can readily pass through and from the unit. It is also an object to provide a filter unit having passageways through which a liquid is actively circulated through all portions to avoid the forming of stagnant pockets of overaged spinning solution within the unit and ultimate partial or complete clogging of the unit. Other objects, features and advantages will be apparent from the following description of the invention and the drawing relating thereto in which

Fig. 1 is an elevation partly in section of a filtering unit and supporting structure therefor according to the invention;

Fig. 2 is a side view of the apparatus illustrated in Fig. 1; and

Fig. 3 is a fragmentary section view taken along line III—III of Fig. 1.

The objects of the invention are accomplished by an improved spinning apparatus comprising a filter unit having an intake port and a discharge port substantially aligned on a common axis and extending into the unit from surfaces at opposite sides or ends of the unit, and a pair of ducts for passing liquid to and from the unit respectively, having spaced termini which are adapted to fit bearing areas of the unit surrounding each port, at least one of the termini being movable toward the other to clamp the unit between the termini. Other portions of the apparatus such as a spinneret and rounder are independently supported.

Fig. 1 illustrates an improved filter unit 4 supported in clamped relationship between the rounded terminal surfaces of a feed member 6 and a member 7 for conducting a liquid from the unit. Although the liquid may be passed through the unit 4 in either direction, the unit is preferably aligned so that its feed end is lower than the discharge end so as to obtain full advantage of an interior passageway arrangement whereby gaseous materials are swept from the unit. As shown,

the feed and discharge ends of the unit 4 are vertically spaced. The members 6 and 7 are supported within a bracket 9 which extends around both ends of the unit 4 in the manner of a C-clamp. The bracket is recessed to receive the member 7 and threaded along a bore contiguous with the recess to receive a cap screw 10 with which to close the end of a passageway 11 of the member 7. The member 7 is provided with a rounded terminal portion 12 which engages the surface within a shallow recess centered in the top surface of the unit 4.

The member 6 has a similarly rounded terminal portion 14 which engages the surface within another recess 15 of the unit 4 spaced axially at the opposite end of the unit from the recess 13. The member 6 is drilled axially and radially to provide a passageway 16 into the unit from a feed tube 17 which is connected with the lateral portion of the passageway. The lower portion 19 of the member 6 comprises a shaft-like extension which is rotatable within a thumb thrust screw 20 in threaded relationship with the bracket 9. A ball 21 provides an anti-friction bearing surface between the end of the member 6 and the thrust screw so as to reduce the tendency to turn the member 6 and to bend the feed tube 17 when the screw is turned to loosen or tighten the grip of the members 6 and 7 on the unit 4.

The bracket 9 may be supported in any desired manner such as that shown wherein the bracket is bolted to a frame member 23 extending into close proximity with a container 24. The bracket 9 is provided with a passageway 28 extending through a pivot plug 31 and contiguous with the passageway 11 of the member 7 to conduct a liquid material into a passageway 32 of another bracket 30. The latter bracket is supported by the bracket 9 between the hollow pivot plug 31 and another pivot plug 34 and is pivotable with respect to an axis passing through the plugs. Shallow recesses are provided on both sides of an upper section of the bracket 30 to receive the enlarged rounded end-portions of the plugs. The pivot plug 34 is adjustable toward and away from the plug 31 by a thumb thrust screw 36 extending through the bracket 9.

A rounder 38, a spinneret 39, and the couplings necessary to attach the spinneret and the rounder in series connection with passageways 32 and 40 provided in the bracket are supported by a portion of the bracket 30 so spaced from its pivot axis that the rounder and spinneret may be swung into and out of the container 24. Such an arrangement permits almost instant detaching of the bracket 30 and parts attached thereto from the bracket 9, as well as disconnecting of the duct system for transferring liquid from the filtering unit 4 to the rounder and the spinneret. As shown in Fig. 3, the position of the bracket 30, and the rounder and spinneret attached thereto is determined by engagement of a lug 41 with the surface 42 of the bracket 9. The stop position of the bracket may also be established by an adjustable set screw 43.

The filter unit 4 is constructed so as to avoid the entrapment of air or other gas and to promote positive movement of liquid through all of the passageways thereof so that no regions are formed within the unit in which spinning solution may stagnate, become overaged, or set-up to clog or otherwise affect the efficiency of the unit. To simplify the construction of the filter unit, the various parts of the unit are preferably concentric and circular in cross-section and the unit is preferably supported with its axis vertical or at least steeply inclined.

The unit 4 comprises an outer shell member 45, a closure 46 for the member 45 in threaded relationship therewith at 47, a core 49 having an exteriorly threaded end portion in threaded relationship with an interiorly threaded recessed portion of the closure at 50, and a porous cylindrical filter 52 supported between a surface 53 of the closure and an annular shoulder 54 of the core 49 with the end surfaces thereof in continuous engagement with the surface 53 and the shoulder as shown, The principal surface 56 of the core 49 is of such a diameter as to form an annular clearance region with the inner surface of the shell member 45 in

which the filter element **52** may be supported so that an annular passageway **58** is formed exteriorly of the element and an annular passageway **59** of substantially equal depth and length is formed interiorly of the element **52**. The threaded portion of the core **49** has an axial passageway **61** contiguous with an intersecting radial passageway **62** through which the filtered medium may pass into the bore **63** of the closure **46** and into the member **7**. As illustrated in Fig. 1, the passageways **61** and **62** are small in cross-sectional contour as compared with the general mass of the core member **49** so that all filament-forming material entering the filter may be actively circulated in accordance with a stated object of the invention, i.e., circulated through the filter without the formation of stagnant pockets of overaged spinning solution. As shown, the shell member **45** constitutes a container having a circular lateral wall **45***a* and an end wall **45***b*. The end wall has a passageway **15***a* which extends inwardly from the recess **15** through the inner surface of the end wall.

An extremely advantageous feature of the invention is that the filter unit **4** may be turned end for end with respect to the orientation shown in figures of the drawing and the direction of movement of liquid through the unit reversed. The recesses **13** and **15** are formed by small surfaces of revolution made identical to implement the reversal; for the same reason, the rounded ends of members **7** and **6** are given a similar contour and are aligned on a common axis.

When the unit **4** has been used sufficiently to require cleaning, it may be restored to efficient operation by removing the unit from the spinning equipment and reversing the position of the unit between the members **6** and **7** while maintaining the same direction in the flow of the liquid filament-forming material through the members **6** and **7**. The spinning solution passed through the filter during the back-flushing period is wasted since it would be overaged by the time it was collected and refiltered. The unit may be retained in the reversed position for a normal service period until its efficiency is reduced to the level where another reversal and cleaning procedure is indicated. Special flushing solutions may be used instead of the spinning solution to clean the unit as well as the entire duct system for supplying spinning solution to a spinneret. A filter unit such as herein described is also conveniently removed and instantly attached to a flushing or cleaning apparatus operated independently of the spinning apparatus. When this cleaning procedure is used, the unit may be instantly replaced with a cleaned replacement unit.

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 filaments from a filament-forming liquid comprising supporting means, a first annular bearing surface in spaced relationship with a second annular bearing surface of said means, a duct within said supporting means extending between, and forming central apertures in, each of said surfaces, a filter unit having a pair of ports, one for receiving the liquid and the other for discharging the liquid, each port being disposed centrally of one of two oppositely-facing bearing surfaces of the unit, a pivotable bracket having oppositely-facing coaxial bearing surfaces, and duct means associated with the bracket and terminating at one end as a central aperture in one of said surfaces of the bracket, a spinneret supported on the bracket remotely from the axis of its bearing surfaces and enclosing the end of the duct means, thrust means adjustably associated with the supporting means capable of movement along the axis of revolution of the first bearing surface of the supporting means for engaging the non-apertured bearing surface of the bracket, said apertured surface of the bracket being forced into engagement with said first bearing surface, and a second thrust means adjustably associated with the supporting means capable of movement along the axis of revolution of the second bearing surface of the supporting means for engaging one of the bearing surfaces of the filter unit whereby the other bearing surface of the unit is held concentrically against said second bearing surface, the second thrust means having a duct extending therethrough in contiguity with the adjacent port of the filter unit for communication thereof with a liquid supply means.

2. Apparatus for spinning filaments from a filament-forming liquid comprising supporting means having a first annular bearing surface in spaced relationship with a second annular bearing surface of said means, said surfaces facing in non-parallel directions, a branched duct within the supporting means extending between, and forming central apertures within, each of said surfaces, a filter unit having a pair of ports, one for receiving the liquid and the other for discharging the liquid, each port being disposed centrally of one of two oppositely-facing bearing surfaces of the unit, a pivotable bracket having oppositely-facing coaxial bearing surfaces, and duct means associated therewith and terminating at one end as a central aperture in one of said surfaces of the bracket, a spinneret supported on the bracket remotely from the axis of its bearing surfaces and enclosing the other end of the duct means, thrust means adjustably associated with the supporting means capable of movement along the axis of revolution of the first bearing surface of the supporting means for engaging the non-apertured bearing surface of the bracket, said apertured surface of the bracket being forced into engagement with said first bearing surface, and a second thrust means adjustably associated with the supporting means capable of movement along the axis of revolution of the second bearing surface of the supporting means for engaging one of the bearing surfaces of the filter unit whereby the other bearing surface of the unit is held concentrically against the second bearing surface, the second thrust means having a duct extending therethrough in contiguity with the adjacent port of the filter unit for communication thereof with a liquid supply means.

3. Apparatus for spinning filaments from a filament-forming liquid comprising an open-topped container, supporting means having a first annular bearing surface in spaced relationship with a second annular bearing surface thereof, said first-named surface having a substantially horizontal axis of revolution, a duct within said supporting means extending between, and forming central apertures in, each of said surfaces, a filter unit having a pair of ports, one for receiving the liquid and the other for discharging the liquid, each port being disposed centrally of one of two oppositely-facing bearing surfaces of the unit, a pivotable bracket having oppositely-facing bearing surfaces, a second duct comprising a portion extending through the bracket and terminating as a central aperture in one of said bearing surfaces of the bracket and a rounder supported on the bracket contiguously with said duct portion, a spinneret supported on the bracket remotely from the axis of its bearing surfaces and connected with the rounder to receive liquid therefrom, thrust means adjustably supported with the supporting means capable of movement along the axis of the first bearing surface of the supporting means for engaging the non-apertured bearing surface of the bracket, said apertured surface of the bracket being forced into engagement with said first bearing surface, said bracket being movable to a position overhanging the interior of the container with the rounder and the spinneret disposed therein, and a second thrust means adjustably associated with the supporting means capable of movement along the axis of revolution of the second bearing surface of the supporting means for engaging one of said bearing surfaces of the filter unit whereby the other bearing surface of the unit is held concentrically against said second bearing surface, the second thrust means having a duct extending therethrough in contiguity with the adjacent port of the filter unit for communication thereof with a liquid supply means.

4. Apparatus for spinning filaments from a filament-forming liquid comprising a support having a first annular bearing surface in spaced relationship with a second annular bearing surface thereof, a duct within the support extending between, and forming central apertures, in each of said surfaces, said support having a pair of extensions, each extension being spaced with respect to a bearing surface of the support along the axis of revolution thereof and having a circularly threaded surface that is coaxial with respect to said axis, a filter

unit having a pair of ports, one for receiving the liquid and the other for discharging the liquid, each port being disposed centrally of one of two oppositely-facing bearing surfaces of the unit, a pivotable bracket having oppositely-facing coaxial bearing surfaces, and duct means associated with the bracket having one end terminating as a central aperture in one of said surfaces in the bracket, a spinneret supported on the bracket remotely from the axis of its bearing surfaces and enclosing the end of a duct means, thrust means in threaded relationship with the threaded surface of the extension adjacent the first bearing surface of the support for engaging the unapertured bearing surface of the bracket, said apertured surface of the bracket being forced into engagement with said first bearing surface, and a second thrust means in threaded relationship with the threaded surface of the extension adjacent the second bearing surface of the support for engaging one of the bearing surfaces of the filter unit whereby the other bearing surface of the unit is held concentrically against the second bearing surface of the support, the second thrust means having a duct extending therethrough in contiguity with the adjacent port of the filter unit for communication thereof with a liquid supply means.

5. A reversible filter unit comprising a container having a lateral circular wall, the container being open at one end and having an aperture extending centrally through its end wall at the other end, a closure for the open end having an aperture along said axis in alignment to said aperture of the container, a core member extending from the inner surface of the closure in concentric and spaced relationship with the interior surface of the lateral wall toward said end wall and terminating in an end surface closely spaced from the end wall, said core member having an annular shoulder on the end portion thereof which is nearer the end wall comprising a radially-extending surface facing away from the end wall, the core member having a liquid-conducting means of relatively small cross-sectional contour as compared with the general mass of the core member extending from the passageway of the closure to a surface of the member, a unitary annular filter element comprising a rigid filtering medium capable of resisting internally applied pressure as well as externally applied pressure extending between the inner surface of the closure and the shoulder at substantially uniform clearance with the surface of the member and at substantially uniform clearance with the longitudinal interior surface of the container wall, means for drawing the core lengthwise of itself toward the closure to obtain the support of the filter element with one end thereof in continuous engagement with the inner surface of the closure and the other end in continuous engagement with said shoulder surface, and the closure and the container each having a small exterior surface of revolution of identical contour centered about the axis which define the peripheries of the outer ends of the apertures through the closure and the container.

6. A filter unit as defined in claim 5 wherein the means for moving the core member lengthwise of its axis relative to the closure comprises an exteriorly threaded end portion of the core member extending in threaded relationship into an interiorly threaded portion of the closure.

7. In combination with a filter unit having a port for receiving a liquid and another port for discharging the liquid, each port being disposed centrally of two oppositely facing coaxial bearing surfaces of the unit; apparatus comprising a support having a first annular bearing surface in spaced relationship with a second annular bearing surface of the support, the first bearing surface having an axis of revolution substantially horizontal, the second bearing surface of the support having a substantially vertical axis of revolution, a branched duct within the support extending between and forming central apertures in each of the bearing surfaces of the support, a pivotable bracket having oppositely-facing coaxial bearing surfaces, and duct means associated with the bracket terminating at one end as a central aperture in one of said surfaces of the bracket, a spinneret supported on the bracket remotely from the axis of its bearing surfaces and enclosing the end of the duct means, an open-topped container, thrust means adjustably associated with the support capable of movement along the axis of the first bearing surface of the support for engaging the non-apertured bearing surface of the bracket, said apertured surface of the bracket being forced into engagement with said first bearing surface, said bracket being swingable to a position overhanging a wall of the container with the spinneret disposed therewithin, and a second thrust means adjustably associated with the support capable of movement along the axis of the second bearing surface of the support for engaging one of the bearing surfaces of the filter unit whereby the other bearing surface of the unit is held concentrically against the second bearing surface, the second thrust means having a duct extending therethrough in contiguity with the adjacent port of the filter unit for communication thereof with a liquid supply means.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
433,710	Aims, Jr.	Aug. 5, 1890
702,382	Topham	June 10, 1902
864,345	Tollefson	Aug. 27, 1907
1,331,237	Burris	Feb. 17, 1920
2,016,161	Wilderman	Oct. 1, 1935
2,294,330	Clark	Aug. 25, 1942
2,337,469	Hill	Dec. 21, 1943
2,574,521	Bailey et al.	Nov. 13, 1951

FOREIGN PATENTS

Number	Country	Date
25,175	Austria	Aug. 10, 1906