July 12, 1938. E. M. WILSON 2,123,689

APPARATUS FOR WASHING ARTIFICIAL THREADS

Filed May 29, 1936 2 Sheets-Sheet 1

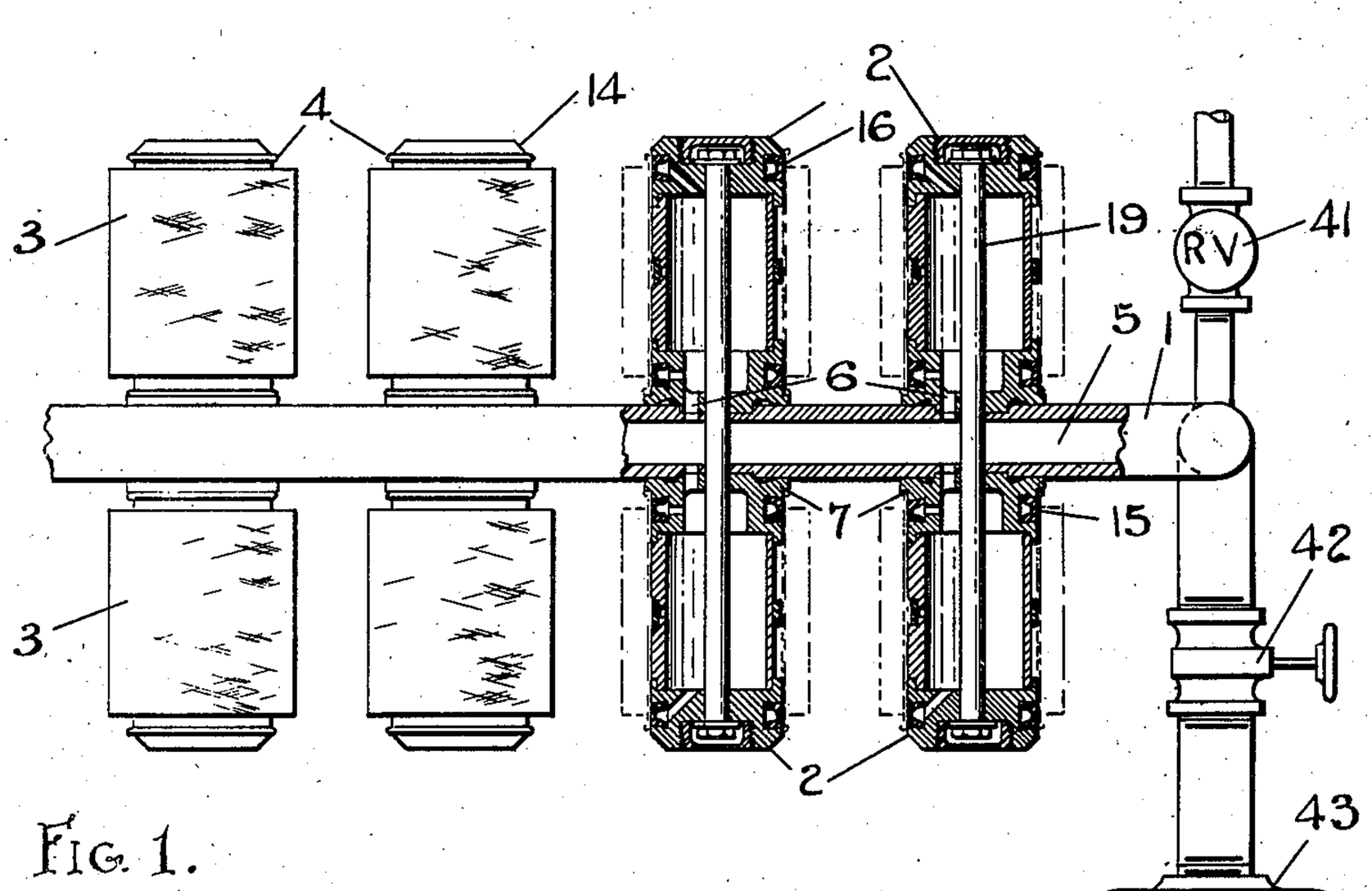

FIG. 1.

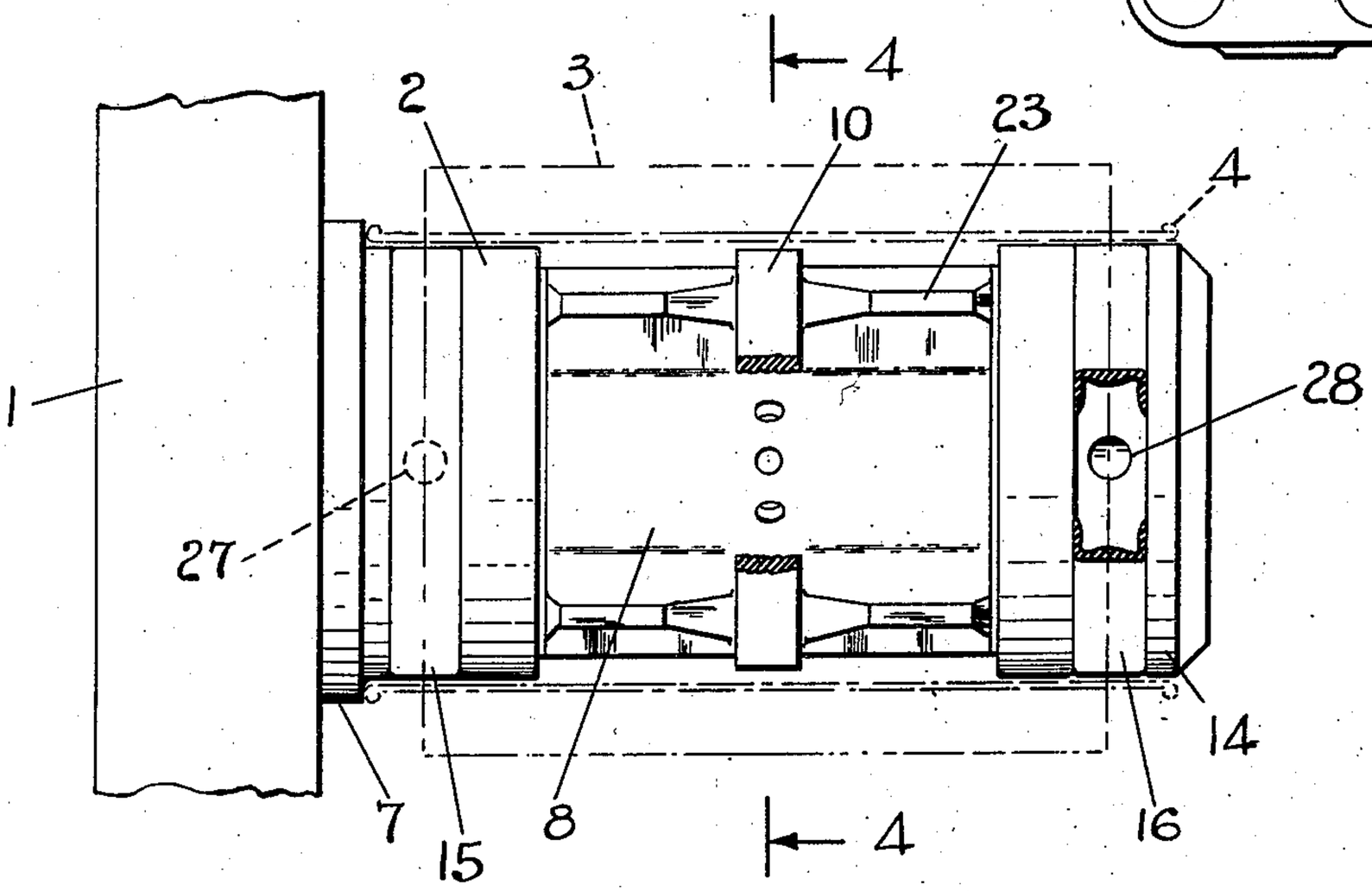

FIG. 2.

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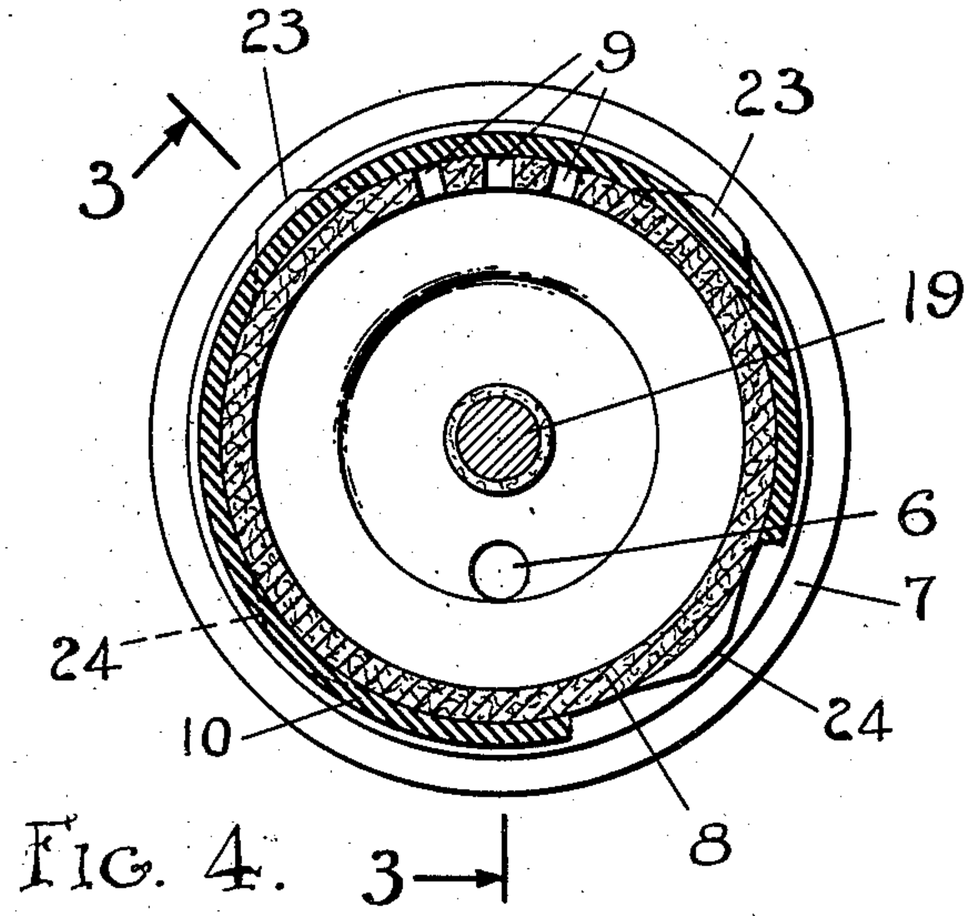

FIG. 4.

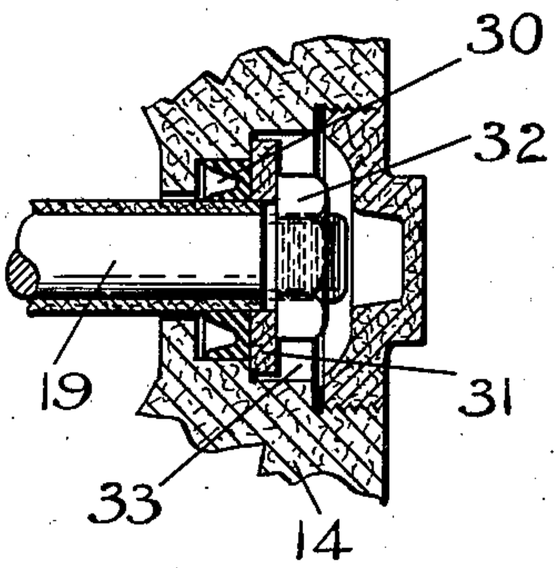

FIG. 5.

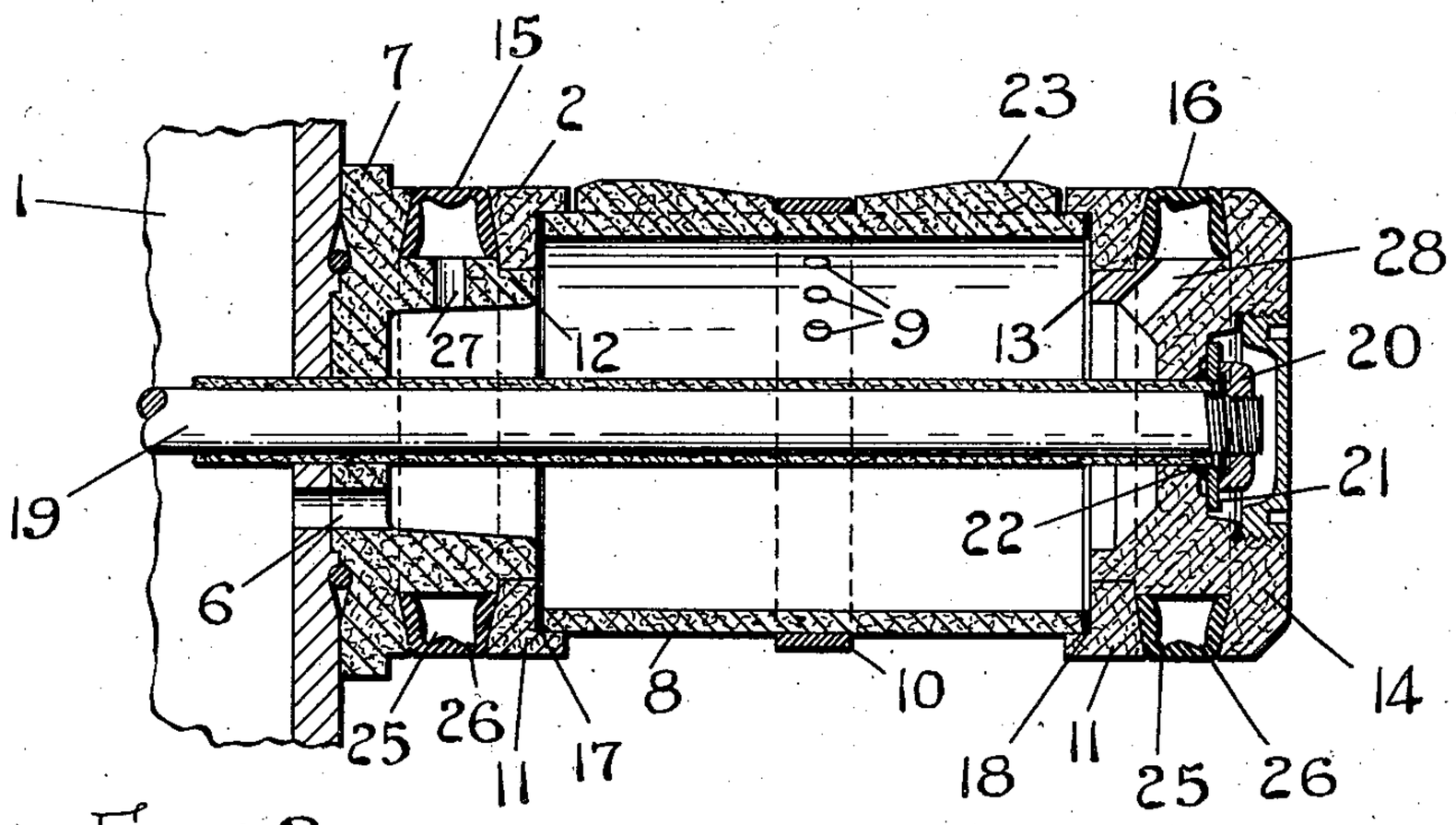

FIG. 3.

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2,123,689

UNITED STATES PATENT OFFICE

2,123,689

APPARATUS FOR WASHING ARTIFICIAL THREADS

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Application May 29, 1936, Serial No. 82,534

3 Claims. (Cl. 18—8)

This invention relates to the treatment of artificial thread, and it pertains in particular to a new and improved spindle for the washing or other liquid treatment of bobbin cake of artificial thread produced by the viscose process.

In the manufacture of artificial thread (rayon) by the viscose process according to one procedure, the viscose is extruded through a spinneret into an acid coagulating bath and is collected on bobbins. The bobbin cakes of yarn are subjected to various liquid treatments including treatments with desulfuring, bleaching and washing solutions to purify the thread. In order to prevent damage to the yarn, it is desired that these liquid treatments be applied to the yarn while it is wound on bobbins, the bobbins being perforated so as to enable the thread to be purified while on the bobbin.

It has been suggested in the copending application of Paul Marie Pierrat, Serial No. 533,175, filed April 27, 1931, now Patent No. 2,088,011, that the bobbins containing the yarn wound thereon be mounted on wash spindles provided with compressible gaskets adapted to be expanded by the washing fluid and adapted to seal the ends of the bobbins so as to direct the treating fluid through the perforations of the bobbins, thereby avoiding leakage around the ends of the bobbins. It has been found, however, that in the operation of a system such as is described in the Pierrat application, leakage may occur at the beginning of the washing operation while pressure is building up and prior to the development of sufficient pressure to fully expand the gaskets, causing the fluid to be sprayed all over the room. Furthermore, after these spindles are used for some time, the plastic material grows and/or cold flows so that the sealing gaskets project beyond the ends of the bobbin so that the application of fluid pressure causes the gaskets to blow out. Additionally, it may happen that all of the gaskets will not contract sufficiently to permit the bobbins to be readily removed from the spindles.

Furthermore, where large spinning bobbins are used and where a large amount of yarn, for example one to two pounds, is wound on the bobbins, a greater fluid pressure is desired in order to properly permeate the bobbin cakes, requiring the use of spindles which are better adapted to withstand the increased strain of higher pressure. Moreover, the handling of the larger bobbin packages requires a more exact centering of the bobbins on the spindle in order that the sealing gaskets may expand uniformly and seal properly.

One object of this invention pertains to improved apparatus for the purification of artificial yarn. Another object relates to new and improved wash spindles adapted for the washing and/or other liquid treatment of artificial yarn produced by the bobbin process. A further object pertains to spindles adapted for the fluid treatment of bobbin cakes, of rigid construction, adapted for accurate centering of the bobbins and efficient washing of the thread. Other objects will appear hereinafter.

The invention will be better understood with reference to the drawings in which:

Figure 1 illustrates a system showing several bobbins mounted on a pipe wash rack.

Figure 2 illustrates a top plan view of one form of the new wash spindle in assembled position.

Figure 3 illustrates a sectional view of the spindle, taken along the line 3—3 of Figure 4.

Figure 4 is a sectional view taken along line 4—4 of Figure 2.

Figure 5 illustrates an alternative mode of securing the spindles in assembled position.

Referring to the drawings, a pipe rack 1 has mounted thereon spindles 2 adapted for the fluid treatment of bobbin yarn cakes 3 wound on perforated bobbins 4. Pipe rack 1 is provided with a fluid passage 5, through which a suitable treating fluid such as water is passed, the fluid entering the wash spindles through openings 6 in the base 7 of the wash spindle. The wash spindle is provided with a tubular sleeve 8 having a row of apertures 9, adapted to be closed by an expansible rubber band 10 shown partly broken away in Figures 2 and 4. At each end of the tubular member 8 are provided annular members 11 adapted to fit over reduced portions 12 and 13 of base 7 and a plug member 14, the members 11 and the base 7 and plug 14 being formed as shown to receive expansible gaskets 15 and 16, which gaskets normally have an outer circumference slightly smaller than bobbins 4, and slightly larger than the circumference of ring members 11 or plug members 14 or the small shoulder of base 7. Washers 17 and 18 are provided to present a fluid tight joint between members 11 and sleeve 8 and to provide for growth of sleeve 8.

Plug member 14 is clamped in place by means of a steel tie rod 19 over the outer ends of which is threaded a nut 20 abutting a washer 21 which bears against a fluid sealing member 22. The tie rod passes through one wash spindle on one side

of the pipe rack, through the pipe rack, through the wash spindle on the other side of the pipe rack and secures the opposite wash spindle assembly at its outer end in the same way as described above for one wash spindle.

The sleeve 8 is provided with lugs 23 and 24, lugs 23 being somewhat higher than lugs 24, the radius of the circle just touching the outer surfaces of lugs 23 being substantially that of the inner circumference of the bobbins 4, so that when the bobbins are placed on the spindles they are automatically centered. It is to be understood that the wash spindles are disposed horizontally with the lugs 23 on the upper side and disposed symmetrically on opposite sides of the central vertical plane of the wash spindle. The radius just touching the outer surfaces of lugs 24 is somewhat smaller than rings 11, permitting a substantial amount of free space below the lower spacers or lugs 24 and the inner surface of the bobbins, so that when the sealing gaskets 15 and 16 are in the collapsed state, the bobbins can be slid onto and off of the spindles without difficulty. The lugs 24 serve to align the bobbins with spindle when sliding them on. Because of this centering arrangement, the new spindle makes it possible for the sealing members 15 and 16 to expand evenly and to provide a more perfect seal than heretofore.

It is preferred that the sealing members 15 and 16 be shaped generally of the cross-section shown. They are preferably molded from a special grade rubber that is not affected by the purification fluids although they may be made from any good grade of rubber and will function satisfactorily for varying lengths of time. They are provided with diminished portions 25 and 26 in order that they may expand more easily and yet be retained in their grooves. Additionally, the outer diameter of the sealing members 15 and 16 is slightly smaller than the diameter of the bobbins, for example, ⅛'' smaller, depending on the grade of rubber used, to allow for a permanent expansion or growth which takes place during the life of the gaskets and tends to increase the size of the gaskets so that they approach or even exceed the inner diameter of the bobbin over the course of time, making it difficult to place the bobbin on or to take the bobbin off of the washing spindle. In the past it has been necessary to replace the rubber sealing gaskets frequently, whereas by allowing clearance in the manner specified, the gaskets may last without replacement for a year or more, without being too small to provide effective sealing when expanded.

The rubber band 10 is adapted to be sufficiently tight so as not to open until a desired pressure of 2 to 3 pounds is built up thereby permitting the gaskets 15 and 16 to be expanded at the beginning by means of the fluid coursing through holes 27 and 28 provided in members 7 and 14, the bobbin thus being efficiently sealed before treating fluid is emitted to the bobbins.

Most of the members comprising the wash spindle will be made of infusible, insoluble, phenol-formaldehyde resin such as is sold under the trade-name "Bakelite", although any other suitable resin, hard rubber or other satisfactory material may be used. These materials have a tendency to "grow" or increase in size with time when in contact with treating solutions which growth is accentuated with higher temperature and pressure. A growth of 3% to 4% over the course of a year's use is common. In earlier wash spindles, the resin has grown to such an extent that the expansible gaskets protruded from the ends of the bobbins to such an extent as to prevent adequate sealing under pressure. With the new spindle of this invention, however, the tie rod 19 maintains the length of the spindle constant, the soft gasket washers 17 and 18, moreover, permitting the cylindrical member 8 and members 7 and 14 to grow to a certain extent without cracking since they are movable with respect to each other and have a tendency to squeeze out the soft rubber gaskets 17 and 18. Too much growth, however, would necessitate the turning down of the member 8 a small amount and the insertion of new washers 17 and 18. However the thicker gaskets 17 and 18 are, the more growth they will take up without injury to the spindle.

The steel tie rod 19 is preferably covered with a layer of "Bakelite", hard rubber, or the like, so that all metal parts of the spindle are protected from contact with and do not contaminate the treating fluids.

In lieu of the mode of fastening member 14 to the wash chuck as shown in Figure 3, an alternative arrangement is shown in Figure 5 in which the end member 14 is provided with a countersunk hole into which is inserted a rubber gasket 30 which is held in place by a cadmium-plated steel washer 31 which is in turn fastened in place by a cadmium-plated nut 32 which screws onto the threaded end of the tie rod 19, the assembly being seated in recess 33 of end member 14.

The wash spindle may be provided with means for positively collapsing, as well as positively expanding the gaskets 15 and 16, as by a vacuum means such as is shown in Figure 3 of the drawings of F. G. Kraft U. S. Patent No. 1,972,150, issued September 4, 1934, although such provision is not essential.

In operating the present invention, the spindles are assembled, the bobbins with the thread cake thereon are placed on the spindles, the treating fluid is introduced through conduit 5 by means of pump 43 and valve 42 thereby expanding the gaskets until a seal is effected, building up a pressure sufficient to lift band 10 and allow the fluid to pass outwardly through apertures 9, through the perforations in the bobbin and through the yarn cake. After the treating cycle is completed the fluid flow is shut off, the pressure released thru relief valve 41 and the bobbin removed. It will be understood that the fluid passed through the spindle may be any desired liquid or even a gas.

Since the invention is susceptible of many different forms, any embodiment which conforms to the spirit of the invention is intended to be included within the scope of the claims.

I claim:—

1. Apparatus adapted for the fluid treatment of bobbin cakes of artificial thread comprising a fluid conduit, a spindle assembly secured to said conduit and adapted to support a bobbin, means whereby fluid is introduced from said conduit to said assembly, means comprising fluid apertures for emitting fluid to said bobbin, expansible gaskets for sealing the ends of said bobbin, and means for centering the bobbin in position, said centering means comprising rigid spacing lugs disposed about said spindle assembly, one or more of which extend further outwardly from said spindle assembly on the upper side thereof than on the under side, the spindle assembly being

adapted to be maintained horizontally during the operation thereof.

2. Apparatus adapted for the fluid treatment of bobbin cakes comprising a fluid conduit, a spindle assembly secured thereto and disposed in horizontal position, said spindle assembly comprising a hollow body portion, end members contacting said body portion and holding it in position, expansible gaskets mounted in said assembly for sealing the ends of the bobbin, and adapted to be expanded by fluid pressure, means for holding the assembly in secured position on said fluid conduit, spacing lugs on said body and disposed symmetrically on the upper surface of said body whereby to center the bobbin in position, means for expanding said gaskets, and means preventing passage of treating fluid to the bobbin cake until such gaskets are expanded.

3. In an apparatus for the fluid treatment of bobbin cakes, a fluid conduit and oppositely disposed spindle assemblies secured to said conduit for holding bobbins, said spindle assemblies comprising tubular sleeves, plugs positioned adjacent to said sleeves, and yieldable members positioned between said plugs and sleeves to permit substantial growth of parts of said assembly without damage, and rigid elements passing through said assemblies and said conduit and provided at their opposite ends with means for holding said assemblies in position and permanently fastening said plugs to said sleeves.

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