July 12, 1932. W. C. VOLK 1,867,197

APPARATUS FOR PROCESSING YARN

Filed June 15, 1929 3 Sheets-Sheet 1

Fig - 1.

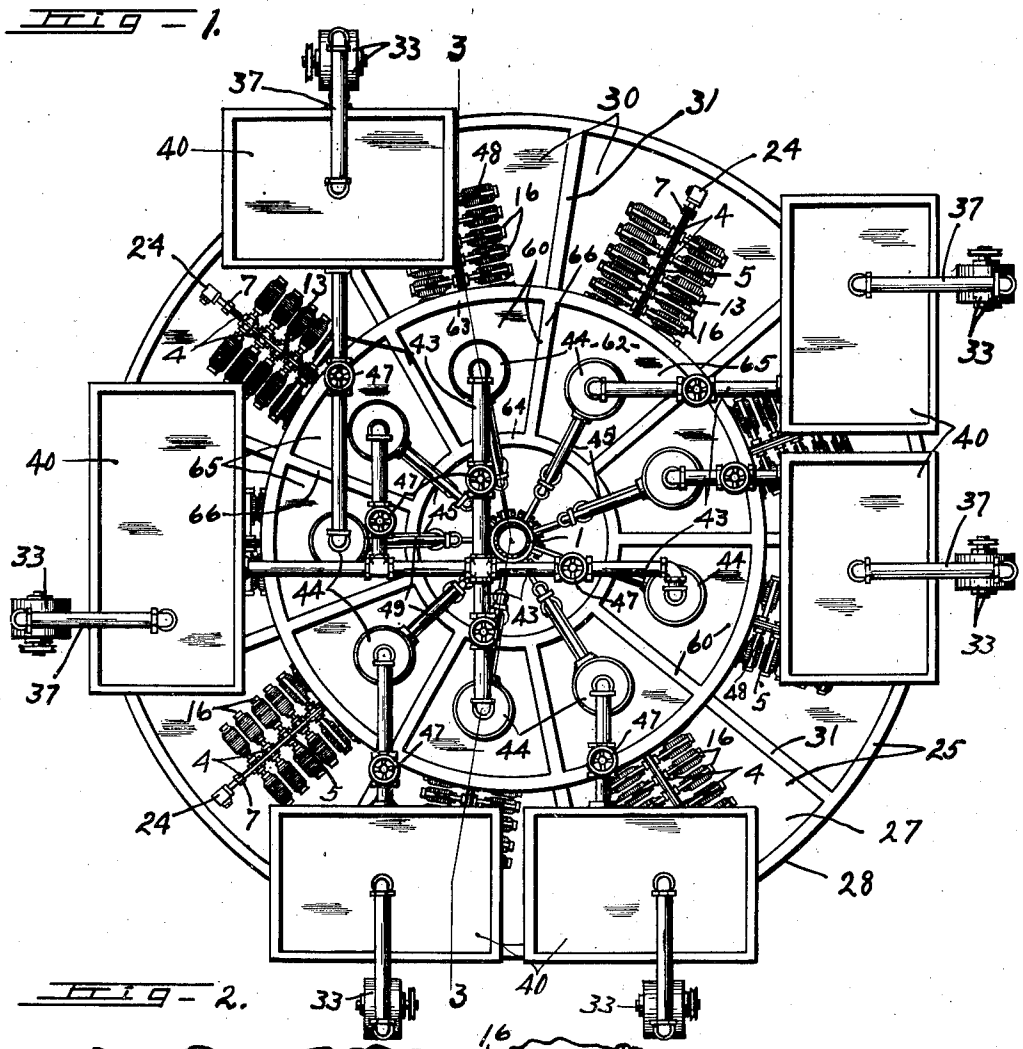
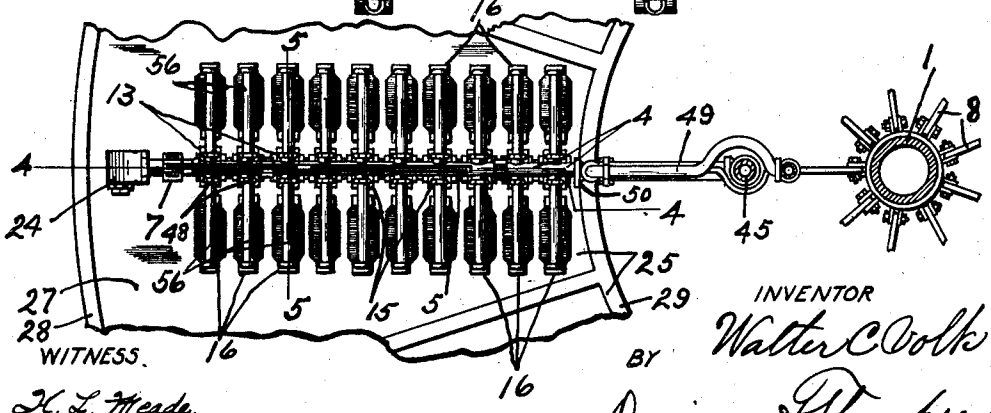


Fig - 2.



WITNESS.
H. L. Meade.

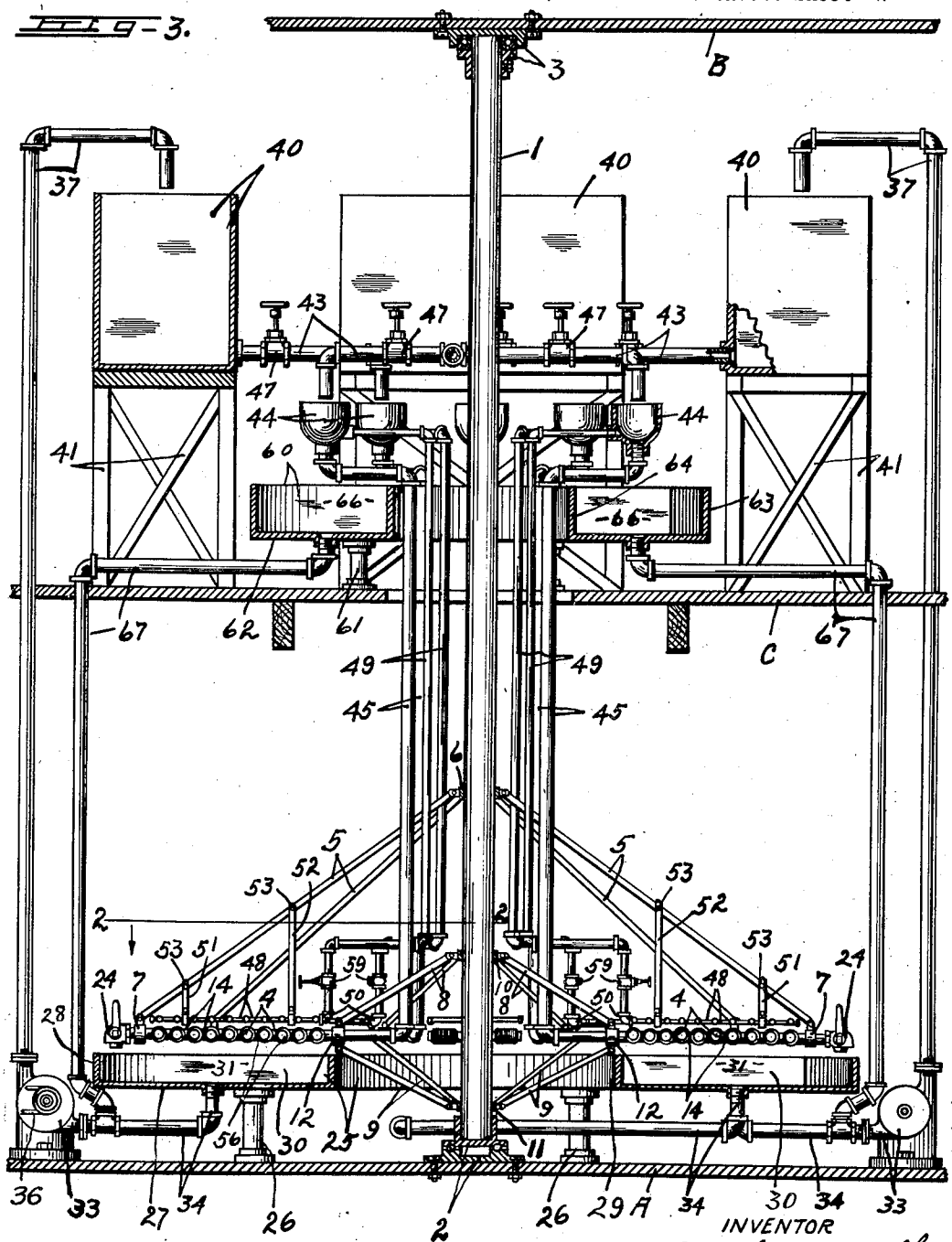
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Fig. 3.



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FIG. 4.

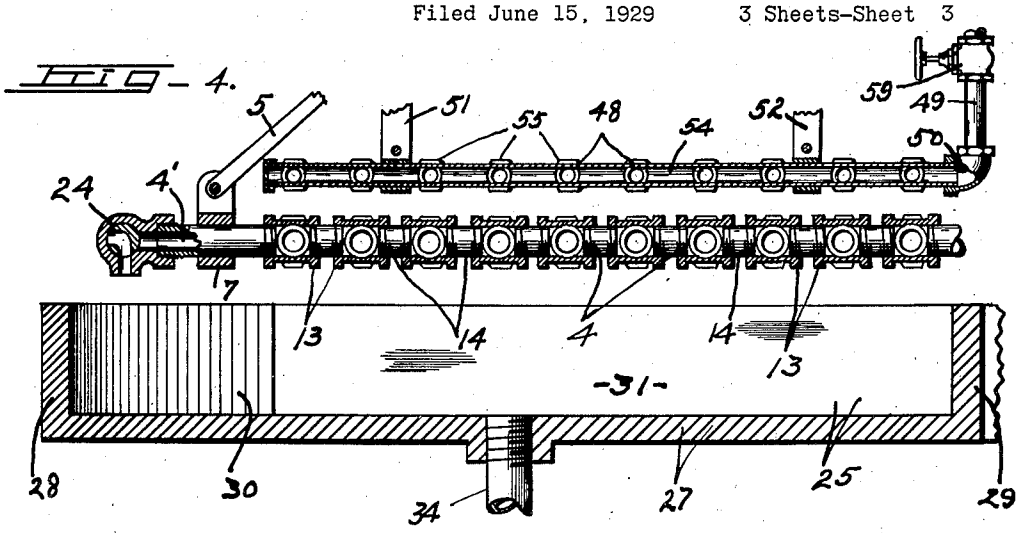
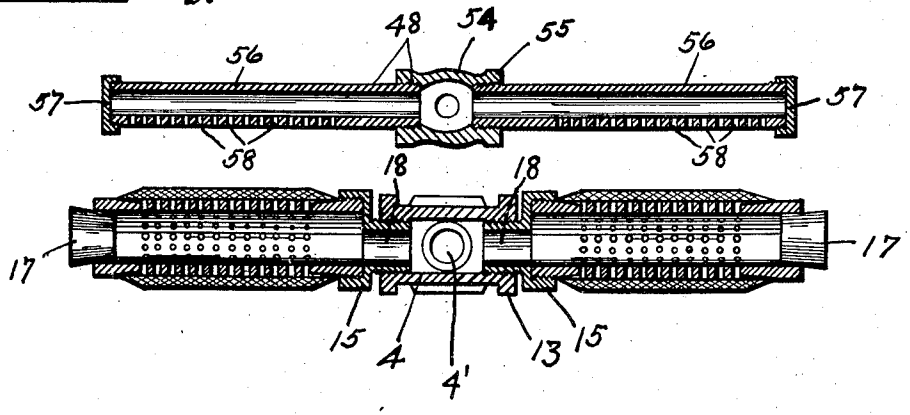


FIG. 5.



WITNESS

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Patented July 12, 1932 1,867,197

UNITED STATES PATENT OFFICE

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APPARATUS FOR PROCESSING YARN

Application filed June 15, 1929. Serial No. 371,280.

This invention relates to a new and improved mechanism to be used in the process of treating yarn or thread which may be made of such materials as silk, cotton, rayon, and so forth.

The main object of this invention is to construct a compact and easily operated mechanism adapted to support a large number of cones, spools or bobbins which have been previously wound with a desired quantity of yarn or thread, such as cotton, silk, or any other material which it may be desired to process, and to subject such yarn or thread to a series of processing treatments without it being necessary to remove the bobbins or spools with the yarn thereon from the machine until the processing of the yarn is completely or to the desired extent finished.

Another object is to reduce the handling of the yarn to a minimum, and eliminate the necessity of winding it into skeins preparatory to the processing treatment, thereby substantially eliminating de-grading and thereby producing a much more perfect yarn or thread.

Other objects and advantages relating to the details of construction will more fully appear from the following description taken in connection with the accompanying drawings, in which:

Figure 1 is a top plan view of a yarn processing mechanism embodying the various elements of this invention.

Figure 2 is an enlarged plan view of one of the bobbin-carrying units taken in the plane of line 2—2, Figure 3.

Figure 3 is an enlarged detail vertical section taken on the line 3—3, Figure 1.

Figure 4 is an enlarged detail longitudinal section of one of the bobbin carrier heads taken on line 4—4, Figure 2.

Figure 5 is a cross-section taken on line 5—5, Figure 2.

As illustrated in the drawings, the apparatus consists of a main vertically disposed supporting member —1— supported by and adapted to rotate on suitable rolling bearing members —2— and —3—, secured to the lower and upper ends respectively, of said supporting member. The bearing members —2— and —3— may be secured to and supported by any convenient means such as the floor A and ceiling B respectively of the room in which the apparatus is located. A plurality of, in this instance nine, bobbin carrying chambered head members —4— are provided and disposed in a horizontal plane a suitable distance above the lower end of the supporting arm —1—. Each of the head members —4— is supported by and adapted to rotate with the supporting arm —1—, by means of radial extending arms —5—, connected at their inner ends to a bracket —6—, secured to the supporting arm —1— and having their outer ends secured to a collar —7—, which is secured to the outer end of respective head members —4—. The inner ends of the head members —4— may be secured to the arm —1— by means of spaced radial arms or brackets —8— and —9— secured at their inner ends to brackets —10— and —11— respectively, which are secured in spaced relation, intermediate the bracket —6— and bearing member —2—, to the supporting arm —1—. The outer end of said brackets —8— and —9— may be secured to a collar —12— provided on the inner end of the head member —4—. The brackets —10— and —11— are positioned at substantially equal distances on either side of the horizontal plane of the head members —4—, thereby supporting the inner end of said head members against vertical movement, while the arms —5— and bracket —6— maintain the respective head members —4— in a norizontal plane.

The chambered head members —4— consist of, in this instance, a plurality of standard pipe cross members —13—, joined together longitudinally by suitable relatively short pieces of pipe or nipples —14— so as to make one continuous chamber —4'— through said head. The lateral openings of the cross members —13— have screw-threaded therein, a flanged member —15— adapted to have a bobbin —16— secured thereto in a liquid tight manner in any suitable way, as by screw-threading one end of the bobbin into the member —15—. The bobbin —16— may consist of a tubular member having its side walls perforated and adapted to have

thread or yarn wound on the surface thereof, over the perforated portion, so that any liquid supplied to the inner chamber of the bobbin may be forced through the perforations and the yarn wound thereon. The outer ends of the bobbin may be closed in any suitable manner as by a plug —17— pressed therein. The flanged member —15— is so constructed that the opening —18— therethrough will be, when the bobbin —16— is positioned on said member, in registration with the lower portion of the bobbin —16— so that when the supply of fluid is cut-off and the pressure released, the fluid will be free to flow out through the opening —18— and head —4—, to a drainage or return system which will be hereinafter more fully described. The outer end of each of the head members —4— may be opened or closed at will by means of a valve —24— screw-threaded thereon, and when opened will permit any fluid remaining in said head to flow freely therefrom and if desired be discharged into a receptacle or vat —25—, located in a horizontal plane beneath the head —4— and in proximity thereto. The vat —25— may be supported upon legs or brackets —26—, which in turn, are supported upon the floor A. The vats —25— may consist, as shown, of a circular plate or ring bottom —27— having concentric up-turned vertical peripheral walls —28— and —29—, the distance between said walls being greater than the length of the head members —4—, so that any fluid passing through the bobbins supported by the head will drain into the vat —25—. The vat —25— may be divided into liquid tight compartments —30—, one for each bobbin carrier head —4—, by radially extending vertically disposed partitions or walls —31— secured to or integral with the bottom —27— and side walls —28— and —29—.

Each of the compartments —30— of the vat —25— may be connected with its respective fluid pump —33—, by pipes as —34— which are connected at one end to said pump and at the other end to the bottom —27—, in communication with the respective compartment —30—. The pump —33— may be supported in any convenient manner as by the floor A and be driven by a belt —36— connected to a motor or other driving means, not shown. The pump is provided to draw the fluid from the respective vat compartment —30— through the pipe —34— and force said fluid through a vertically disposed pipe system —37— into respective supply tanks or vats —40—, disposed in a horizontal plane near the upper end of the supporting arm —1—. Each of the said vats may be supported upon a suitable frame —41— which, in turn, is supported by a horizontally disposed platform or floor as C, which is positioned intermediate the ends of said supporting arm.

The supply tanks or vats —40— may be arranged about the supporting arm —1— in any convenient manner and are each provided with an outlet pipe —43— which may be secured to said vats at or near the bottom thereof, and may extend to one or more fluid feed cups as —44—. The said cups —44—, may as shown, be of relatively small U or cup shaped construction, positioned in a horizontal plane below the supply vats —40—, one cup for each bobbin carrier head. Each of the cups is connected to the inner end of a corresponding bobbin carrier head —4—, by a pipe —45—, said pipes forming supports for the respective feed cups, and also causing them to rotate with the carrier heads —4— about the axis of supporting arm —1—. The amount of fluid supplied to each of the feed cups —44— may be controlled by a valve —47— provided in the outlet pipe —43—, one valve for each feed cup supplied by the pipe. Each of the feed cups —44— may also supply fluid to an auxiliary process head —48—, by means of a vertically disposed pipe system —49—, which in this instance has the upper end thereof screw-threaded into the side of the respective feed cup —44—, and the lower end thereof connected at —50— to the inner end of respective auxiliary head —48—.

The heads —48— are supported in a horizontal plane above the bobbin carrier heads —4— by vertically disposed brackets —51— and —52— which have their lower ends secured to the head member —48—, one near each of the ends thereof, and having their upper ends secured at —53— to the arm —5—. The auxiliary head member —48— may be constructed in any suitable manner, but for the purpose of illustration, I have shown a specially constructed tubular member —54— of substantially the same length as the carrier head —4—, and provided with radial horizontally disposed flanges —55—, extending from either side of the tubular member —54— in the vertical plane of the bobbin carrier flanged members —15—.

A pipe or tubular member as —56— has one end thereof screw-threaded into each of said flanges and extends outwardly therefrom a distance substantially equal to that of the bobbin —16— when in the operative position in the head —4—. The outer end of the pipes —56— may be closed by a cap —57— screw-threaded on the outer end thereof. A series of perforations —58— are provided in the lower side wall of the pipe —56— for a distance substantially equal to that portion of the bobbin which is covered by the thread or yarn wound thereon, so that when it is desired to do so the thread on the respective bobbin —16— may be subjected to an additional supply of processing fluid by opening a shut-off valve as —59—, provided in each of the supply pipes —49—.

When in operation, a fluid flowing from the supply tanks —40— through pipes —43— to the respective feed cups —44— is usually of greater quantity than that which will pass through the outlet pipes —45— and —49— and respective bobbins —16— or auxiliary head —48—, therefore, the excess fluid supplied to said feed cups will overflow and I have therefore provided a receptacle or vat as —60— to receive this overflow. The vat —60— is positioned in a horizontal plane below the feed cups and may be supported in said position by brackets as —61—, which in turn may be supported by the floor or platform C.

The vat —60— is constructed similarly to the vat —25— and consists of a circular or ring plate bottom —62— having upwardly turned vertical peripheral walls —63— and —64—. The vat —60— is divided into liquid tight compartments —65— by means of radial extending vertically disposed partitions or walls —66— which divide the vat —60— into as many chambers as there are feed cups —44—. Drain pipes as —67— are connected to the bottom —62—, one in registration with each of the compartments —65—, and are connected at their lower ends to drain pipes —34— leading from the co-operating compartments —30— of the vat —25—.

In the processing of thread or yarn such as rayon, it is necessary that the yarn be brought into contact with and be acted upon by a number of different fluids; as, for instance, the thread or yarn may first be washed by water, after which it may be treated by a desulphurizing agent such as, for instance, sodium sulphide, and then it may again be washed by water; after that it may be treated with a bleaching agent as, for instance, a solution treated with chlorine, and so on until the yarn or thread has been processed to the desired degree.

I have, therefore, illustrated a number of supply vats —40—, one of which may contain water and have the outlet pipe —43— lead to one, two, or more of the feed cups —44—, depending upon the desired amount and frequency of the treatment of the thread by water. Another of the supply vats may contain the desulphurizing agent, while another one may be used to contain the bleaching agent, and the remaining vats may be each used to contain other desired processing fluids.

It is now evident, that with one of the carrier heads —4— loaded with bobbins which have yarn or thread wound thereon and with the feed cup —44— connected therewith, in registration with one of the outlet pipes —43—, that the fluid contained in the particular supply vat —40— to which said outlet pipe is connected will flow when the valve —47— is opened into said feed cup and from there through the respective pipes —45— into the chamber —4'— of the head —4— and then flow through the ports —18— to the interior of the respective bobbins —16—, where the fluid will be forced under pressure created by fluid in the pipes —45— through the perforations and the yarn or thread wound on said bobbins, it being understood that the valve —24— of said head —4— is in the closed position.

This processing may continue until the yarn is thoroughly treated by the fluid under consideration, whereupon the supply of fluid may be cut-off by closing the respective valve —47— or by rotating the chambered heads 4 together with the feed-cups 44 connected therewith sufficiently to bring said feed cups out of registration with the outlet pipes 43 and then by opening the valve —24—, the fluid remaining in the feed cup —44—, pipe —45—, chamber —4'—, and the interior of the bobbins —16— will be permitted to flow freely into the vat —25— and return by the action of the respective pump —33— to the supply vat —40—, or if it is desired to do so, as when water is being used, the drain pipe —34— may be connected to a drainage system not shown, whereupon the fluid in supply vat —40— may be replenished from any suitable source as a water system so that a fresh supply of water will be always available for cleansing purposes.

After the supply of fluid has been cut-off and the drainage valve —24— opened, the respective head —4— may remain in its present position until the thread or yarn carried by the bobbins has drained to the desired degree, during which time the next succeeding bobbin carrier head may be loaded with thread wound bobbins, after which all the mechanism mounted upon and supported by the supporting arm —1— which includes the bobbin carrier heads —4—, auxiliary heads —48—, pipes —45— and —49—, and the feed cups —44—, may be rotated about the axis of the supporting arm —1— to bring each of the feed cups —44— into registration with the next succeeding outlet pipe —43—. The valves —24— for the respective loaded carrier heads may now be closed and by opening the valves —47—, if said valves have been closed, positioned in the outlet pipes —43—leading to the respective feed cups in communication with said loaded carrier heads, the thread carried by the bobbins secured to said loaded heads will be treated by the fluid contained in the respective supply tanks —40—.

These series of processing treatments may continue until the first carrier head —4— to be loaded has completed the cycle that is, made one revolution about the axis of the supporting arm —1—, whereupon the yarn or thread carried thereby will have been processed to the desired degree and the bobbins

with the thread thereon may then be removed and replaced by bobbins having unprocessed thread wound thereon, to be subjected to the different processing treatments.

As hereinbefore stated, any of the auxiliary heads —48— may be used to supply an additional amount of the processing fluid to the thread or yarn carried by the bobbins mounted on the respective carrier head —4— by opening the respective valve —59— positioned in the pipe —49—, and of course this additional supply of fluid may be discontinued at any time it is desired to do so by closing said valve.

It is also evident that if it is desirable to omit one or more of the process treatments as, for instance, the washing of the yarn by water at one of the stations supplied from the tank —40— having the outlet pipe —43— thereof leading to a plurality of feed cups —44—, it is only necessary to discontinue the supply of the liquid to the feed cup supplying that particular station by closing the valve —47— positioned in the feed pipe leading to said cup, whereupon the remainder of the processing treatments may continue without interruption.

Although I have shown and particularly described the preferred embodiment of my invention, I do not wish to be limited to the exact construction shown, as various changes may readily be made without departing from the spirit of this invention, as set forth in the appended claims.

I claim:

1. A yarn processing apparatus comprising a rotatable supporting means, a chambered head secured to the supporting means having an inlet and a plurality of outlets, a plurality of removable members having perforated walls secured in a liquid-tight manner to the head, each one of said members registered with an outlet from the head, means connected with the head for draining said head, feeding means connected with the head adapted to supply fluid through the head to the interiors of said members, and fluid-supplying means adapted at a predetermined position to supply fluid to the feeding means.

2. A yarn processing apparatus comprising a rotatable supporting means, a chambered head secured to the supporting means having an inlet and a plurality of outlets, a plurality of removable tubular members having perforated walls secured in a liquid-tight manner to the head, each one of said members registered with an outlet from the head, a drainage outlet from said head, a valve for controlling said drainage outlet, fluid-supplying means adapted to supply fluid through the head to the interior of said tubular members, and means for returning the drainage to said supply means.

3. A yarn processing apparatus comprising a rotatable supporting means, a chambered head secured to the supporting means having an inlet and a plurality of outlets, a plurality of removable tubular members having perforated walls secured to the head, each one of the said members registered with an outlet from the head, fluid supplying means adapted to supply fluid through the head to the interior of the tubular members and an auxiliary means connected with the fluid supply means adapted to supplying fluid to the outside of said tubular members.

4. A yarn processing apparatus comprising a rotatable supporting means, a chambered head secured to the supporting means having an inlet and a plurality of outlets, a plurality of removable tubular members having perforated walls secured to the head, each one of said members registered with an outlet from the head, feeding means connected with the head for supplying fluid through the head to the interior of the tubular members, fluid supplying means adapted in a predetermined position to supply fluid to said feeding means and an auxiliary means connected with the feeding means adapted to supplying fluid to the outside of said tubular members.

5. A yarn processing apparatus comprising a movable supporting means, a chambered head secured to the supporting means, a perforated bobbin adapted to carry yarn secured to said head, a conduit connected to the head for supplying fluid thereto, and a plurality of fluid-supply tanks each having an outlet for fluid unconnected to but adapted to be disposed above the conduit for supplying fluid to the head at different predetermined positions of the supporting means.

6. A yarn processing apparatus comprising a rotatable supporting means, a chambered head secured to the supporting means, a perforated bobbin adapted to carry yarn secured to said head, a conduit connected to the head for supplying fluid thereto, and a plurality of fluid-supply tanks each having an outlet for fluid unconnected to but adapted to be disposed above the conduit for supplying fluid to the head at different predetermined rotated positions of the supporting means.

7. A yarn processing apparatus comprising a rotatable supporting means, a chambered head secured to the supporting means, a perforated bobbin adapted to carry yarn secured to said head, a conduit connected to the head for supplying fluid thereto, a plurality of fluid-supply tanks each having an outlet for fluid unconnected to but adapted to be disposed above the conduit for supplying fluid to the head at different predetermined rotated portions of the supporting means, and additional means below said outlets for collecting fluid when a conduit is not positioned below the outlet.

8. Apparatus for treatment of yarn with

a plurality of processing fluids comprising, in combination, a rotatable vertical shaft; a plurality of hollow, chambered, fluid-distributing manifolds mounted on said shaft and rigidly secured thereto for rotation therewith, and each provided with a fluid inlet orifice and a plurality of fluid discharge orifices; a hollow perforated yarn-support adapted for the support of artificial silk yarn, associated with each of said fluid discharge orifices and communicating therethrough with the interior of the fluid distributing manifold with which it is associated; a vertical fluid conduit associated with, and extending upwardly above, each of said fluid distributing manifolds and communicating with the interior chamber thereof through said fluid inlet orifice therein, said vertical fluid conduits being secured to said vertical rotatable shaft for rotation therewith; a plurality of fixed fluid supply reservoirs; and means whereby processing fluid can be discharged from said reservoirs into said vertical fluid conduits when the latter are brought into operative association with said reservoirs by rotation of said vertical shaft and its associated apparatus, whereby fluid discharged from said reservoirs into said vertical fluid conduits is distributed by said fluid distributing manifolds into the said hollow perforated yarn supports, and forced outwardly through the yarn supported thereby to act thereon, the pressure of the fluid thus forced through the yarn being determined only by the static head of fluid pressure produced by the processing fluid contained in said vertical fluid conduits.

9. Apparatus for treatment of yarn with a plurality of processing fluids comprising, in combination, a rotatable vertical shaft; a plurality of hollow, chambered, fluid-distributing manifolds mounted on said shaft and rigidly secured thereto for rotation therewith, and each provided with a fluid inlet orifice and a plurality of fluid discharge orifices; a hollow perforated bobbin adapted for the the support of artificial silk yarn, associated with each of said fluid discharge orifices and communicating therethrough with the interior of the fluid distributing manifold with which it is associated; a vertical fluid conduit associated with, and extending upwardly above, each of said fluid distributing manifolds and communicating with the interior chamber thereof through said fluid inlet orifice therein, said vertical fluid conduits being secured to said vertical rotatable shaft for rotation therewith; a plurality of fixed fluid supply reservoirs; and means whereby processing fluid can be discharged from said reservoirs into said vertical fluid conduits when the latter are brought into operative association with said reservoirs by rotation of said vertical shaft and its associated apparatus, whereby fluid discharged from said reservoirs into said vertical fluid conduits is distributed by said fluid distributing manifolds into said bobbins, and forced outwardly through the yarn supported thereby to act thereon, the pressure of the fluid thus forced through the yarn being determined only by the static head of fluid pressure produced by the processing fluid contained in said vertical fluid conduits.

10. Apparatus for treatment of yarn with a plurality of processing fluids comprising, in combination, a rotatable vertical shaft; a plurality of hollow, chambered, fluid-distributing manifolds mounted on said shaft and rigidly secured thereto for rotation therewith, and each provided with a fluid inlet orifice and a plurality of fluid discharge orifices; a hollow perforated yarn-support adapted for the support of artificial silk yarn, associated with each of said fluid discharge orifices and communicating therethrough with the interior of the fluid distributing manifold with which it is associated; a vertical fluid conduit associated with, and extending upwardly above, each of said fluid distributing manifolds and communicating with the interior chamber thereof through said fluid inlet orifice therein, said vertical fluid conduits being secured to said vertical rotatable shaft for rotation therewith; a plurality of fixed fluid supply reservoirs; means whereby processing fluid can be discharged from said reservoirs into said vertical fluid conduits when the latter are brought into operative association with said reservoirs by rotation of said vertical shaft and its associated apparatus, whereby fluid discharged from said reservoirs into said vertical fluid conduits is distributed by said fluid distributing manifolds into said perforated yarn supports, and forced outwardly through the yarn supported thereby to act thereon, the pressure of the fluid thus applied to the yarn being determined only by the static head of fluid pressure produced by the processing fluid contained in said vertical fluid conduits; and auxiliary means for applying processing fluid to the exterior of the yarn on said supports.

11. Apparatus for treatment of yarn with a plurality of processing fluids comprising, in combination, a rotatable vertical shaft; a plurality of hollow, chambered, fluid-distributing manifolds mounted on said shaft and rigidly secured thereto for rotation therewith, and each provided with a fluid inlet orifice and a plurality of fluid discharge orifices; a hollow perforated yarn-support adapted for the support of artificial silk yarn, associated with each of said fluid discharge orifices and communicating therethrough with the interior of said fluid distributing manifold; a vertical fluid conduit associated with, and extending upwardly above, each of said fluid distributing manifolds and communicating with the interior

chamber thereof through said fluid inlet orifice therein, said vertical fluid conduits being secured to said vertical rotatable shaft for rotation therewith; a plurality of fixed fluid supply reservoirs; means whereby processing fluid can be discharged from said reservoirs into said vertical fluid conduits when the latter are brought into operative association with said reservoirs by rotation of said vertical shaft and its associated apparatus, whereby fluid discharged from said reservoirs into said vertical fluid conduits is distributed by said fluid distributing manifolds and discharged through the perforations of said yarn support, to act upon the yarn supported thereby, the pressure of the fluid thus applied to the yarn being determined only by the static head of fluid pressure produced by the processing fluid contained in said fluid conduits; and means for entrapping excess processing fluid overflowing from the tops of said vertical fluid conduits when discharged from said reservoirs, and returning the same to the proper reservoir.

12. An apparatus for treatment of artificial silk yarn including a rotatable assembly and fixed elements, said rotatable assembly including a vertical central shaft, a plurality of liquid distributing manifolds, yarn supporting means associated with said distributing manifolds, liquid supply conduits above said distributing manifolds, and liquid entrapping means associated with the upper ends of said supply conduits for entrapping liquid supplied thereto and feeding it to said conduits while permitting excess liquid to overflow, whereby the pressure of the liquid supplied to the yarn is substantially constant, and is determined solely by the head of pressure due to the height of liquid in said supply conduits above said distributing manifolds; and said fixed elements including liquid supply reservoirs arranged to supply liquids to said entrapping means.

13. An apparatus for treatment of artificial silk yarn including a rotatable assembly and fixed elements, said rotatable assembly including a vertical central shaft, a plurality of liquid distributing manifolds, yarn supporting means associated with said distributing manifolds, liquid supply conduits above said distributing manifolds, and liquid entrapping means associated with the upper ends of said supply conduits for entrapping liquid supplied thereto and feeding it to said conduits while permitting excess liquid to overflow, whereby the pressure of the liquid supplied to the yarn in substantially constant, and is determined solely by the head of pressure due to the height of liquid in said supply conduits above said distributing manifolds; and said fixed elements including liquid supply reservoirs arranged to supply liquids to said entrapping means, means for catching excess liquid overflowing from said entrapping means and returning it to said reservoirs, means for catching treating liquid which has passed through the yarn and recirculating it to said reservoirs, and auxiliary means for applying treating liquid to the yarn.

In witness whereof I have hereunto set my hand this 6th day of June 1929.

WALTER C. VOLK.