April 29, 1930. L. A. PALEY 1,756,435

METHOD OF AND APPARATUS FOR PREPARING RAYON

Filed June 15, 1925 4 Sheets-Sheet 1

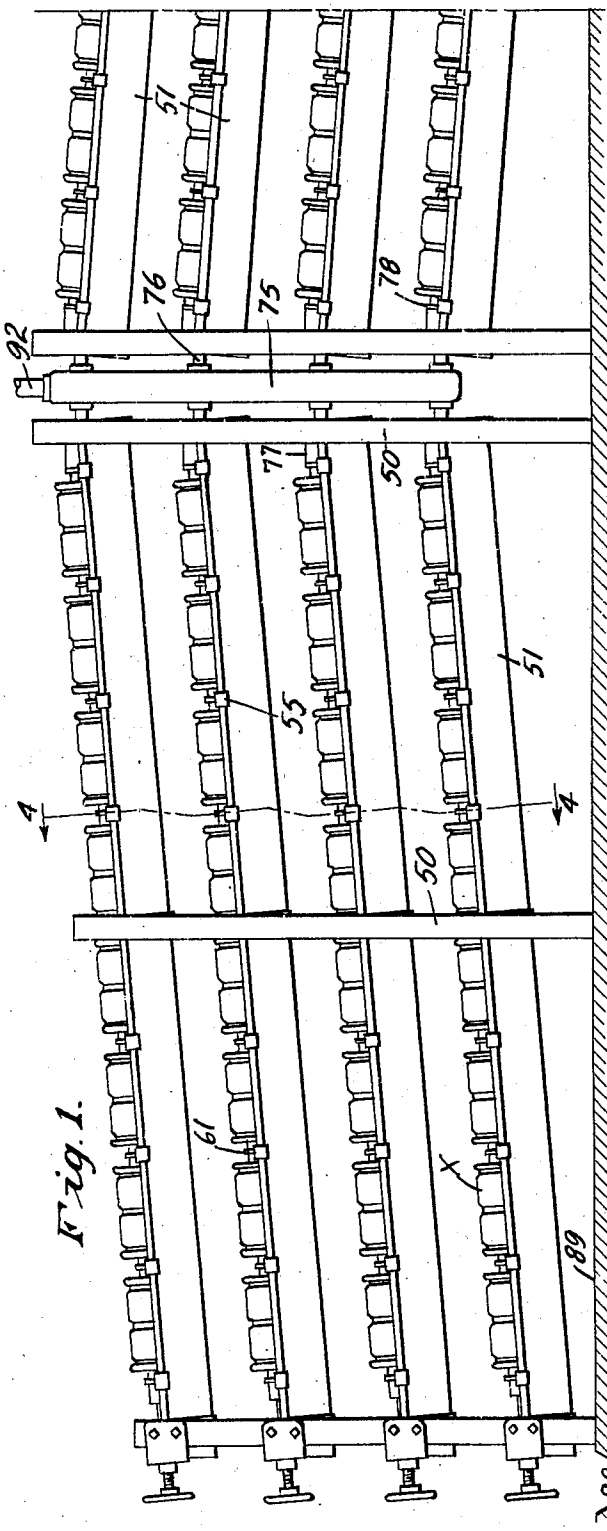


Fig. 1.

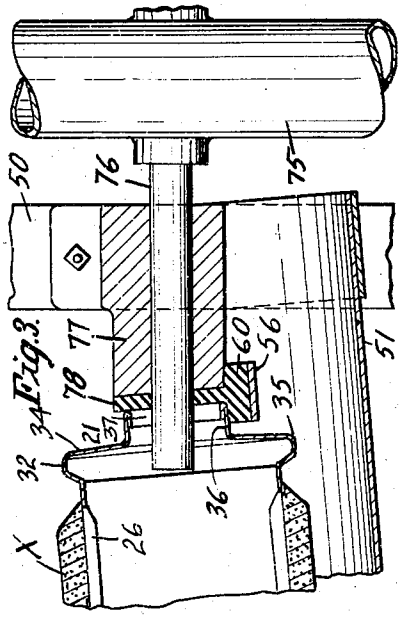


Fig. 3.

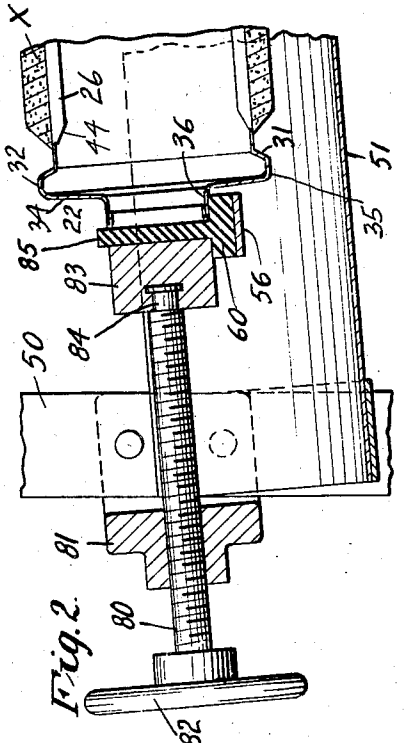


Fig. 2.

INVENTOR
LEWIS A. PALEY
by Parker & Prochnow.
ATT'YS.

April 29, 1930. L. A. PALEY 1,756,435

METHOD OF AND APPARATUS FOR PREPARING RAYON

Filed June 15, 1925 4 Sheets-Sheet 2

Fig. 4.

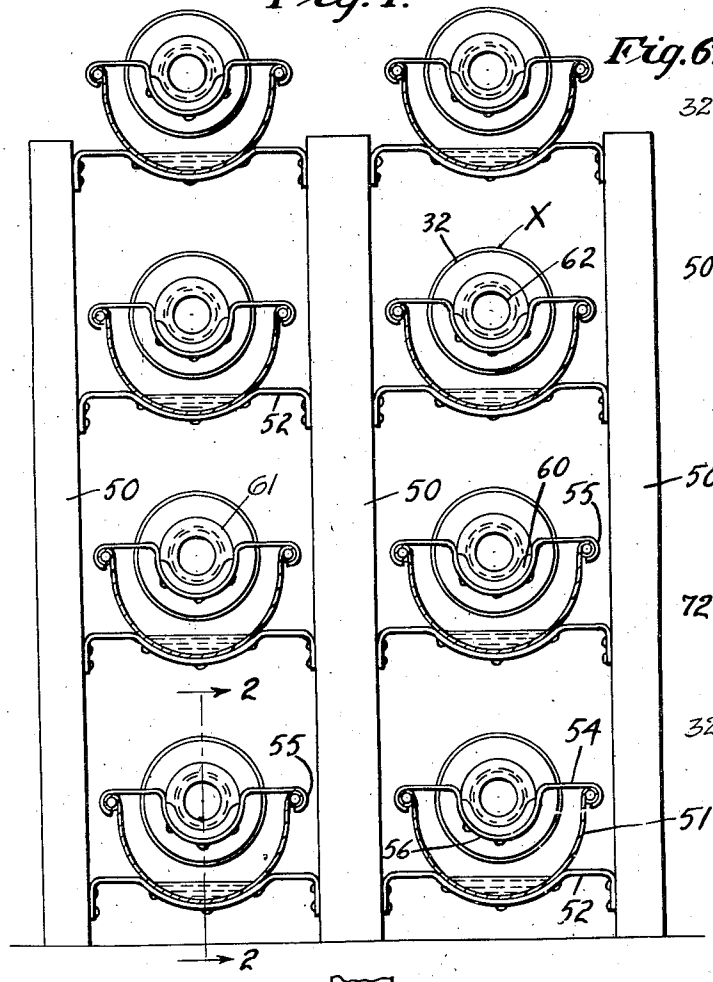


Fig. 6.

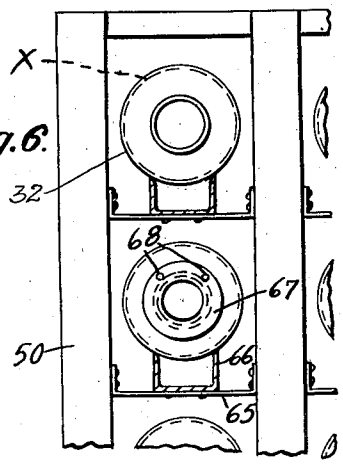


Fig. 7.

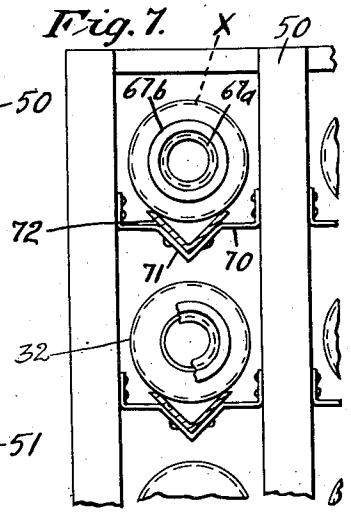


Fig. 5.

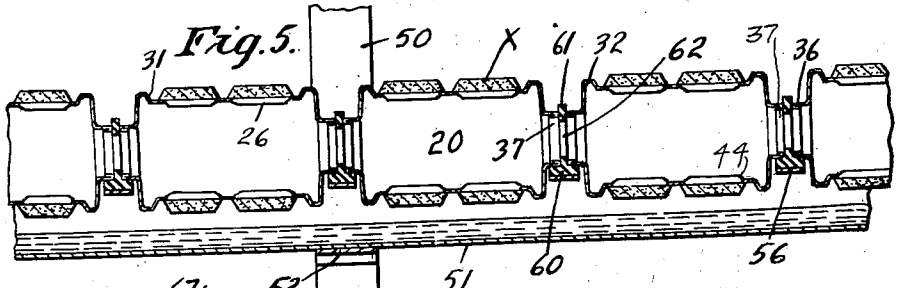
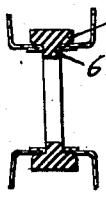


Fig. 16.



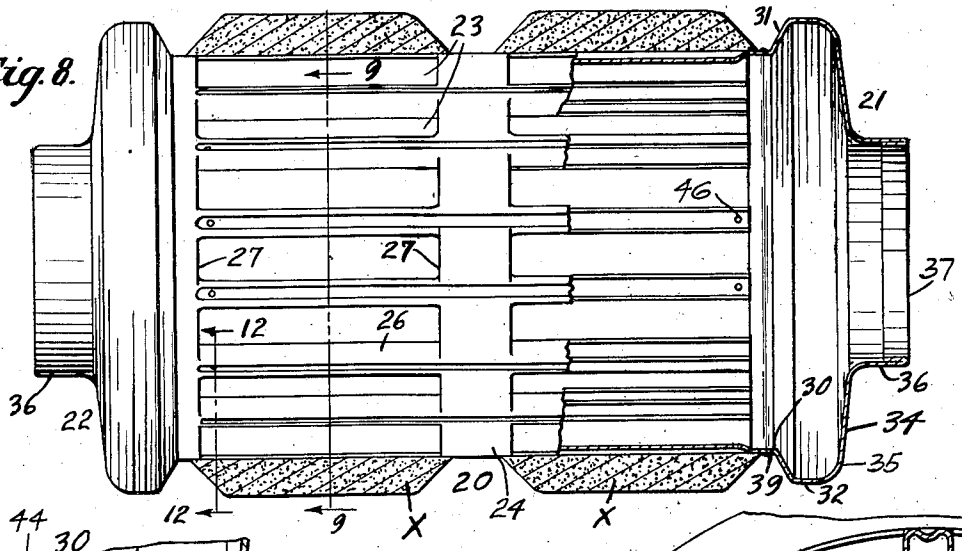
INVENTOR
LEWIS A. PALEY
By Parker & Prochnow
ATT'YS.

April 29, 1930. L. A. PALEY 1,756,435

METHOD OF AND APPARATUS FOR PREPARING RAYON

Filed June 15, 1925 4 Sheets-Sheet 3

Fig. 8.



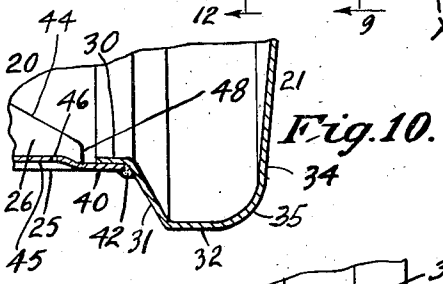


Fig. 10.

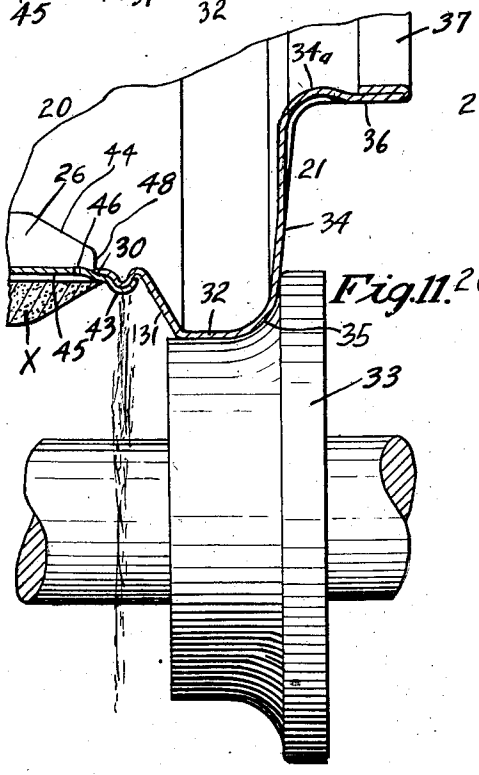


Fig. 11.

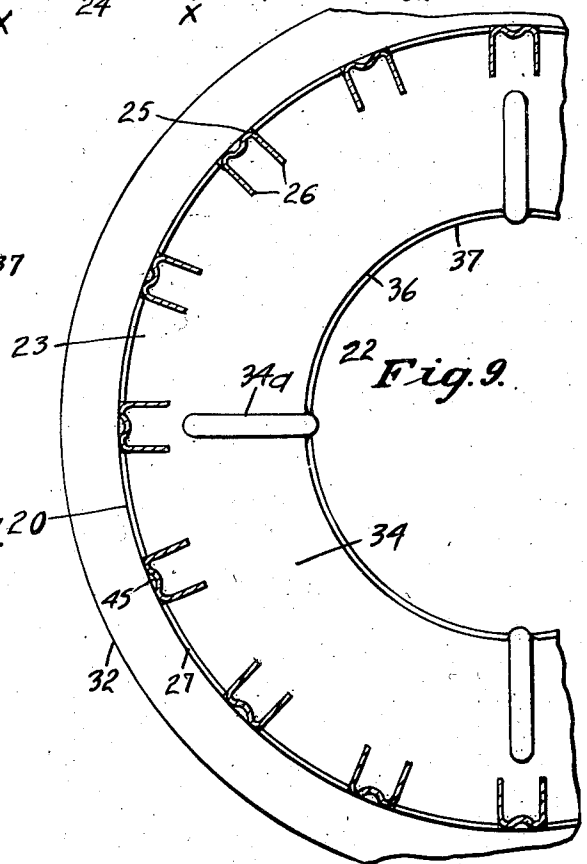


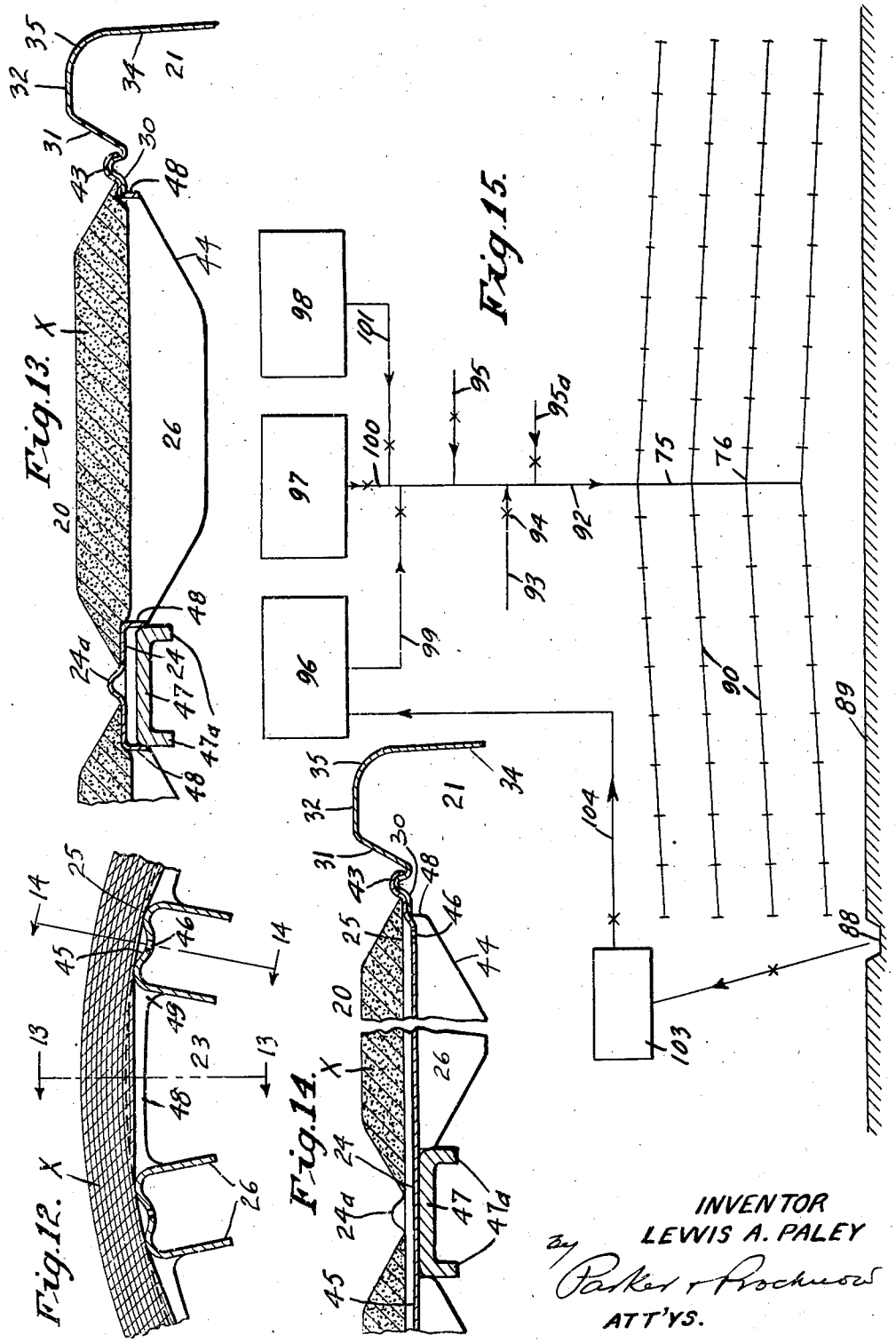
Fig. 9.

INVENTOR
LEWIS A. PALEY
by Parker & Prochnow.
ATT'YS

April 29, 1930. L. A. PALEY 1,756,435

METHOD OF AND APPARATUS FOR PREPARING RAYON

Filed June 15, 1925 4 Sheets-Sheet 4



Patented Apr. 29, 1930 1,756,435

UNITED STATES PATENT OFFICE

LEWIS A. PALEY, OF GRAND ISLAND, NEW YORK, ASSIGNOR TO DU PONT RAYON COMPANY, INC., A CORPORATION OF DELAWARE

METHOD OF AND APPARATUS FOR PREPARING RAYON

Application filed June 15, 1925. Serial No. 37,402.

This invention relates to methods of and apparatus for treating and washing rayon or artificial silk while the same is wound on spinning drums.

The objects of this invention are to provide a method of treating rayon to remove therefrom certain chemicals which are detrimental to the silk, which method serves to greatly reduce the length of time heretofore required for effecting the washing and treating of rayon and also improving its uniformity and quality; also to provide an apparatus for use in connection with the washing and treating of rayon wound on drums, whereby a material reduction in the amount of time heretofore required for washing is effected; also to provide an apparatus of this kind in which a plurality of hollow drums can be arranged end for end with watertight connections between adjacent drums, and in which the fluid with which the silk is treated can be introduced into the interior of the drums; also to provide an apparatus of this kind in which the rows of drums extend outwardly from a central liquid supply source; also to arrange the rows of drums in the apparatus in such a manner as to counteract the effect of static pressure, so that all of the drums in the apparatus will be acted upon by substantially the same liquid pressure; also to provide spinning drums forming removable parts of said apparatus, which drums are of improved construction, and which are made of sheet metal which may, if desired, be partly or entirely coated in such manner as to enable the metal to resist the action of acids and other chemicals to which the drums are subjected in use; also to provide drums of this kind having elongated slots in their cylindrical surfaces and in which the metal, cut from the cylindrical surfaces to form the slot, reinforces the portions of the drums between the slots, thus decreasing the amount of metal which would otherwise be necessary to give the drums the desired strength; also to provide drums in which the portions of the cylindrical surface which support the rayon are provided with grooves or channels through which water or other fluid may pass to act on portions of the rayon which would otherwise be in contact with the cylindrical drum surface; also to provide drums of this kind with means for preventing the spreading of a layer of rayon wound on the drum, which spreading causes breaking of the rayon threads when the same is unwound from the drum; also to improve process and apparatus for use in treatment of rayon in other respects hereinafter specified.

In the accompanying drawings:

Fig. 1 is an elevation of an apparatus or rack for use in connection with the carrying out of my improved process.

Figs. 2 and 3 are fragmentary sectional views on an enlarged scale on line 2—2, Fig. 4, at opposite ends of a row of drums on the treating rack.

Fig. 4 is a transverse sectional elevation thereof on line 4—4, Fig. 1.

Fig. 5 is a fragmentary, longitudinal, sectional elevation thereof on line 2—2, Fig. 4.

Figs. 6 and 7 are fragmentary end views similar to Fig. 4, showing two slightly modified forms of the apparatus.

Fig. 8 is a view partly in section of one of the removable drums of the apparatus showing layers of rayon wound thereon.

Fig. 9 is a fragmentary transverse sectional elevation thereof on line 9—9, Fig. 8, the layers of rayon being omitted.

Fig. 10 is a fragmentary section of a drum showing a seam of slightly different construction.

Fig. 11 is a fragmentary, longitudinal section of a drum having another modified form of seam, and showing the drum cooperating with a driving roll therefor.

Fig. 12 is a fragmentary transverse sectional view on an enlarged scale on line 12—12, Fig. 8.

Figs. 13 and 14 are sectional views thereof on lines 13—13 and 14—14 respectively, Fig. 12.

Fig. 15 is a diagrammatic view showing a system of piping connections with the washing and treating apparatus.

Fig. 16 is a sectional view of a modified form of drum gasket.

In the manufacture of rayon, as heretofore

generally carried on, the rayon, upon leaving the coagulating bath, is wound on glass drums having a smooth imperforate cylindrical surface, and after the desired amount of rayon has been wound on a drum, the drum is placed on a washing rack in which warm water trickles on the rayon on the drum, and after a period of washing requiring approximately a day, the drums are carried to a drying room, where the moisture is driven off from the rayon, after which the rayon is unwound on spools or bobbins.

In accordance with my invention, the rayon, after passing through the coagulating bath, is wound upon metal drums having a large number of openings or slits in the cylindrical portions thereof, and in the washing of the rayon, the washing water or other fluid is admitted to the interior of the drums and passed outwardly through the slits therein. Consequently my invention involves the use of drums of improved construction, which are preferably made of relatively thin sheet metal, either iron or aluminum having been found most satisfactory. The drums embodying my invention are preferably constructed as follows:—

Each of the drums includes a cylindrical or body portion 20 and two end portions or heads 21 and 22 which are preferably formed separately of the body portion and secured thereto in any suitable manner. The cylindrical body portion 20 is formed of a flat sheet of metal, and is provided with a plurality of longitudinally extending slots or openings 23, two annular series of slots being shown in the drums illustrated, although it will be understood that one or more series may be employed, which are separated by an imperforate annular section 24. The slots also preferably terminate short of the ends of the cylindrical body portion, so that imperforate end portions are available for securing the heads 21 and 22 to the body portion.

The slots or openings 23 are formed by slitting the metal lengthwise of the body portion and crosswise at the ends of the slots, and the metal at opposite sides of the lengthwise slits is then bent inwardly, so that a plurality of grids or ribs are formed between the slots 23, each of these grids having a portion 25 which forms substantially a part of the cylindrical surface of the drum and inwardly extending flanges 26 which reinforce the grids or ribs, thus resisting the crushing action of the rayon as it shrinks on drying. The slots preferably terminate in end walls 27, which extend substantially at right angles to the length of the slots so that the slots are substantially rectangular in shape.

The two heads 21 and 22 of the drums may be identical, as shown, and each header includes a substantially cylindrical portion 30, which is adapted to be secured to the cylindrical body portion 20 of the drum. Adjacent to the cylindrical portion 30 is an outwardly extending part 31, which terminates in a substantially cylindrical supporting portion or driving face 32, which is adapted to support the drum on any surface or object, for example, on a set of driving rolls 33, one of which is illustrated in Fig. 11. These driving rolls have a substantially cylindrical surface, adapted to cooperate with the cylindrical surface 32 of a header, and form an extended bearing surface through the medium of which the drum is rotated, for example, for winding the rayon on the drum. The cylindrical surface 32 terminates in a radially extending, and preferably slightly inclined section 34, a rounded portion 35 being preferably interposed between the cylindrical part 32 and the radially extending section 34. The inner portion of the radially extending section 34 terminates in an outwardly extending, substantially cylindrical, flange or hub 36, the outer edge of which may be folded over as indicated at 37 to form a smooth edge to facilitate the handling of the drums and avoid injury to operatives. A plurality of beads 34^a may be formed in the section 34, as shown in Figs. 9 and 11, these beads extending into the hub 36 to the folds 37 so as to stiffen these sections 34 and prevent the bruising of the heads from such causes as dropping the drum.

The cylindrical body portion may be secured to the headers in any suitable and desired manner. In Fig. 8 these two parts are shown as butt-welded, as indicated at 39. In Fig. 10 a lap joint 40 is shown, and a welded joint 42 secures the parts together and also fills the space between the edge of the cylindrical body portion and the header, so as to leave a substantially smooth joint on the outer face of the drum.

The preferred form of joint is illustrated in Figs. 11, 13 and 14, in which the two adjacent parts of the body portion and header are first telescoped to overlap substantially as shown in Fig. 10 and an annular groove or bead 43 is then rolled outwardly or otherwise formed at the joint, which serves to securely hold the parts together and to stiffen the drum structure. This bead also prevents the cakes from spreading under fluid pressure as will be hereinafter described. This annular end bead 43 serves another important function, viz., to throw off the drip acid from the rayon without wetting the rubber drive rolls 33. This greatly increases the friction between the drum and the dry drive roll and prevents deterioration of the drive roll due to the acid.

As has been stated, the drums are made of sheet metal having a high resistance to the chemical action of the chemicals in which the drum is subjected when in use, or a combination of metals for the several parts of the

drum, sheet aluminum having been found very satisfactory, and sheet iron, coated with nickel or other protective coating, having also been found to serve this purpose. It will be understood, of course, that other metals may be employed if desired. In order to further enable these drums to resist the action of chemicals, the drums are preferably coated with a suitable resisting composition, such as a lacquer or enamel of the desired composition, which may, for example, be applied to the drums by dipping. It has also been found advantageous to use steel as a material for the drums, this steel being provided with a suitable rust proof coating such as iron phosphate prepared by the Parkerizing or other process and then provided with a coating of baked enamel over the iron phosphate coating. Consequently by forming the radially extending parts 34 of the headers at a slight inclination or at an angle to a perpendicular to the axis of a drum, the composition in which the drums are dipped will drain freely from the interior thereof when the drum is supported vertically.

In the use of these drums, the rayon is wound thereon in cakes or layers X, these layers being arranged to cover the slots 23 in the drums, and to be supported by the outer faces 25 of the ribs or grids. Since the remaining portions of the drums are imperforate, the washing or otherwise treating of the rayon on the drums can be readily effected by means of water or other fluid introduced under pressure into the interior of the drums and passing outwardly through the slots 23 to the rayon on the drums. As this fluid pressure acting on the layers of rayon has a tendency to cause the cake to spread, the ends 27 of the slots 23 have been made to extend substantially perpendicularly to the length of the slots, so that the rayon wound on the drums will engage with the end walls 27, as is clearly shown in Figs. 12 and 13, thus resisting the spreading of rayon on the drums. If this spreading of the cake under fluid pressure is not prevented, overlapping threads will be produced and cause excessive breaking of the thread when unwinding the rayon from the end of the drum.

In the washing or chemical treatment of rayon wound on drums, difficulty has been experienced in the past in obtaining a uniform washing or treating of the rayon since those portions of the rayon which are in contact with the drums are not subjected to the washing or treating fluids to the same extent as those portions with which the fluid can readily contact. In attempting to eliminate this difficulty I perforated the portions of the drums with which the rayon contacts. This was found objectionable for the reason that the rayon tightly wound over the supporting sections of the drum resists the flow of fluid through the same to such an extent that no flow of fluid takes place through the rayon unless the fluid pressure inside the drum is excessively high, also because these openings weaken the structure of the drums. I have found that this problem can be solved by providing inwardly extending grooves 45 in the outer faces 25 of the ribs or grids, these grooves extending preferably throughout the length of these grids and across the imperforate annular portion 24, and by providing holes or flow passages 46 in portions of these grooves, for example, in the outer ends thereof so that streams of water flow through the grooves 46 lengthwise of the depressions 45 in the grids toward the annular imperforate portion of the drums, where the water will be discharged between the two cakes of rayon. The holes or flow passages 46 are of such a size as to supply the desired amount of fluid to the grooves 45. Thus the area of tightly wound rayon above the supporting grids of the drum is washed by contact with a rapid stream of water flowing through the grooves 45. By means of this arrangement a very uniform washing or treating of the rayon is made possible and the grooves furthermore have the advantage of strengthening the ribs or grids.

An outwardly extending bead 24^a may be formed in the annular section 24 between each pair of adjacent grooves 45. These beads serve to prevent the two cakes spreading together thus serving to keep the groove passages between the cakes open for the discharge of water and also prevent overlapping threads due to spreading cakes. The beads 24^a also strengthen and stiffen the annular section 24.

Since the cake or layer X of rayon is drawn fairly tightly upon the drums and exerts a crushing effect or strain on the drums, especially as it shrinks on spinning, washing and drying, it is desirable, but not essential, to provide a reinforcing member at the middle portion thereof, preferably just within the imperforate annular portion 24 of the drum. In the construction shown for this purpose, a band or ring 47 of hard aluminum, nickel plated steel or other material is provided inside of the imperforate annular portion 24 of the drum, as is clearly shown in Figs. 13 and 14. This reinforcing ring is preferably of such size that the inner faces of the grooves or depressions 45 engage the same and this ring has the further advantage of increasing the weight of the drums, which otherwise would be quite light owing to their sheet metal construction, and this weight is desirable since it increases the friction between the drums and the driving rolls 33 shown in Fig. 11 as the drums are used for winding the rayon thereon. The bands 47 may be of stampings and have a stiffening annular flange 47^a on one or both edges thereof

Suitable means may be provided for stiffening the drum at the ends of the slots 23 and grids. In the construction shown for this purpose, the metal at the ends of the slots 23 is bent downwardly so that these downwardly bent flanges 48 merge with the flanges 26 so as to form inwardly extending stiffening fillet flanges 49 at the junction of the grids with the body portion of the drum. The flanges 48 on the opposite sides of the annular portion 24 also engage the opposite sides of the reinforcing rings 47 and thus securely hold the same in place. The downwardly bent portions 48 at the ends of the slots 23 serve the further purpose of forming a smooth surface against which the rayon may be pressed without injury and prevent the rayon from coming in contact with sharp or cut edges of the cylindrical portion of the drum and these downwardly extending portions or flanges 38 are made of sufficient depth to extend inwardly beyond the cake or layer X of rayon. A fillet 49 is formed integral with flanges 48 and 26, this fillet serving to greatly strengthen the grids at their junction with the cylinder and prevent them from becoming deformed under the crushing action of the rayon. By providing the flanges 26 with inwardly inclined or bevelled ends 44, plenty of metal can be left at the ends of the slots 23 to form the downwardly extending flange 48 and furthermore these bevelled or rounded edges 44 will not cut the hands of an operator when he reaches into the drums in the course of handling the same. The ring 47 reinforces the middle portion of the drums and the headers of the drums are of such shape as to reinforce the outer edges of the cylindrical body portion of the drums, while the reinforcing flanges of the grids serve to resist crushing of the drum at the rayon supporting surface thereof, so that the entire drum, though light, is of ample strength to withstand strains due to contraction or shrinking of the rayon.

In order to effect the washing of the rayon on the drums, washing racks are provided which have means for supporting the drums, end to end, so that water or other treating fluid may be admitted at one end of a row of drums and discharged through the slots 23 and grooves 45 therein. In the construction shown for this purpose, a rack is provided having a plurality of upright legs or frame members 50 and troughs 51 are mounted on the frame members and are adapted to carry off the liquid discharged from the drums and preferably also to form supports for the drums. In the construction shown in Figs. 1–5, the troughs 51 are of substantially semi-cylindrical shape, and suitable transverse frame members 52, the ends of which are secured to adjacent legs 50 of this rack, support the troughs 51. The drums are supported over the troughs by means of supporting straps or saddles 54, the ends 55 of which are bent partly around the upper edges of the troughs 51 or otherwise slidably secured to the troughs to hold the straps in fixed relation to the drums, and the intermediate portions of the straps are rounded or pressed as indicated at 56, in order to receive the end portions 36 of the drums.

The substantially semi-circular or depressed portions 56 of the saddle members 54, shown in Figs. 1–5, are of sufficient width to receive the ends or hubs 36 of two adjacent drums 20 and each of these saddle members support a gasket member of flexible material with which the opposite ends of adjacent drums are adapted to cooperate to form a water tight joint between the drums. These gasket members may be of any suitable or desired construction, those shown including a flanged portion 60 which is formed to rest on the semi-circular saddle portion 56 of the saddle member 54 and which is preferably formed integral with a gasket member 61 which is in the form of an annular disk having a central hole 62 through which the water may pass.

Means of modified construction for supporting the drums on the washing or treating rack are shown in Figs. 6 and 7. Both of these constructions are intended for use in cases where the layer or cake X of rayon wound on the drum is of such thickness as not to extend radially beyond the outer cylindrical edges 32 of the drum, and consequently in the construction shown in Figs. 6 and 7, the drums are supported on the outer peripheral faces 32 of the heads thereof. In the particular construction shown in Fig. 6, the upright members or legs 50 of the washing rack are connected by means of transverse frame members 65, which support troughs 66 of substantially channel shaped cross section and the drums 20 when placed on the washing rack rest with their edges 32 on the upper edges of the upwardly extending flanges of the channel shaped cross members 66. In this construction the gaskets which are used between adjacent drums are made in the form of annular disks 67 of rubber or other suitable packing material, and each of the disks is preferably provided with a pair of transversely extending pins or projections 68 which are adapted to rest on the outwardly extending flanges or hubs 36 of the drums so that these packing disks are temporarily held in place by the ends of adjacent drums.

In the construction shown in Fig. 7, the upright legs 50 of this rack are connected by means of transverse frame members 70, each of which is provided with a V-shaped depression 71 in the middle portion thereof, and an angle bar 72 or other V-shaped member is supported in said depression and forms the trough adapted to receive the drum. The pe-

ripheral edges 32 of the drums rest on the upper edges of the angle shaped trough member 72, and in this case a modified form of packing member or gasket 67ª is shown, as illustrated in Fig. 16, to form a tight joint between adjacent drums. This packing gasket 67ª is provided with an annular shoulder 67ᵇ adapted to extend outside of hub flanges 37 and insure that adjacent hub members are concentric and fluid tight during the washing and treating operation. In all of the constructions described, the troughs serve to support the drums and also to receive all of, or the greater part of the liquid used in washing the silk on the drums, but it will be obvious that other means for supporting the drums can be used without departing from this invention.

The washing or treating racks are preferably each arranged to accommodate two vertical tiers or series of rows of drums, as shown, and the racks may be arranged in pairs and extend toward opposite sides from a central supply manifold 75 of any suitable construction through which the fluid used in the treating of the silk on the drums is supplied to the washing racks, and each of the manifolds is provided with a branch pipe 76 for each row of drums. As is clearly shown in Fig. 3, the branch pipe 76 extends through a fitting 77 suitably mounted on the frame of the washing racks and extends through a gasket 78 arranged at the end of the fitting 77, and the end of each branch pipe 76 preferably extends slightly beyond the gasket 78 so as to enter into an adjacent drum 20. Any other means for supplying the fluid to the rows of drums may be provided if desired.

At the opposite end of each row of drums, suitable means are provided for pressing the drums into engagement with adjacent gaskets, the means shown for this purpose being clearly illustrated in Fig. 2 and including a clamping screw 80 having a threaded engagement with a fitting 81 suitably secured on the frame of the washing or treating rack. At one end of this screw shaft a hand wheel 82 is arranged for turning the shaft or rod 80 and at the other end of this threaded shaft is arranged a pressure head or member 83 having a suitable swivelled connection 84 with the screw shaft 80. It will be obvious in the operation of the washing and treating rack, that after the drums 20 have been loosely placed over the troughs with their opposite ends in engagement with the gaskets, the screw shaft 80 may be turned to move the pressure head 83 toward the nearest drum, which will tend to clamp all of the drums into engagement with the gaskets and thus form fluid tight joints between adjacent drums. The rod 80 may be provided with double or triple threads so that quick operation is insured. The pressure head 83 preferably engages with a gasket 85 which is imperforate to form a tight joint with an adjacent drum. The rows of drums are preferably arranged at a slight inclination as shown in Fig. 1, for the purposes of producing an equal hydrostatic pressure in each of the drums of any row and also to enable the troughs on which the drums are supported to readily drain the liquid discharged into the troughs toward the opposite sides of the machine, for example, into gutters 88 arranged in the floor 89 on which the treating rack is supported.

In Fig. 15 is shown diagrammatically an arrangement whereby the treating rack may be used to subject the rayon on the drums to the action of a number of different media. In Fig. 15, 90 represents the different rows of drums on which the rayon to be treated is wound and 75 represents the fluid supply header or headers to which fluid is supplied through a pipe 92. A water supply pipe 93 controlled by a valve 94 communicates with the pipe 92 so that the water for washing may be supplied to the drums. A compressed air supply pipe 95 and steam pipe 95ª also controlled by valves are provided so that compressed air, steam or other vapor or gas may be supplied to the drums for the purpose of effecting a partial or complete drying of the silk on the drums or for desulphuring, bleaching or dyeing the rayon. A series of supply tanks 96, 97 and 98 may be connected with the supply pipe 92 by pipes 99, 100 and 101 respectively to supply various other fluids to the drums on the rack. If it is desired to use any of the liquid in the tanks 96, 97, 98, repeatedly, the following arrangement which is illustrated in connection with the tank or reservoir 96 may be employed. The liquid drained from the gutter or drain 88 may be transmitted to a sump or basin 103 from which it may be pumped or otherwise conducted to the tank 96 by means of a pipe or passage 104.

The tanks 96, 97 and 98 or other necessary containers, may be used for the liquids with which it is desired to treat the rayon. Thus tank 96 may contain a liquid adapted to remove sulphur compounds from the rayon. Tank 97 may contain a bleaching solution for producing rayon of light color. Tank 98 may contain a dyeing solution for producing rayon of any desired color. It is obvious that the rayon may be treated under pressure successively with any number of fluids for cleansing, etc. by providing a suitable number of solution tanks or gas inlet pipes. It is particularly advantageous to treat the rayon with compressed air as a final treatment to expel the excess of water and insure a rapid drying without discoloration of the rayon and with a minimum of steam required for drying. The compressed air is also convenient for expelling liquids from the drums between solution treatments.

By means of the apparatus described a process of treating rayon is made possible, which consists in winding the rayon on drums having elongated perforations or slots therein in such a manner that the layer or cake of rayon covers these slots or openings in the drums, and of arranging the drums endwise in such a manner as to form a substantially tight joint between abutting ends of adjacent drums, clamping the drums in their operative position, and then admitting to the interior of the rows of drums the media by means of which the silk is to be treated. Another part of my process consists in passing the treating fluid in small streams lengthwise of the grooves or depressions 45 of the ribs or grids on which the rayon is supported, which method insures a thorough treatment of the portions of the rayon on the grids or ribs of the drums so that all portions of the layer or cake of rayon on the drums are uniformly treated or washed. The washing or treating action of the small streams of fluid on those portions of the layer or cake of rayon supported on parts of the drums is effected without forcing the liquid to pass through these portions of the silk. The washing process and apparatus described makes possible a great saving in the time, labor and floor space heretofore required for washing the rayon. The fact that the water in the groove flows freely from one end of the groove to the other end thereof has been found very effective in washing the portions of the artificial silk which rests against the grids or ribs of the drums.

If desired, the cylindrical driving surfaces 32 of the drum may be left uncoated so that the bare metal contacts with the rubber friction roller 33, which has been found to produce a better driving connection because of the greater coefficient of friction which results from contact between rubber and bare metal than is produced when coated metal, glass or the like, contact with rubber. This is an important feature for the reason that drums of the construction shown are much lighter in weight than the glass drums heretofore used so that a better driving contact is desirable to insure sufficient tension in the thread being wound on the drums.

I claim as my invention:—

1. The method of treating rayon consisting of winding the rayon in a layer on a series of grids, passing a treating fluid under pressure between said grids and outwardly through the layer of rayon, and passing currents of said fluid lengthwise of said grids between said grids and said rayon.

2. The method of purifying rayon consisting of winding the rayon on an annular series of grids, passing a purifying fluid under pressure from the interior of said series outwardly through said rayon, and passing currents of purifying fluid lengthwise of said grids between said grids and said rayon.

3. A drum for use in connection with the manufacture of rayon, including a substantially cylindrical body portion made of sheet metal and provided with longitudinal slots in the parts of the body portion which are to be covered by rayon, the portions of the drum between said slots being provided with inwardly extending reinforcing flanges.

4. A drum for use in connection with the manufacture of rayon including a substantially cylindrical body portion made of sheet metal and having longitudinal slots formed therein, the metal which is severed to form said slots being bent toward the axis of the drum to form reinforcing flanges for the portions of the drums between the slots.

5. A drum for use in connection with the manufacture of rayon including a substantially cylindrical body portion having a plurality of slots formed therein and extending lengthwise thereof and adapted to be covered by rayon, the ends of the slots extending substantially at right angles to the length thereof, the metal at the ends of said slots being bent inwardly to form surfaces against which the rayon may press.

6. A drum for use in connection with the manufacture of rayon including a substantially cylindrical body portion having a series of slots arranged around the periphery of said body portion, and over which a layer of rayon is to be wound, said slots being spaced so as to terminate short of the edges of said layer of rayon, the metal at the edges of said slots being bent inwardly.

7. A drum provided with a cylindrical surface having an annular series of slots, said slots being separated by grids having substantially radially extending reinforcing flanges.

8. A substantially cylindrical drum having an annular series of grids adapted to support an annular layer of rayon and having openings between said grids through which fluid may pass to said layer, and channels on the outer surfaces of said grids in which fluid may flow between said grids and said rayon.

9. A drum on which rayon may be wound and having a series of spaced rayon supporting surfaces, and grooves in said supporting surfaces in which streams of fluid may flow between said surface and the rayon.

10. A drum on which rayon may be wound and having a series of spaced rayon supporting surfaces, and grooves in said supporting surfaces in which streams of fluid may flow between said surfaces and the rayon and means for supplying fluid to said grooves from the interior of said drum and for discharging fluid at the exterior of said drum.

11. A drum on which rayon may be wound and having a series of spaced rayon supporting surfaces, and grooves extending length-

wise of said supporting surface and each terminating at one end beyond said surface and communicating near the other end with the interior of said drum, whereby liquid from the interior of said drum may pass lengthwise of said grooves between said supporting surface and the rayon on said drum.

12. A drum having a cylindrical surface provided with a plurality of annular series of grids, each of said series of grids being adapted to support a layer of rayon, and a reinforcing ring arranged within the drum between adjacent series of grids and adapted to prevent collapsing of the drum due to pressure of the rayon thereon.

13. A drum having a sheet metal body portion provided with a plurality of annular series of grids adapted to support the rayon, each adjacent series of grids being separated by an imperforate annular part of said body portion, and a reinforcing member arranged in contact with said annular part to prevent collapsing of said drum.

14. A drum having a sheet metal body portion provided with a plurality of annular series of grids adapted to support the rayon, said grids being formed integral with said body portion and provided with integral reinforcing flanges, the portion of the drum between adjacent series of grids being reinforced by a heavy annular member arranged with said drum.

15. A drum having a sheet metal body portion provided with supporting portions for annular layers of rayon, said supporting portions being formed by grids formed integral with said body portion and separated by slots, an annular reinforcing member arranged inside of said drum and engaging a portion of the drum between adjacent supporting portions, and flanges at the ends of said slots which extend inwardly and which retain said reinforcing ring in its operative position.

16. A drum having a cylindrical surface provided with a plurality of annular series of grids, each of said series of grids being adapted to support a layer of rayon, a reinforcing ring arranged within the drum between adjacent series of grids and adapted to prevent collapsing of the drum due to pressure of the silk thereon and headers secured to and reinforcing the ends of said drum.

17. A drum having a cylindrical sheet metal surface provided with a plurality of annular series of grids, each of said grids being separated from adjacent grids by slots, the metal severed to form the slots being bent inwardly to reinforce said grids, an imperforate portion of said drum being arranged between each adjacent series of grids, a reinforcing ring arranged in said drum and supporting said imperforate portion of the drum against the crushing strain of the silk wound on said grids, and headers at the ends of said cylindrical portion which support the outer edges of the series of grids adjacent to the ends of said cylindrical portion.

18. A drum for use in connection with the manufacture of rayon and having a substantially cylindrical body portion, and headers of greater diameter than said body portion and arranged at the ends of said body portion, said drums being coated with a protecting composition, the portions of said headers of greatest diameter being uncoated to provide a frictional driving surface whereby the drum may be rotated.

19. A drum for use in connection with the manufacture of rayon including a substantially cylindrical body portion, sheet metal headers secured to said body portion and having frictional driving surfaces of greater diameter than said drum, the opposite sides of said headers extending outwardly at an inclination to the axis of the drum, whereby said drum when dipped in a coating composition and held with its axis substantially vertically will permit said composition to drain from all parts thereof.

20. An apparatus for use in treating rayon, consisting of a support for a plurality of hollow open ended drums on which the drums may be arranged end for end in a row with their open ends connected to form a continuous passage through the drums of a row, said rows of drums being arranged at an inclination, means for admitting liquid to the interior of each row at the upper ends thereof, whereby the fluid pressure inside of each row will be approximately the same at each end of said row.

21. An apparatus for use in treating rayon consisting of a plurality of troughs adapted to support open ended drums end for end, means for admitting liquid at one end of a row of drums, and means for applying pressure to the other end of said row to move the open ends of said drums into fluid tight engagement with each other.

22. An apparatus for use in treating rayon wound on open ended drums having openings in the portions thereof on which the rayon is wound, including a support on which a plurality of drums may be arranged end for end, a packing member adapted to be engaged by the end drum at one end of said row and arranged in substantially fixed relation to the apparatus, a packing member movably arranged at the opposite end of said row of drums and adapted to be moved toward the drum at the opposite end of said row to move said drums into engagement with each other and with said packing member, and means for admitting fluid into the interior of a row of drums at one end thereof.

23. An apparatus for use in treating rayon wound on open ended drums, having openings in the portions thereof on which the rayon is wound, including a support on which a plurality of drums may be arranged end for end,

a packing member adapted to be engaged by the end drum at one end of said row and arranged in substantially fixed relation to the apparatus, a packing member movably arranged at the opposite ends of said row of drums and adapted to be moved toward the drum at said opposite end of said row to move said drums into engagement with each other and with said packing member, means for supporting packing members between adjacent drums to form a water tight connection between the open ends thereof, and to permit fluid to flow from one drum to another, and means for admitting fluid into the interior of a row of drums at one end thereof.

24. In an apparatus for use in treating rayon, the combination of a trough adapted to support a plurality of drums on which rayon is wound, a fixed gasket member at one end of said trough with which the open end of a drum is adapted to engage, a movable packing member at the opposite end of said trough which is adapted to be moved into engagement with the opposite end of the row of drums to press said row of drums into clamping engagement with both of said packing members, and means at said fixed packing member to admit fluid to said row of drums.

25. An apparatus for use in treating rayon including a support on which a plurality of drums are adapted to be arranged in rows, means for clamping said drums in substantially fluid tight relation to each other, whereby each row of drums forms substantially a continuous passage for fluid, and a header by means of which fluid is conducted to said row of drums, said drums being arranged at opposite sides of said header to receive fluid therefrom.

26. An apparatus for use in treating rayon including a supporting rack on which drums may be arranged end for end in substantially fluid tight relation to form a plurality of rows so that liquid may be admitted to one end of each of said rows and to pass through the rayon wound on said drum, and a header for supplying fluid to said rows of drums, said rows extending from said header toward opposite sides thereof.

27. In an apparatus for use in treating rayon wound upon hollow open ended drums, the combination of a trough, saddle members connected to and extending across the open upper end of said trough and adapted to support the ends of said drums so that said ends will be arranged substantially in alinement, and clamping means arranged near one end of said trough and adapted to move the ends of said drums into contact with each other to form a substantially fluid tight joint between adjacent drums, and means for admitting fluid to a row of drums.

28. In an apparatus for use in treating rayon wound upon hollow open ended drums, the combination of a trough a saddle member carried by said trough adapted to support the ends of adjacent drums to aline the same, gaskets carried by said saddle member and adapted to engage the open ends of said drums and having openings therein through which fluid may pass from one drum to another, means for pressing said drums against said gaskets, and means for admitting fluid into the interior of a row of drums.

29. In a drum for use in connection with the manufacture of rayon, a substantially cylindrical body portion adapted to receive cakes of freshly spun rayon, a head formed on each end of the cylinder having rolling edges of larger diameter than the cylinder, and an annular rib formed on the cylinder between each head and its nearest cake, said rib being adapted to throw off liquid from the rayon so as to keep said rolling edges dry during the spinning operation.

30. In an apparatus for use in treating rayon, a plurality of open ended perforated drums arranged end to end in a row, a gasket between a pair of adjacent drums, an annular shoulder associated with said gasket adapted to cause said drums to be held concentric one with the other, means for forcing said drums together in contact with said gaskets so that the junction of said drums and gasket is fluid tight and means for forcing a fluid under pressure through said row of drums and through rayon wound on said drums.

31. A drum for use in connection with rayon having a cylindrical surface provided with a series of openings, an imperforate section between said series of openings, and means on said imperforate section to prevent the cakes from spreading during treatment.

LEWIS A. PALEY.