June 23, 1936. F. W. MATTINSON 2,045,530

METHOD AND APPARATUS FOR MANUFACTURING ARTIFICIAL SILK

Filed Jan. 14, 1932 6 Sheets-Sheet 1

Fig. 1

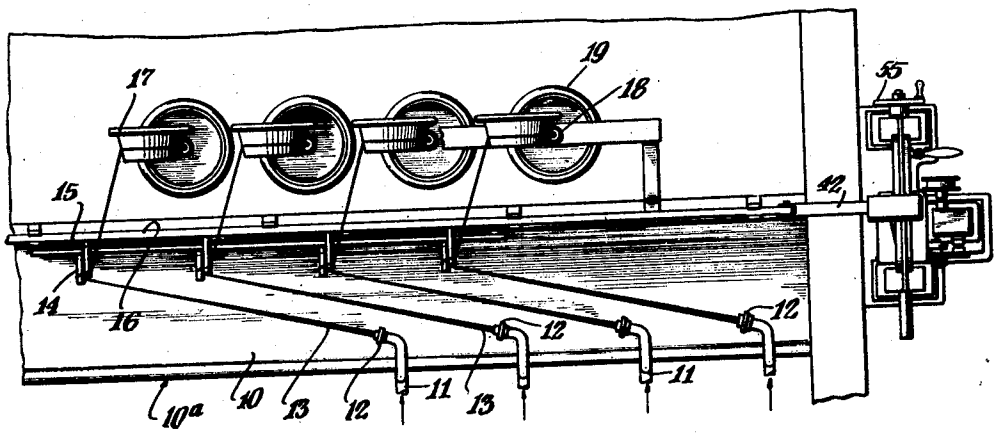
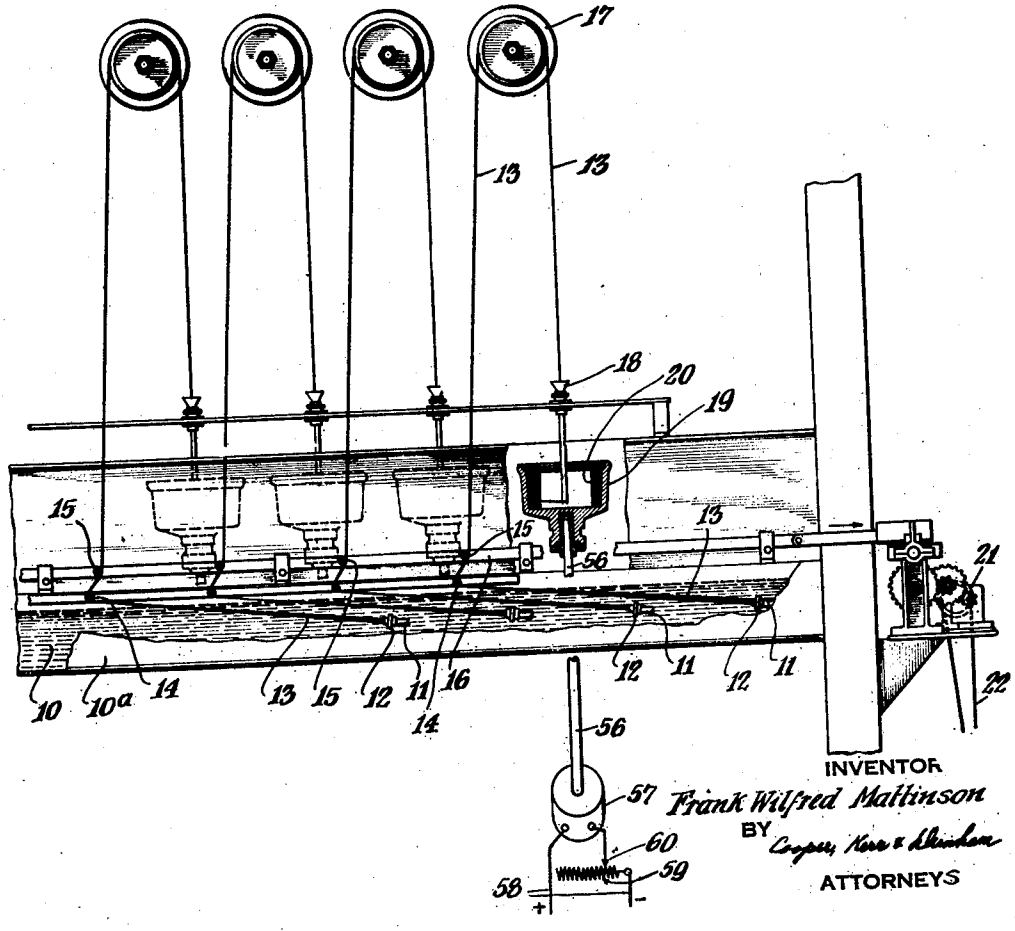


Fig. 2



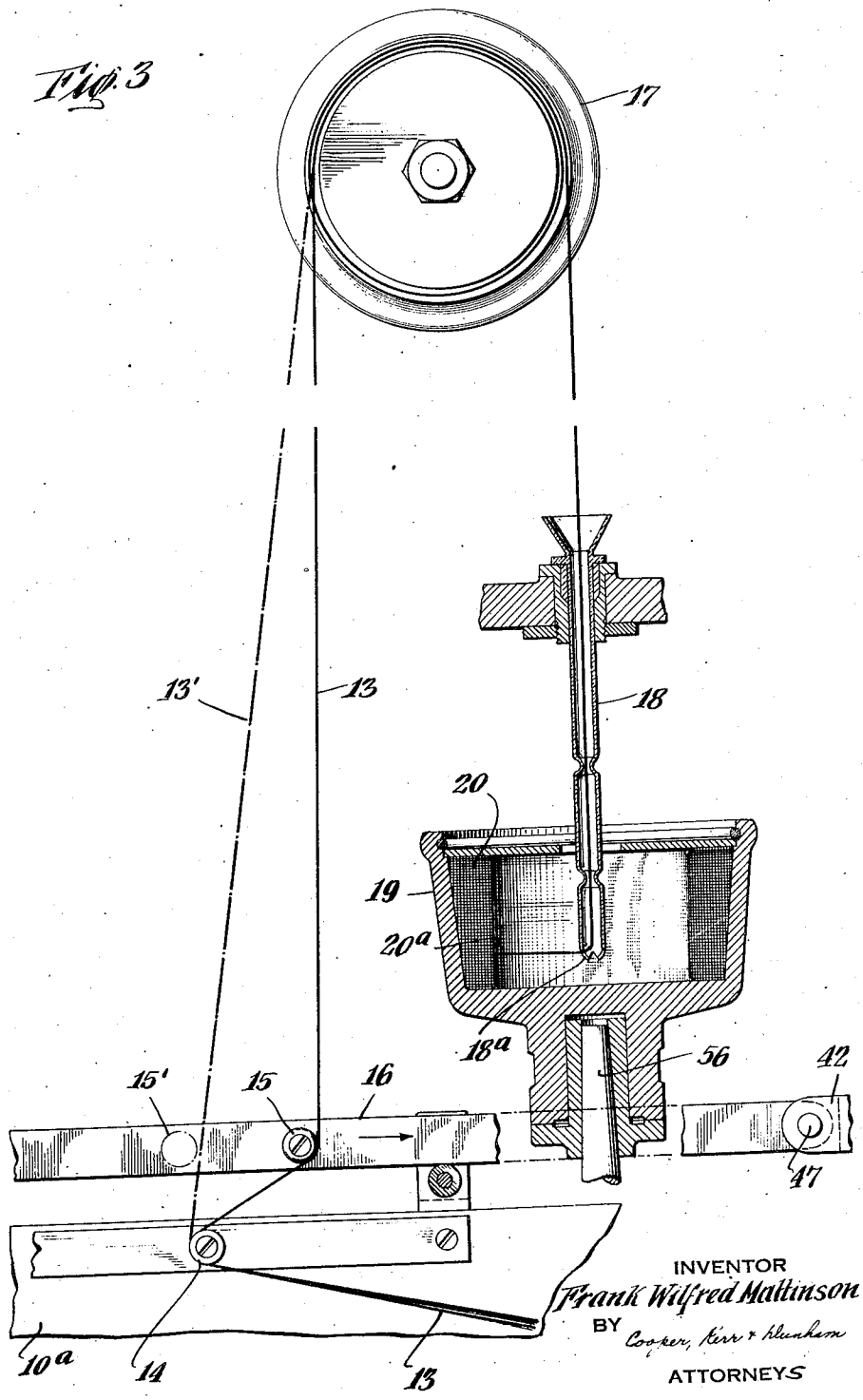
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METHOD AND APPARATUS FOR MANUFACTURING ARTIFICIAL SILK

Filed Jan. 14, 1932 6 Sheets-Sheet 2

Fig. 3



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METHOD AND APPARATUS FOR MANUFACTURING ARTIFICIAL SILK

Filed Jan. 14, 1932 6 Sheets-Sheet 3

Fig. 4

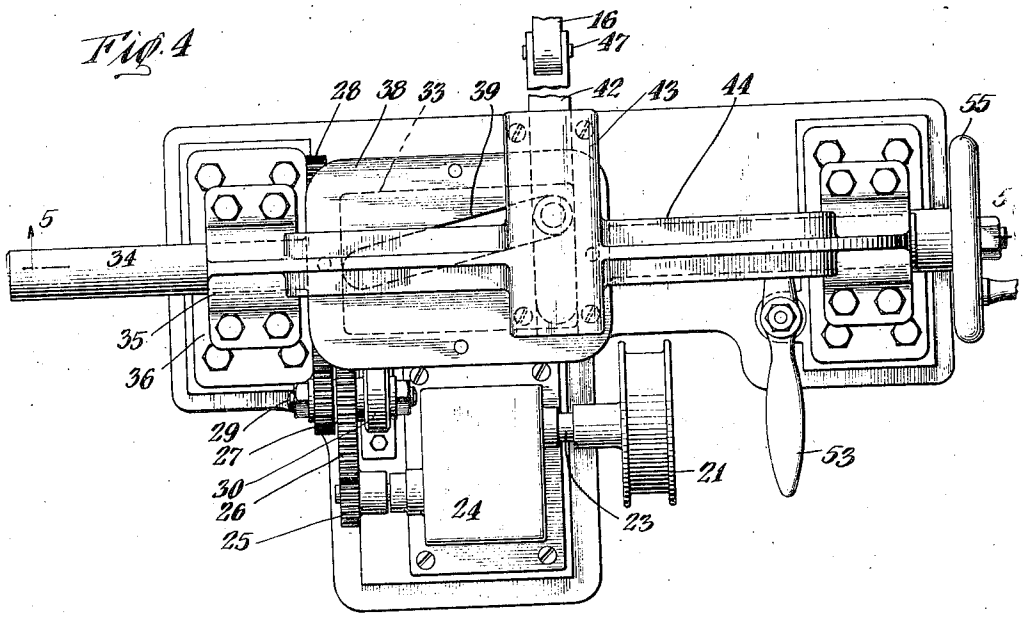
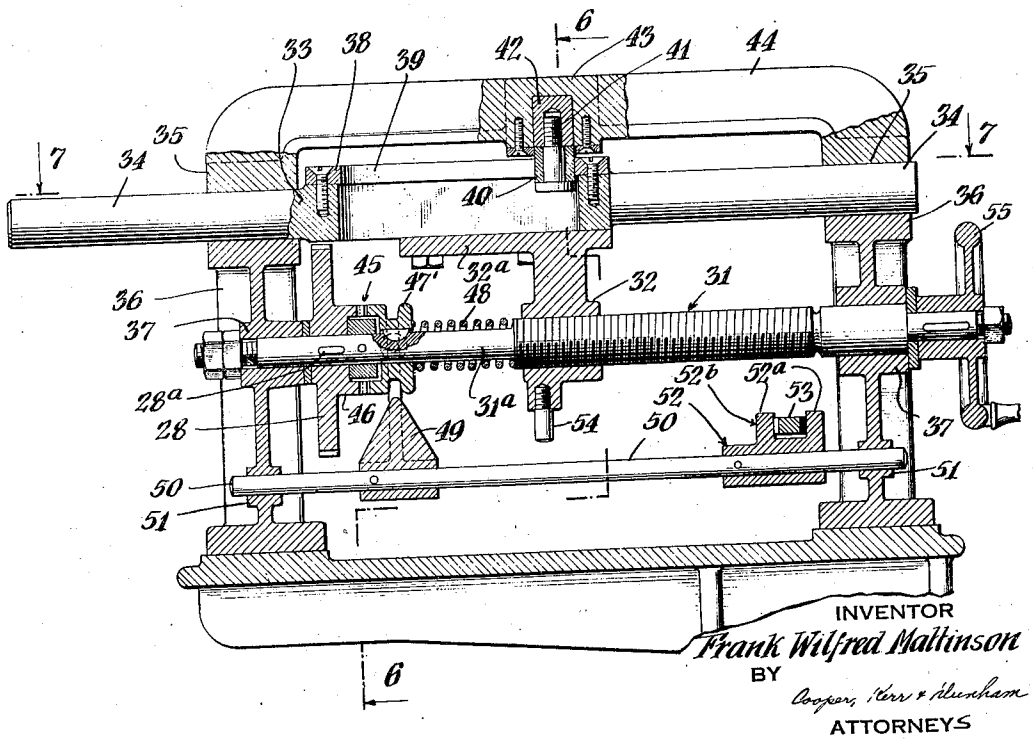


Fig. 5



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June 23, 1936. F. W. MATTINSON 2,045,530

METHOD AND APPARATUS FOR MANUFACTURING ARTIFICIAL SILK

Filed Jan. 14, 1932 6 Sheets-Sheet 4

Fig. 6

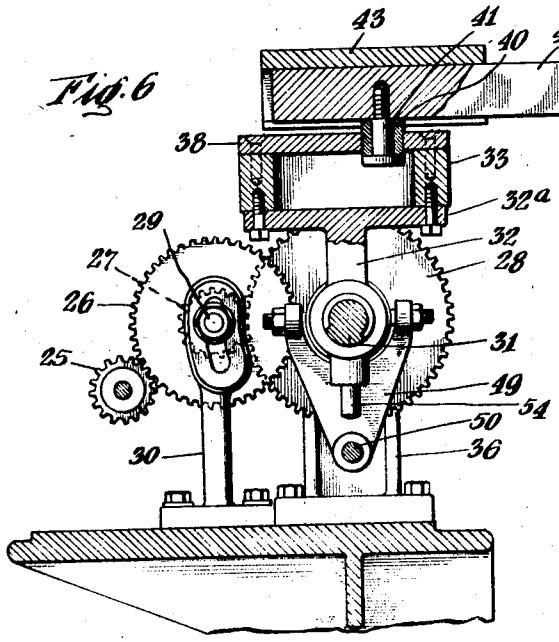


Fig. 8

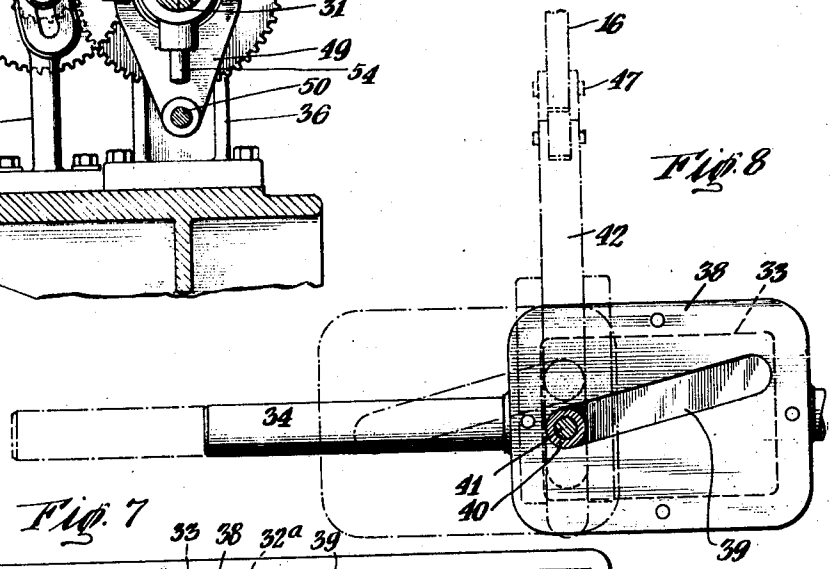
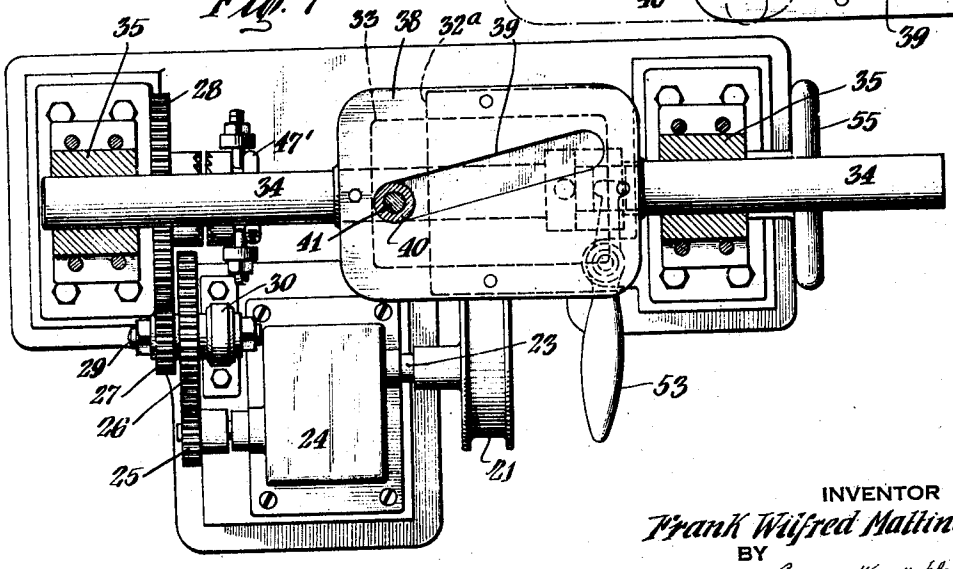


Fig. 7



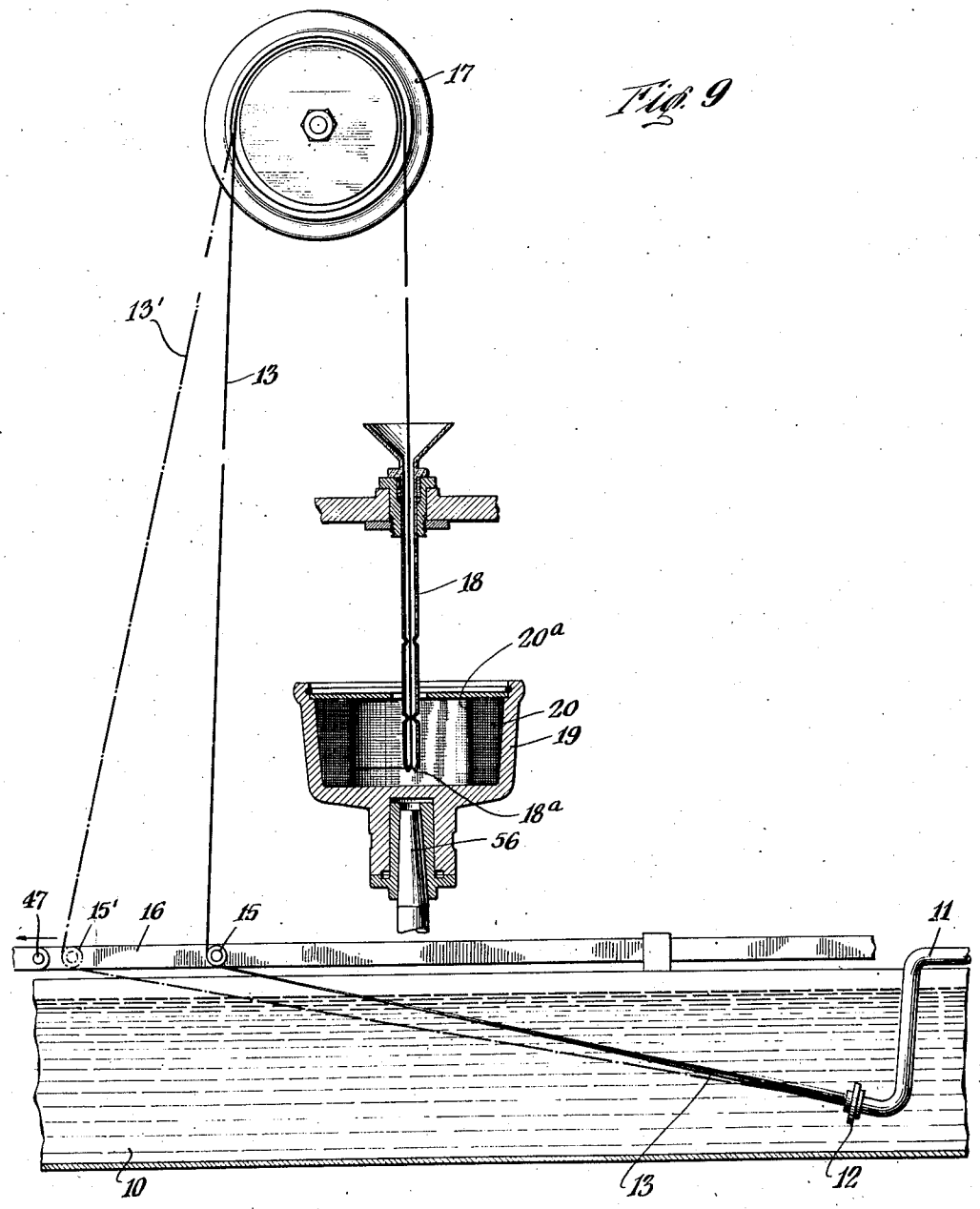
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METHOD AND APPARATUS FOR MANUFACTURING ARTIFICIAL SILK

Filed Jan. 14, 1932 6 Sheets-Sheet 5

Fig. 9



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June 23, 1936. F. W. MATTINSON 2,045,530

METHOD AND APPARATUS FOR MANUFACTURING ARTIFICIAL SILK

Filed Jan. 14, 1932 6 Sheets-Sheet 6

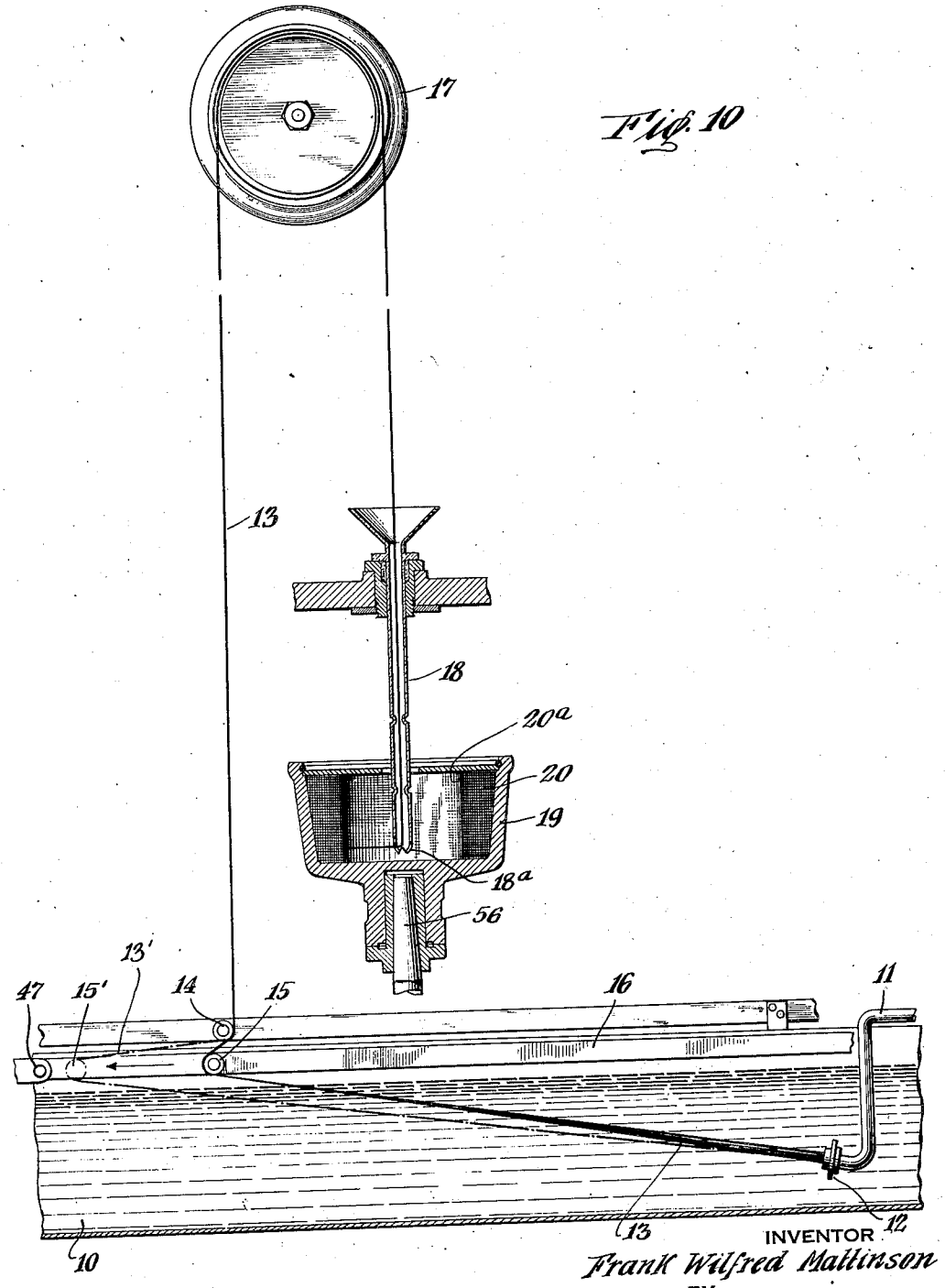


Fig. 10

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Patented June 23, 1936 2,045,530

UNITED STATES PATENT OFFICE

2,045,530

METHOD AND APPARATUS FOR MANUFACTURING ARTIFICIAL SILK

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Application January 14, 1932, Serial No. 586,553

21 Claims. (Cl. 18—8)

This invention relates to the manufacture of artificial silk, and more particularly to a novel method of manufacturing artificial silk or "rayon" thread having more uniform dyeing qualities, or "dye affinity" as it is sometimes called, than has heretofore been possible.

A major difficulty which has been encountered for many years in the manufacture of rayon thread or yarn has been that the finished thread cannot be made so as to have uniform dyeing qualities. Some yarn is more absorptive of dye than others, and even yarn from different parts of the same yarn cake varies in dye affinity. This necessarily results in undesirable variations in color or shade of the dyed thread, or of fabric produced therefrom. Many and repeated efforts have been made in the industry to overcome this trouble, but so far as I know, no successful or practical way of doing so has been found prior to my present invention.

I shall describe my invention more particularly with reference to the "cake" or "centrifugal spinning bucket" method of spinning rayon from viscose, that being the industrial process to which I have applied my invention. It may be, however, that in proper cases my invention is capable of advantageous application to other processes of manufacturing artificial silk.

I have discovered by extended investigation and test that in manufacturing rayon thread or yarn from viscose by the centrifugal spinning bucket method of spinning, the principal cause of non-uniform dye affinity of the spun yarn is the variation in the tension applied to the yarn during spinning, due to decrease of centrifugal force as the yarn cake builds inwardly from the wall of the centrifugal spinning bucket (sometimes called the "spinning pot") toward the axis of the bucket. By long and careful observation, I have found that the thread on the outside of a spun yarn cake, spun by this centrifugal spinning method, is sufficiently different in structure from the thread on the inside of the completed cake so that when the whole yarn cake is dyed the thread on the outside of the cake absorbs a less amount of dye and comes out a different shade of color. I have discovered that the more the yarn is stretched during its manufacture the less will be its dye absorption, and consequently yarn from the outside of a spun cake dyes to a lighter shade than does yarn from the inside of the same cake.

Having discovered that the foregoing is a principal cause of the non-uniform dyeing qualities which have heretofore characterized substantially all viscose rayon made by the centrifugal spinning method, to the great detriment of the commercial value of the yarn, I have invented a method of overcoming this difficulty. Broadly stated, this method consists in making a progressive compensating adjustment or regulation, during the operation of spinning each yarn cake, which so controls the actual structure of the yarn, or the individual filaments of which it is composed, that it produces compensation for the non-uniform dyeing qualities which would otherwise result. I have thus succeeded in producing a spun yarn cake in which yarn or thread in all parts of the cake has substantially uniform dyeing properties, or, as it is sometimes technically expressed, a uniform "dye affinity" or "dye index".

I have invented several ways in which this control of the yarn structure by compensating adjustment or regulation can be effected during the spinning operation. By "spinning operation" in that sense I refer broadly to all the various operations which take place between the squirting of viscose filaments through the "spinnerette" into the "spinning bath" and the time the spun cake is finally "doffed" from the spinning pot.

From a practical commercial standpoint, the method which I now prefer for producing the required regulation of the yarn structure, which method I shall presently describe in greater detail in connection with the accompanying drawings, consists in applying a progressively increasing tension to the thread or yarn as it comes out of the spinning bath and moves towards the "godet wheel". This increasing tension is so regulated that it produces a compensating change in the final structure of the thread, or the individual filaments thereof, which neutralizes the effect of the decreasing centrifugal pull exerted on the thread during the spinning of each yarn cake, due to the decreasing inside radius of the yarn cake as it builds inwardly from the wall of the spinning pot towards the axis of the pot. With constant distance that the thread travels through the spinning bath, constant angle of the thread at the sickle guide, uniform godet slip, and uniform spinning pot speed, there is still a difference in the actual structure of the thread on the inside and outside of each yarn cake, due to decreasing centrifugal pull on the thread as the inside radius of the cake decreases while the cake builds up in the spinning pot. According to what I now consider the preferred form of my invention, this decreasing centrifugal pull on the thread is neutralized or compensated by the in-

crease in tension just described, thereby controlling the thread structure to impart uniform dyeing qualities to the yarn.

Another way in which I have found that the desired compensation can be introduced during the spinning operation, to control the yarn structure, is gradually to increase the speed of rotation of the spinning pot during the spinning of each cake, in sufficient amount to offset the decreasing weight of the thread due to its lessening free length and the decreasing centrifugal force due to the diminishing inside radius of the cake. In this case, the number of revolutions per second of the spinning pot being increased, it is desirable, also, in order to prevent increased twist of the thread, to make corresponding adjustments of the speed of other parts of the apparatus, to keep their relation uniform. Thus the godet speed should be increased in relation to the pot speed in order to maintain uniform twist; the speed of the viscose pump should be increased to maintain uniform denier; and the distance that the thread is immersed in the spinning bath should be increased in order to compensate for the increased speed of the yarn.

Still another way in which the desired control of the yarn structure can be accomplished to introduce the compensation necessary to produce uniform dyeing quality, is gradually to increase the length of time that the thread is immersed in the spinning (coagulating) bath after it emerges from the spinnerette. This, I have found, changes the structure of the individual filaments of the thread (yarn) in such a way that the thread tends to dye lighter in color as the time of immersion in the spinning bath is increased, thus neutralizing the increasing dye affinity due to the diminishing centrifugal pull during the spinning of each cake, that would otherwise cause the thread on the inside of the yarn cake to absorb more dye than the thread on the outside.

What I now consider to be the preferred commercial form of apparatus for carrying out my method is one which operates by control of the thread tension in the manner first described. I shall accordingly describe that form of apparatus, and how my method is performed by use of the same, in greater detail in connection with the accompanying drawings, in which:

Figure 1 is a plan view of an artificial silk spinning apparatus embodying the invention;

Fig. 2 is a vertical elevation of the same, partly in section, and partly broken away;

Fig. 3 is a detailed view of a part of Fig. 2;

Figs. 4, 5, 6, 7 and 8 show details of mechanism for operating the variable tension guides. Fig. 4 is a plan view of this mechanism. Fig. 5 is a vertical section on line 5—5 of Fig. 4. Fig. 6 is a transverse section on line 6—6 of Fig. 5. Fig. 7 is a horizontal section on line 7—7 of Fig. 5. Fig. 8 is a diagrammatic plan view illustrating in detail the motion of a part of the mechanism;

Fig. 9 is a detailed elevation, partly in section, of an apparatus for carrying out the method of the invention by progressively increasing the time that the yarn is immersed in the spinning bath, and

Fig. 10 is a detailed elevation, partly in section, of an apparatus for carrying out the method of the invention by a combination of the first and third methods described above.

Referring more particularly to Figs. 1, 2 and 3, 10 represents a spinning or coagulating bath contained in a suitable tank 10*a*. Taking the right-hand spinning unit by way of example, the others being similar, the viscose enters through the pipe 11 and flows to the spinnerette 12 from which it is ejected into the spinning bath 10 in the form of a plurality of filaments shown at 13. These filaments then pass over the fixed or "sickle" guide 14, then under the movable tension guide 15, which is carried and operated by the longitudinally movable bar 16, in the manner explained hereafter. The filaments pass next around the godet wheel or roller 17, and then pass down through the vertically reciprocating funnel guide 18, whence by the action of the rapidly rotating spinning pot or "bucket" 19 the filaments are spun—i. e. twisted—into yarn or thread, which by virtue of the centrifugal force exerted by the rapidly-rotating spinning bucket, winds up against the inside of the spinning bucket or "pot", to form a "yarn cake", 20.

By more particular reference to Fig. 3 it will be seen that during the spinning of the yarn cake 20 the distance between the lower end 18*a* of the reciprocating funnel guide 18 and the point 20*a* where the yarn is actually wound into the yarn cake, decreases during the spinning of each yarn cake, due to the fact that the cake builds inwardly from the wall of the spinning pot 19 toward the funnel guide, which is at the axis of the pot. The centrifugal force to which the filaments are subjected while they are being spun is consequently progressively reduced during the spinning of each yarn cake, due not only to the decreasing radius, causing decreasing centrifugal force, but also because the length, and consequently the weight, of the free yarn between the points 18*a* and 20*a* is continuously diminished.

To compensate for the progressively lessened tension applied to the yarn during the spinning of each cake, due to these factors, I arrange the variable tension guide in the manner already described, and as shown in greater detail in Fig. 3.

At the beginning of the spinning operation the bar 16 with its movable tension guides 15—of which I shall now refer more particularly to the one shown in detail in Fig. 3—is adjusted by means of a hand wheel (shown in Figs. 1, 4 and 5) so that the movable guide occupies the position indicated by the dotted lines at 15'. There is then substantially no tension upon the filaments 13 (which then occupy the position indicated by the dotted lines at 13') due to the movable guide 15. At this period of the operation the centrifugal force applied to the yarn filaments by the rotation of the spinning pot is a maximum, because the yarn cake is then building up against the wall of the pot, and therefore has the maximum radius. As the spinning progresses the bar 16 is automatically moved to the right, by the mechanism provided for that purpose and to be described presently, bringing the movable guide from the position shown at 15' to that shown at 15. This causes a progressive increase in the tension applied to the filaments 13, both because the travel is longer and because a sharper angle is introduced therein. The distance between the positions 15' and 15, and the rate of motion, are so co-related with the rate of spinning that the increased tension produced by the movement of the guide 15 and bar 16 from their starting to their final position just compensates for the decreased tension due to the lessening centrifugal force exerted by the spinning pot as the cake builds inwardly, decreasing its radius. In this way a uniform tension and thread structure is

maintained, and the resulting yarn has substantially uniform dyeing properties.

Referring now more particularly to Figs. 4, 5, 6, 7 and 8, Fig. 4 shows a plan view of the mechanism for operating the movable bar 16 in the manner just described. 21 is a pulley adapted to be driven by a belt 22, from a suitable source of power, as shown at the lower right hand side of Fig. 2. The pulley 21 is mounted on a shaft 23 which operates a speed reduction gear box 24. The reduced speed gear 25 drives a train of gears 26, 27, 28 (see Fig. 6). The gears 26 and 27 are carried on a common stud 29, adjustably mounted on a bracket 30 to allow for taking up any possible play, and to give an accurate mesh of the gears. Gear 28 is keyed at 28a to the main spindle 31 (see Fig. 5). The spindle 31 is threaded, and has mounted thereon an internally threaded sleeve 32, formed integrally with the bracket 32a on which is mounted the cam supporting frame 33. Frame 33 is provided at each side with a laterally extending guide rod 34, sliding in the bearings 35 of the main supporting frame or housing 36, so that as the spindle 31 is rotated, the cam frame 33 is moved parallel thereto on the guide rods 34. The main spindle shaft 31 is journaled in suitable bearings 37 in the same main supporting frame 36. Secured to the top of the cam frame 33 is a slotted cam plate 38 provided with a diagonally extending slot 39 (see Fig. 7). Within the slot 39 is arranged a cam roller 40 carrying a stud 41 which is secured to a sliding member 42 arranged to slide in a direction transverse to that of the motion of the cam plate 38. This transverse sliding member 42 slides in a fixed guiding block 43 (see Fig. 5) integral with the cover 44 of the main supporting frame 36. This transverse sliding member 42 is connected by a suitable linkage 47 (see Fig. 8) to the movable bar 16, shown in Figs. 1, 2 and 3.

The operation of the mechanism is that as the pulley 21 is driven, the gear train 26, 27, and 28 is driven through the gear box 24, and rotates the main spindle 31. By virtue of its threaded engagement with the sleeve 32 this rotation of the spindle 31 moves the entire cam assembly, including bracket 32a, cam frame 33, guide rods 34, and cam plate 38, from its left-hand position, shown in Fig. 5, toward the right, as shown by the full lines in Fig. 8. The operation of the cam plate 38 is then to force the cam roller 40 backwardly, drawing with it the transversely sliding member 42 and thus operating the movable bar 16 in the manner described. In Fig. 8 the initial position of the cam plate and roller is shown in dotted lines and the final position, with the bar 16 retracted, is shown in the full lines.

In order to stop the operation of the drive mechanism when the cam has reached the limit of its travel, an automatic clutch 45 is provided as shown in detail in Fig. 5. This clutch is generally designated as 45, and consists of two members 46 and 47'. Clutch member 46 is integral with the gear 28 and is the drive member of the clutch. Clutch member 47' is slidable on the reduced portion 31a of the spindle 31, and is normally kept in engagement with the driving member 46 by means of the spring 48. Fork member 49 engages the collar portion of clutch member 47', as shown in Fig. 5, and is pinned to the shaft 50, which is slidably journaled in bearings 51 on the main frame 36. The shaft 50 has mounted on its other end a clutch control member 52 provided with upturned fork elements 52a, between which is located a pivoted operating handle 53. On the lower face of the threaded sleeve 32 is mounted a pin 54 which is arranged to engage the side face 52b of the clutch control element 52 when the sleeve 32 has attained its right-hand position on the spindle 31. When the pin 54 engages the clutch control block 52, it moves the entire shaft 50 to the right, thus disengaging the two halves 46 and 47' of the clutch 45 and stopping the motion of the apparatus. On the right-hand end of the spindle 31 is arranged a hand wheel 55 for resetting the apparatus. When the apparatus is returned to its starting position, the clutch is automatically engaged and the action of the movable bar 16 begins again. The manual clutch control handle 53 provides means for disengaging the clutch 45 at any desired moment, without waiting for the automatic disengagement to take place.

When controlling the structure of the yarn in the second way described above, namely by increasing the speed of rotation of the spinning pot 19 as the spinning progresses, the apparatus shown diagrammatically at the bottom of Fig. 2 may be employed for the purpose. 56 is the spindle (shown partly broken away) upon which the spinning pot 19 is mounted. It is arranged to be driven by means of an electric motor 57 which is supplied with current from a suitable source, as a power line 58. Branched across the line 58 is a rheostat consisting of a resistance 59 and slidable contact 60 by which the speed of the motor is controlled. If desired, similar provision may be made for controlling the speed of the other parts of the apparatus, such as the pumps for delivering the viscose, and the drive for the godet wheels 17. If these are all electrically driven, their speed may be controlled, if desired, by a rheostat (not shown, but similar to 59—60) which varies all of their speeds simultaneously, in such a way that proper coordination of the apparatus is maintained.

Apparatus for controlling the structure of the yarn in the third way described above, namely by increasing the time that the yarn is immersed in the spinning bath, is shown in detail in Fig. 9. In this apparatus the movable bar 16 is arranged to travel from right to left, as indicated by the arrow, instead of travelling from left to right as shown in the preceding figures. To this end, the mechanism for moving the bar, which is shown in detail in Figs. 4 to 8 inclusive described above, is mounted at the left hand end of the bar 16 instead of at the right, as in Fig. 1, and draws the bar to the left instead of towards the right.

In this arrangement of apparatus, also, the fixed or sickle guides 14 are dispensed with and the yarn filaments 13 are carried directly from the spinnerette 12 to the movable guide 15, the initial position of which is shown by the full lines. During the progress of spinning each yarn cake the bar 16 moves to the left in such a way that the guide 15 is carried from its initial position, shown by the full lines, to the position shown by the dotted lines at 15'. The yarn filaments being moved from their initial position, 13, to the position shown by the dotted lines at 13', the distance that the yarn filaments travel through the liquid of the spinning bath 10 after ejection from the spinnerette 12 is correspondingly increased, as shown in the drawings.

Fig. 10 shows an apparatus for carrying out the process of the invention by simultaneously and progressively increasing the tension applied

to the thread and increasing the time of its immersion in the spinning bath. In this arrangement the sickle guide 14 is fixed, as in Fig. 3, but is placed above the movable bar 16 and movable guides 15. The direction of motion of the movable bar 16 is, in this case also, from right to left as indicated by the arrow. The initial position is shown in full lines and the final position of the guide 15 is shown by the dotted lines at 15'. The yarn filaments 13 are threaded first around the left side of the movable guide 15 and then under and around the right side of the fixed guide 14, as shown. During the motion of the movable guide 15 from its initial position to its final position, 15', the tension on the yarn 13 is increased by drawing the yarn into the position shown by the dotted lines, and the time of immersion of the yarn in the spinning bath is also increased, thus accomplishing progressive regulation of the yarn structure by a simultaneous application of the first and third methods described above.

The methods, and arrangements of apparatus, herein specifically illustrated and described are the best now known to me, but it is to be understood that the invention is not necessarily limited to the methods and constructions herein specifically illustrated, but may be carried out in other ways without departing from its spirit.

I claim:

1. In the manufacture of rayon by the centrifugal spinning process, the method of producing yarn having substantially uniform dyeing qualities throughout all parts of the spun yarn cake which comprises ejecting viscose to be spun from a spinnerette into a spinning bath, leading the viscose filaments over guides to a centrifugal spinning pot, spinning the filaments by rotation of said pot, and controlling the internal structure of the yarn filaments during the spinning operation by progressively introducing a correcting structural change in the filaments to compensate for variations of structure which would otherwise cause non-uniformity in the dyeing quality of the yarn in different parts of the yarn cake.

2. Method of spinning rayon yarn of substantially uniform dye affinity, wherein viscose is ejected from a spinnerette into a spinning bath, led over guides to a centrifugal spinning pot, and there spun into a yarn cake which builds from the wall of the pot inwardly towards its axis, characterized by the fact that at least one of said operations is progressively adjusted during the spinning of each yarn cake to compensate for structural variations in the yarn from outside to inside of the cake, which variations would otherwise produce yarn having a non-uniform dye affinity, said adjustment being coordinated with the other operations to produce a yarn cake whereof the yarn in all parts of the cake has substantially uniform dye affinity.

3. Method of manufacturing rayon yarn of substantially uniform dye affinity, which includes the steps of ejecting viscose into and passing it through a coagulating spinning bath, then passing it over guides to a centrifugal spinning pot, and there spinning it into yarn in a cake by the rotation and centrifugal action of said spinning pot, and progressively regulating at least one of said operations during the spinning of each yarn cake to compensate for characteristics of the yarn which would otherwise cause differences in the dye affinity of the yarn in different parts of the spun cake.

4. Method of spinning artificial silk thread having substantially uniform dye affinity, comprising spinning the thread into a cake according to the centrifugal spinning pot process, and effecting adjustment of the thread tension progressively during the spinning of the cake to compensate for variation in thread structure which would otherwise cause non-uniform dyeing quality of the thread in different parts of the cake.

5. In the manufacture of rayon by the centrifugal spinning process, the method of producing yarn having substantially uniform dyeing qualities throughout all parts of the spun yarn cake which comprises progressively increasing the tension applied to the yarn during the spinning of each yarn cake, to compensate for the reduction in tension on the yarn caused by diminishing centrifugal pull upon the yarn as the cake is spun.

6. In the manufacture of rayon by the centrifugal spinning process, the method of producing yarn having substantially uniform dyeing qualities throughout all parts of the spun yarn cake which comprises progressively increasing the speed of rotation of the spinning pot during the spinning of each yarn cake to compensate for decreasing tension which would otherwise be applied to the yarn because of diminishing centrifugal pull upon the yarn as the cake is spun.

7. In the manufacture of rayon by the centrifugal spinning process, the method of producing yarn having substantially uniform dyeing qualities throughout all parts of the spun yarn cake which comprises progressively increasing the speed of rotation of the spinning pot during the spinning of each yarn cake to compensate for decreasing tension which would otherwise be applied to the yarn because of diminishing centrifugal pull upon the yarn as the cake is spun, and simultaneously adjusting the speeds of the other parts of the spinning apparatus to maintain the same relation between them.

8. In the manufacture of rayon by the centrifugal spinning process, the method of producing yarn having substantially uniform dyeing qualities throughout all parts of the spun yarn cake which comprises progressively increasing the length of time that the yarn is immersed in the coagulating bath, to produce decreasing dye affinity of the yarn to compensate for the increasing dye affinity of the yarn resulting from reduction of centrifugal pull upon the yarn as the cake is spun.

9. Method of spinning artificial silk thread having a substantially uniform dye affinity, comprising spinning the thread into a cake according to the centrifugal spinning pot process and simultaneously effecting adjustment of the thread tension and adjustment of the time of immersion in the coagulating bath, progressively during the spinning of the cake, to compensate for variation in thread structure which would otherwise cause non-uniform dyeing quality of the thread in different parts of the cake.

10. Apparatus for the manufacture of artificial silk yarn having a substantially uniform dye affinity throughout the yarn cake comprising, in combination, a spinnerette for ejecting viscose filaments into a coagulating bath, a guide for leading the coagulated filaments to a godet wheel, a godet wheel, a centrifugal spinning bucket for spinning the yarn into a cake, and automatically adjustable mechanical means associated with the foregoing apparatus for producing a progressive increase in the tension applied to the yarn during the spinning of each yarn cake to introduce a

correcting structural change in the yarn during the spinning of the cake, to compensate the variation in structure which would otherwise occur and cause non-uniformity in the dyeing quality of yarn from different parts of the same yarn cake.

11. Apparatus for the manufacture of artificial silk yarn comprising, in combination, a spinnerette for ejecting viscose filaments into a coagulating bath, a guide for leading the coagulated filaments to a godet wheel, a godet wheel, a centrifugal spinning bucket for spinning the yarn into a cake, and means for progressively increasing the tension applied to the yarn in the course of spinning a yarn cake to compensate for decrease in tension on the yarn due to decreasing centrifugal force as the cake is spun.

12. Apparatus for spinning artificial silk having a substantially uniform dye index, according to the centrifugal spinning bucket method, including automatically adjustable mechanical means comprising a movable tensioning device arranged to apply a progressively increasing tension to the yarn during the spinning of each yarn cake for producing a progressive structural change in the yarn during the spinning of the cake to compensate the variation in structure which would otherwise occur and cause non-uniformity in the dyeing quality of yarn from different parts of the same yarn cake.

13. Apparatus for spinning artificial silk according to the centrifugal spinning bucket method, including means for progressively increasing the tension applied to the yarn in the course of spinning a yarn cake to compensate for decrease in tension on the yarn due to the decreasing centrifugal force as the cake is spun.

14. Apparatus for spinning artificial silk according to the centrifugal spinning bucket method, including means for progressively and simultaneously increasing the tension applied to the yarn and the length of time that the yarn is immersed in the coagulating bath, during the course of spinning a yarn cake, to compensate for varying dye affinity of the yarn which would otherwise occur in different parts of the yarn cake.

15. In the manufacture of rayon by the centrifugal spinning process, the method of producing yarn having improved uniformity of dyeing qualities which comprises ejecting a cellulosic solution from a spinnerette into a spinning bath, leading the resulting filaments over guides to a centrifugal spinning pot, spinning the filaments by rotation of said pot, and controlling the internal structure of the moving yarn filaments by progressively introducing a correcting structural change in the filaments to offset variations of structure which would otherwise cause non-uniformity in the dyeing quality of the yarn.

16. Apparatus for spinning, according to the centrifugal spinning bucket method, artificial silk having improved uniformity of dyeing properties, comprising, in combination, a spinnerette for ejection of artificial silk filaments, a spinning bath for coagulating the filaments, a rotating godet roll for the filaments, a rotating centrifugal spinning bucket for spinning the filaments into a yarn cake, and means for progressively increasing the speed of at least one of said rotating elements to overcome the detrimental effect that decreased centrifugal force would otherwise have upon the dyeing properties of the yarn.

17. Apparatus for spinning, according to the centrifugal spinning bucket method, artificial silk having improved uniformity of dyeing properties, comprising, in combination, a spinnerette for ejection of artificial silk filaments, a spinning bath for coagulating the filaments, a rotating godet roll for the filaments, a rotating centrifugal spinning bucket for spinning the filaments into a yarn cake, and means for progressively varying the speed of at least one of said rotating elements, while spinning each yarn cake, to produce a yarn cake in which yarn from all parts of the cake can be dyed with substantial uniformity.

18. In the manufacture of rayon yarn by the centrifugal spinning process, the method of producing yarn having improved uniformity of dyeing qualities, which comprises ejecting a cellulosic solution from a spinnerette into a spinning bath, leading the resulting filaments over a godet wheel to a centrifugal spinning pot, spinning and collecting the filaments into a yarn cake in said pot by rotation of the pot, and progressively increasing a component of tension applied to the moving filaments during the collection of the yarn cake in said pot, to offset effects which would otherwise arise from decreasing internal diameter of the cake of collected filaments in the spinning pot during formation of the yarn cake, whereby the dyeing-quality of the yarn in different parts of the yarn cake is rendered more nearly uniform.

19. In the manufacture of rayon by the centrifugal spinning process, the method of producing yarn of improved uniformity, which comprises ejecting a cellulosic solution from a spinnerette into a spinning bath, leading the resulting filaments over a godet wheel to a spinning pot and collecting the filaments therein, and, during the travel of the filaments from the spinnerette to the pot, applying tension to the filaments and causing said tension progressively to increase as the internal diameter of the package of collected filaments decreases, to offset variations which would otherwise cause non-uniformity of the collected yarn.

20. Apparatus for spinning artificial silk having improved uniformity of dyeing properties, comprising, in combination, a filament-ejecting spinnerette, a bath for coagulating the ejected filaments, a rotating collector for the filaments, and means for progressively increasing the tension on the filaments prior to their introduction into the collector, as the internal diameter of the collected package of filaments decreases, to overcome detrimental effects which such decreasing internal diameter of the collected package of filaments would otherwise have upon the dyeing properties of the silk.

21. In the manufacture of rayon by the centrifugal spinning bucket method, the process of producing artificial silk having improved uniformity of dyeing properties, comprising, in combination, the steps of ejecting artificial silk from a spinnerette, passing the ejected filaments through a spinning bath, passing the filaments over a rotating godet roll and into a rotating centrifugal spinning bucket, spinning the filaments into a yarn cake in said centrifugal bucket, and progressively varying the speed of at least one of said rotating elements, to overcome the detrimental effect that decreased centrifugal force would otherwise have upon the dyeing properties of the yarn.

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