

Nov. 15, 1938.

H. B. KLINE

2,136,386

MANUFACTURE OF THREAD OR THE LIKE

Filed March 26, 1935

2 Sheets-Sheet 1

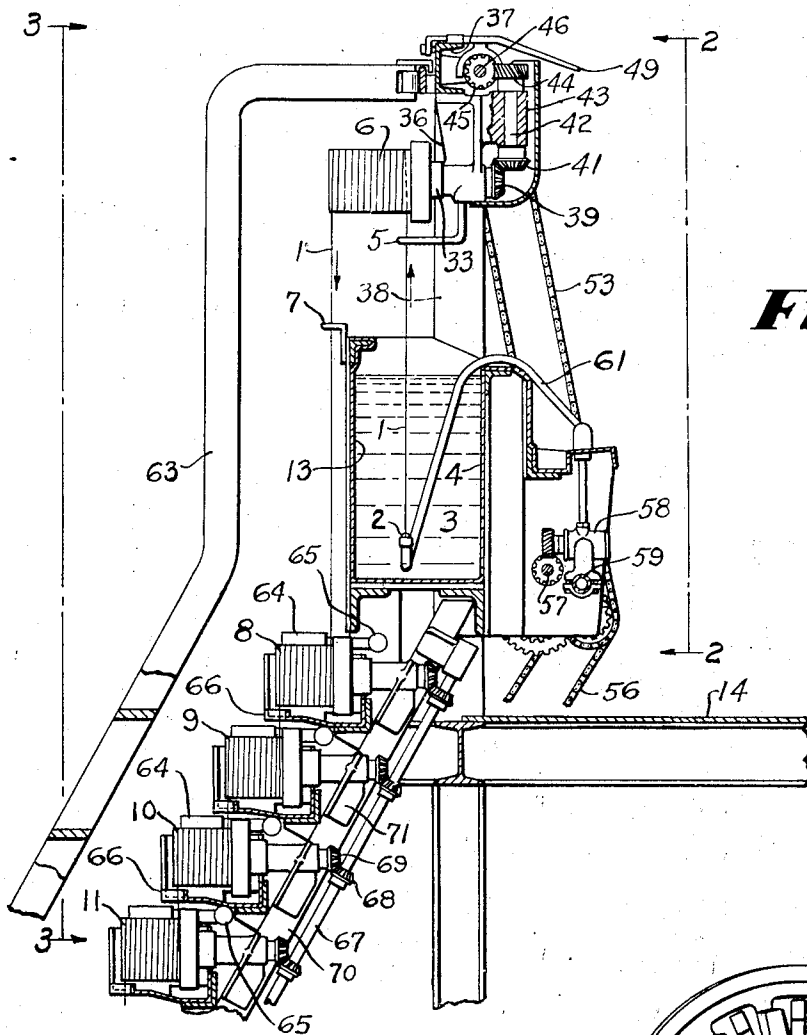


Fig. 1

Fig. 4

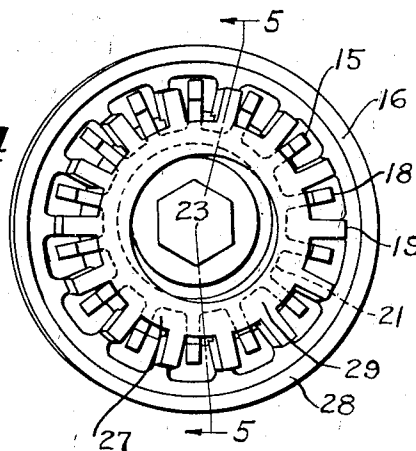
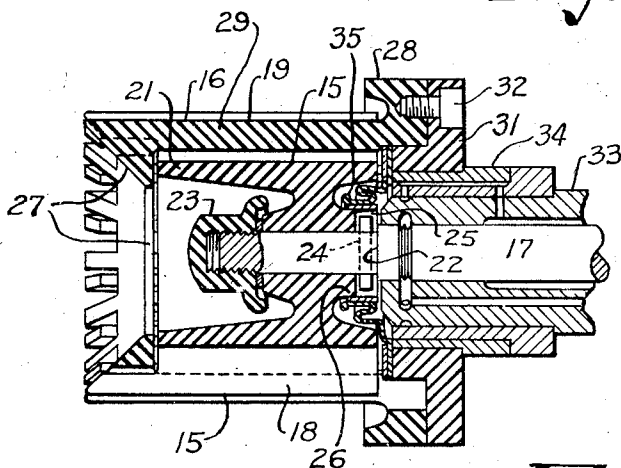


Fig. 5

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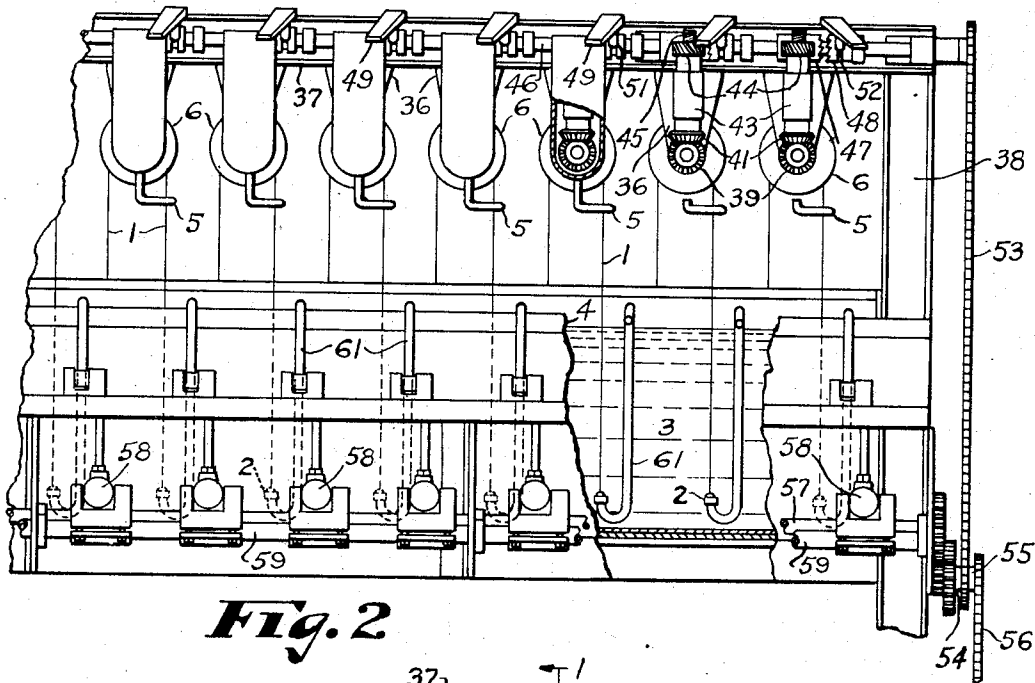


Fig. 2

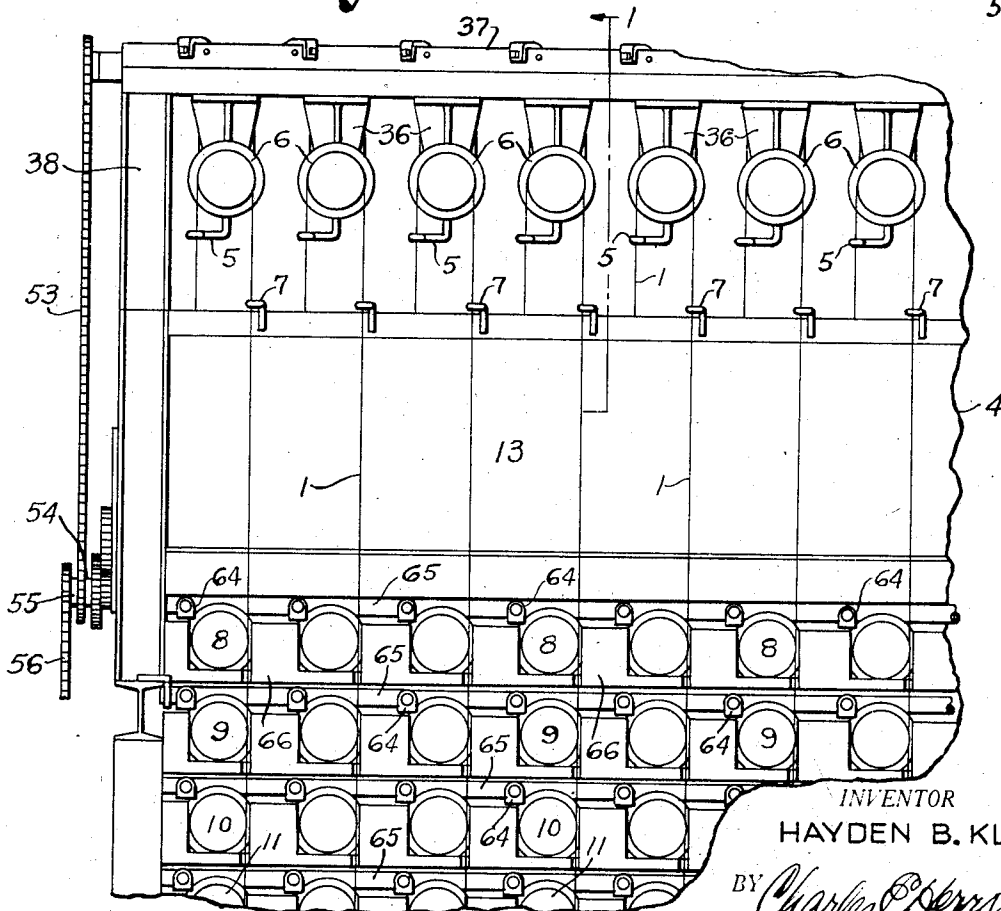


Fig. 3

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MANUFACTURE OF THREAD OR THE LIKE

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Application March 26, 1936, Serial No. 71,020

3 Claims. (Cl. 18—8)

This invention relates to apparatus for the manufacture of thread or the like.

Broadly speaking, the invention is directed to apparatus comprising a trough containing liquid coagulant in which thread or the like, such, for example, as artificial silk thread or the like, is formed by a process of extrusion from a spinning nozzle; a thread-storage, thread-advancing device disposed above the trough with its receiving end generally over the trough and its discharge end extending beyond the lateral limits of said trough; and suitable take-up means; e. g., one or more thread-storage, thread-advancing devices to which the thread or the like passes from said first mentioned thread-storage, thread-advancing device and on which the thread or the like is subjected to processing treatment. The invention is well adapted to employment in apparatus for the manufacture of thread or the like, such as artificial silk thread or the like, of the general type of that shown, claimed and described in prior application Serial No. 7,114, filed February 18, 1935, by Walter F. Knebusch and Alden H. Burkholder.

In the drawings, forming a part hereof, Figure 1 is a sectional elevation, from line 1—1 of Figure 3, of a portion of continue apparatus embodying the invention. Figure 2 is an elevation from line 2—2 of Figure 1 showing the working face of the trough, together with the apparatus associated with said trough, parts being shown as broken away. Figure 3 is an elevation from line 3—3 of Figure 1 of the apparatus. Figure 4 is an end elevation of one form of thread-storage, thread-advancing device which may be employed in apparatus embodying the present invention. Figure 5 is a longitudinal sectional elevation from line 5—5 of Figure 4 of the thread-storage, thread-advancing device of Figure 4. In the drawings, like reference numerals refer to like parts throughout.

While the apparatus is capable of use in the manufacture of various kinds of thread or the like, as, for example, viscose, cuprammonium, nitrocellulose, or cellulose acetate artificial silk thread, it will be described hereinafter as applied to the manufacture by a continuous process of multiple filament viscose artificial silk thread.

In the apparatus illustrated, the thread 1 is formed by extrusion of viscose from the spinning nozzle 2 immersed in the liquid coagulating bath 3 contained in the longitudinally extending trough 4. The thread passes upward out of the bath 3 through guide 5 to the thread-storage, thread-advancing device 6 disposed above the

trough 4, on which it is temporarily stored and axially advanced and from which it passes downward through guide 7 to a series of other thread-storage, thread-advancing devices on each of which it may be subjected to suitable processing treatments. As many thread-storage, thread-advancing devices as is desirable may be provided for the thread 1 after it leaves the first thread-storage, thread-advancing device 6, four, bearing reference numerals 8 to 11, inclusive, being illustrated.

The thread-storage, thread-advancing device 6 is preferably of a type adapted by the action of the elements thereof to store and advance the thread axially thereof in a plurality of generally helical turns, and, as shown, may be of cantilever form; i. e., supported and driven from one end only, the other end being free and unobstructed. According to the present invention, the thread-storage, thread-advancing device 6 is disposed above the trough 4 with its thread-receiving end located generally over the spinning nozzle 2 and its thread discharge end located beyond the lateral limits of the trough 4. In the embodiment shown, the thread-storage, thread-advancing device 6 is of cantilever form and disposed with its thread-receiving end directly over the spinning nozzle and with its discharge end beyond the lateral limits of trough 4 as defined by wall 13. The thread-storage, thread-advancing device 6 is shown as mounted with its free end extending away from the working face of trough 4, defined as that face of the trough from which access may be had to the spinning nozzles, spinning pumps, etc., by an operator who, in the apparatus shown, may stand on platform 14.

The thread is withdrawn from the spinning nozzle 2 by the thread-storage, thread-advancing device 6 and advanced thereby away from the working face of the trough to a point past the lateral limits of the trough, from which point it is withdrawn by a suitable device, as a succeeding thread-storage, thread-advancing device. If desired, no processing medium is applied to the thread while it is stored on the thread-storage, thread-advancing device 6 which may, under these circumstances, provide an additional period for coagulation of the thread before it is passed to a succeeding device, in addition to performing the functions of withdrawing the thread from the spinning nozzle in the coagulating bath and passing it to the succeeding device.

The thread-storage, thread-advancing device 6, as well as thread-storage, thread-advancing devices 8 to 11 of the apparatus shown may, if 55

desired, take the form of reels of the form illustrated in Figures 4 and 5.

This reel is of a type similar to the reel shown, described and claimed in a prior application, Serial No. 652,089 entitled "Winding reel" filed January 16, 1933, by Walter F. Knebusch, to which reference may be had if desired. From Figures 4 and 5 it can be seen that each reel comprises two rigid, generally cylindrical members 15 and 16. Member 15, which may be termed the concentric member, is mounted concentrically upon and for rotation with drive shaft 17 and has its periphery comprised of a plurality of bar members 18. Member 16, which may be termed the eccentric member, is rotatably mounted with its axis slightly offset from and askew to that of concentric member 15 and has its periphery comprised of a plurality of bar members 19 equal in number to bar members 18 and alternately disposed therewith.

Concentric member 15 may be formed as shown, having the bar members 18 formed on the periphery of a hollow cylindrical body 21, in which case great rigidity is imparted to the bar members 18. While member 15 may be mounted on the drive shaft 17 in various manners, in that shown it is held against shoulder 22 formed on drive shaft 17 by cap-nut 23 which is threaded on the end of reel drive shaft 17. Member 15 is caused to rotate with the drive shaft 17 by means of a pin 24 through the shaft 17, the projecting ends of which pin extend into a slot 25 formed in the hub 26 of concentric member 15. The projecting end of the drive shaft 17 and the nut 23 are thus contained within the body 21 of member 15 and therefore protected from any processing liquids which may be used.

The bar members 19 of eccentric member 16 may be provided at their outer ends with annular reinforcing rib 27, and may be supported from a ring-like portion 28 at their inner ends. Eccentric member 16 may thus constitute an extremely rigid, generally cylindrical, cage-like member 29 mounted on a rigid annular supporting member 31, as by bolts 32. Annular supporting member 31 is rotatably supported in offset and askew position with respect to the axis of concentric member 15 by being mounted in the desired position on frame member 33, the shaft 17 being journaled in or otherwise supported in correct relationship with frame member 33. The bushing 34 may be provided in annular supporting member 31 to act as a bearing if desired. Flexible sealing means 35 may be furnished if desired to prevent corrosion of the bearing members.

Rotation of the reel drive shaft 17 causes concentric member 15 fixed thereto to rotate, whereby contact of bar members 18 of concentric member 15 with bar members 19 of eccentric member 16 causes said eccentric member to rotate at the same angular speed. During such rotation, the offset relation with the generally cylindrical members 15 and 16 causes the thread to transfer from the bar members of one generally cylindrical member to the bar members of the other generally cylindrical member. At the same time, the askew relationship of said generally cylindrical members causes the thread to advance in a plurality of spaced, generally helical turns.

While the reels 6 may be mounted in various ways in the desired position above the trough 4, in the arrangement shown each reel 6 is supported by a bracket 36 on which is mounted reel frame member 33. The brackets 36 are mounted

on a horizontal frame member 37 which extends longitudinally above the trough 4 and is supported by vertical columns 38. Each reel 6 in the apparatus shown is rotated by a bevel gear 39 mounted on the drive shaft 17 of the reel, which is driven by a bevel gear 41 fixed to the short shaft 42 journaled in a bearing member 43 supported by bracket 36, to which short shaft 42 is fixed a helical gear 44 driven by a helical gear 45. The helical gears 45 for the reels 6 are adapted to be rotated by a shaft 46 extending along the frame member 37 longitudinally of the trough 4.

It has been found desirable to provide means for stopping each of the reels 6 independently of the others; therefore in the apparatus illustrated clutch means are provided to disconnect each of the reels 6 from the drive shaft 46. For this purpose, each helical gear 45 is rotatably mounted on drive shaft 46 and has mounted on it a clutch member 47 which is adapted to be engaged by a clutch member 48 slidably mounted for rotation with shaft 46. Clutch member 48 is engaged with clutch member 47 by a handle lever 49 which operates the shifter fork 51 disposed in the groove 52 of clutch member 48. It is apparent from Figures 2 and 3 that the manner shown of mounting and driving the reels 6 provides space between these reels, which is advantageous when it is desired to thread up or start the thread 1 on the reels 6 or for other manipulation of the thread thereon.

The shaft 46 is driven by chain 53 which is driven by sprocket 54 adapted to be rotated by means of a sprocket 55 which is driven by a chain 56 from a suitable source of power. The pump drive shaft 57 for the spinning pumps 58 may also be driven from sprocket 55 and chain 56. If desired suitable change speed mechanism (not shown) may be provided to adjust the speed of the pump drive shaft 57 with respect to the reels 6 and/or sprocket 55. It can be seen, in the illustrated embodiment, that the reels 6 are rotated in timed relation with the pump drive shaft 57, thus providing a constant take-up of the thread 1 formed by extrusion of viscose through spinning nozzle 2 by the corresponding spinning pump 58, thus providing uniformity of the thread. The spinning pumps 58 may be mounted in a conventional manner on a viscose supply conduit 59 and driven from drive shaft 57 through suitable gears, each pump 58 communicating with its corresponding mass tube 61 on which is supported a spinning nozzle 2.

While the thread-storage, thread-advancing devices 8 to 11 may be of any suitable form and arranged in any one of various ways, they have been shown as being of cantilever form and disposed in an arrangement similar to that described in said prior Knebusch and Burkholder application, in which they are shown as disposed in a plurality of conjugated vertical series. In each vertical series the thread-storage, thread-advancing reels are disposed in stepped arrangement with the thread receiving end of each reel adjacent the thread discharge end of the preceding reel, the open ends of the reels all facing an operator who may gain access thereto as from a ladder 63 which may be adapted for sliding movement along the face of the machine. This arrangement of the reels 8 to 11 provides advantages in allowing access to these reels for starting the thread thereon, inspection, repair, etc. In addition, the reels in adjacent vertical series may be disposed in corresponding positions, thus pro-

viding advantages in the construction of the processing medium supply and removal systems, since such systems may extend longitudinally of the machine and serve all reels in corresponding positions in adjacent vertical series.

While more than one processing treatment may be applied to the thread on each of reels 8 to 11, inclusive, in the apparatus shown the thread is subjected to a single liquid processing treatment on each reel. In the case of viscose thread, the thread may be desulphurized on reel 8, washed on reel 9, bleached on reel 10, washed on reel 11, etc. The processing liquid may be supplied to the thread on each reel from a reagent distributor 64 positioned above the reel, said reagent distributor being supplied from a conduit 65 which may extend longitudinally of the machine and serve like reels in a horizontal series. The processing liquid may be collected in a trough 66 beneath each reel, which trough may likewise extend longitudinally of the machine and serve all corresponding reels of a horizontal series. The drain from each of the troughs 66 may communicate with a sewer in the case of liquids which it is desired to use only once, such as wash water, or with makeup and recirculating systems in the case of liquids which it is desired to re-use.

In the apparatus shown, each of the reels 8 to 11, inclusive, in a single vertical series is driven from an inclined shaft 67 through gears 68, 69. Each of the shafts 67 is mounted along the inclined beam 70 on which are mounted the brackets 71 which support reels 8 to 11, inclusive. Shafts 67 may be driven by a suitable driving means common to all, which means may also drive the chain 56, from which the drive shaft 46 for the reels 6 and the pump drive shaft 57 are driven. By such an arrangement, all of the elements of the apparatus concerned in the manufacture and processing of thread, such as pump 68, reel 6 and reels 8 to 11, may be driven in timed relation.

It is apparent that various modifications may be made in the apparatus illustrated without in any way departing from the spirit of the invention. For instance, the invention is not restricted to employment of the particular type of thread-storage, thread-advancing device illustrated, since other types may be used either for reel 6 or in place of reels 8 to 11, etc. It is intended that the patent shall cover, by suitable expression in the appended claims, whatever features of patentable novelty reside in the invention.

What is claimed is:

1. Apparatus for the manufacture of thread or the like comprising a coagulating trough; a spinning nozzle in said coagulating trough; a thread-storage, thread-advancing device of cantilever form adapted to advance thread or the like toward the unsupported end thereof in a plurality of closely spaced, generally helical turns to which thread-storage, thread-advancing device the thread or the like proceeds from said spinning

nozzle, said thread-storage, thread-advancing device being mounted directly above said coagulating trough with its supported end so disposed with respect to said spinning nozzle that the path of the thread or the like from said spinning nozzle to said thread-storage, thread-advancing device is substantially vertical and with its unsupported end extending beyond the lateral limits of said coagulating trough; and take-up means disposed below the level of the liquid in said coagulating trough to which the thread or the like proceeds from the unsupported end of said thread-storage, thread-advancing device.

2. Apparatus for the manufacture of thread or the like comprising a coagulating trough; a spinning nozzle in said coagulating trough; a thread-storage, thread-advancing device of cantilever form adapted to advance thread or the like toward the unsupported end thereof in a plurality of closely spaced, generally helical turns to which thread-storage, thread-advancing device the thread or the like proceeds from said spinning nozzle, said thread-storage, thread-advancing device being so disposed with respect to said coagulating trough that, although the unsupported end of said thread-storage, thread-advancing device extends beyond the lateral limits of said coagulating trough, said thread-storage, thread-advancing device as a whole overlies said coagulating trough, whereby coagulating liquid carried up by the thread or the like can drip from said thread-storage, thread-advancing device directly into said coagulating trough; and take-up means disposed below the level of the liquid in said coagulating trough to which the thread or the like proceeds from the unsupported end of said thread-storage, thread-advancing device.

3. Apparatus for the manufacture of thread or the like comprising a coagulating trough; a spinning nozzle in said coagulating trough; a thread-storage, thread-advancing device of cantilever form adapted to advance thread or the like toward the free end thereof in a plurality of closely spaced, generally helical turns to which thread-storage, thread-advancing device the thread or the like proceeds from said spinning nozzle, said thread-storage, thread-advancing device being so disposed with respect to said coagulating trough that between said spinning nozzle and the supported end of said thread-storage, thread-advancing device the path of the thread or the like is always within the lateral limits of said coagulating trough and upon discharge of the thread or the like from the unsupported end of said thread-storage, thread-advancing device the path of the thread or the like is always outside the lateral limits of said coagulating trough; and take-up means disposed below the level of the liquid in said coagulating trough to which the thread or the like proceeds from the unsupported end of said thread-storage, thread-advancing device.

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