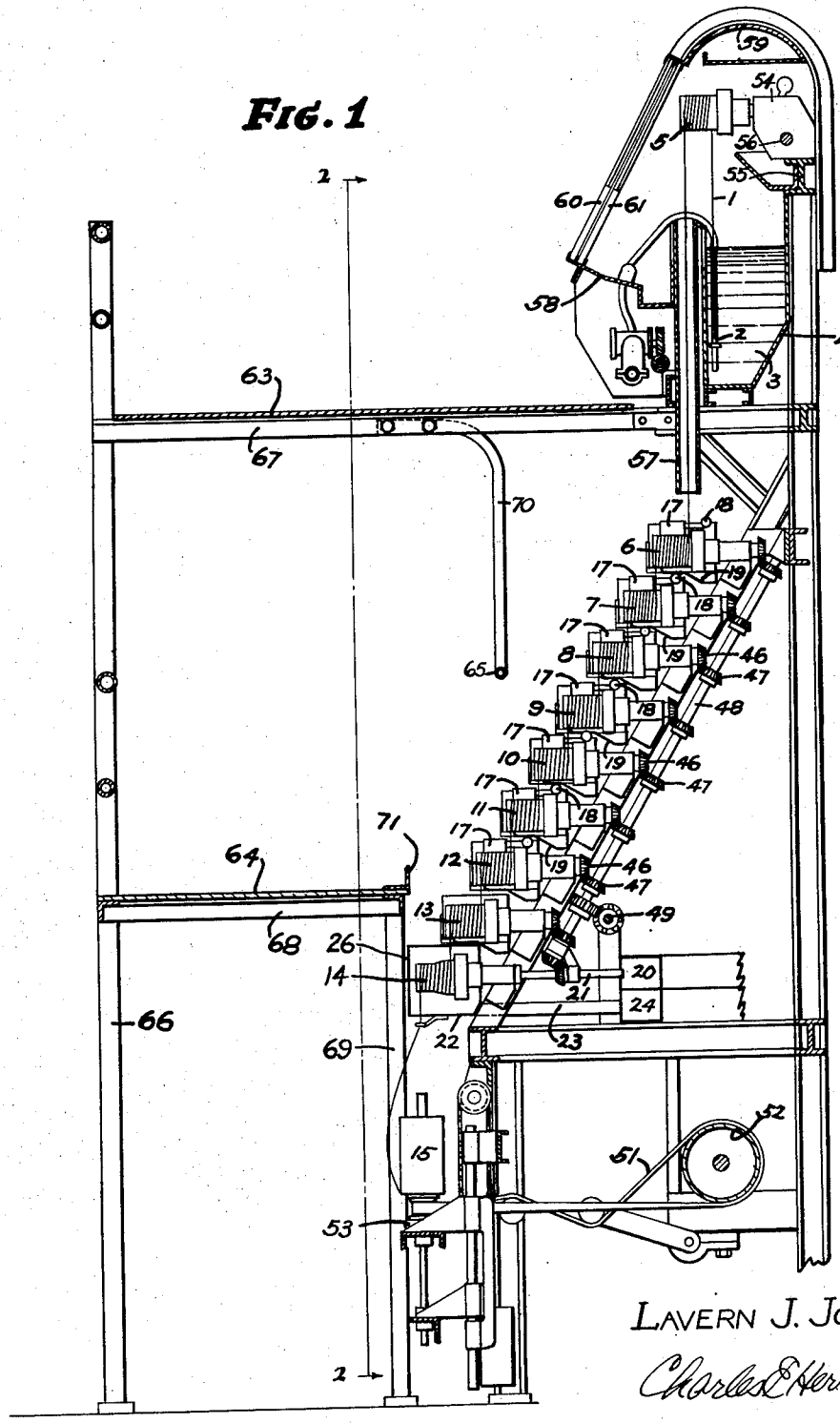
Dec. 24, 1940. L. J. JORDAN 2,225,638

APPARATUS FOR THE MANUFACTURE OF THREAD OR THE LIKE

Filed Sept. 4, 1937 2 Sheets-Sheet 1

FIG. 1



Inventor

LAVERN J. JORDAN

Charles E. Herrstrom

Attorney

Dec. 24, 1940. L. J. JORDAN 2,225,638

APPARATUS FOR THE MANUFACTURE OF THREAD OR THE LIKE

Filed Sept. 4, 1937 2 Sheets-Sheet 2

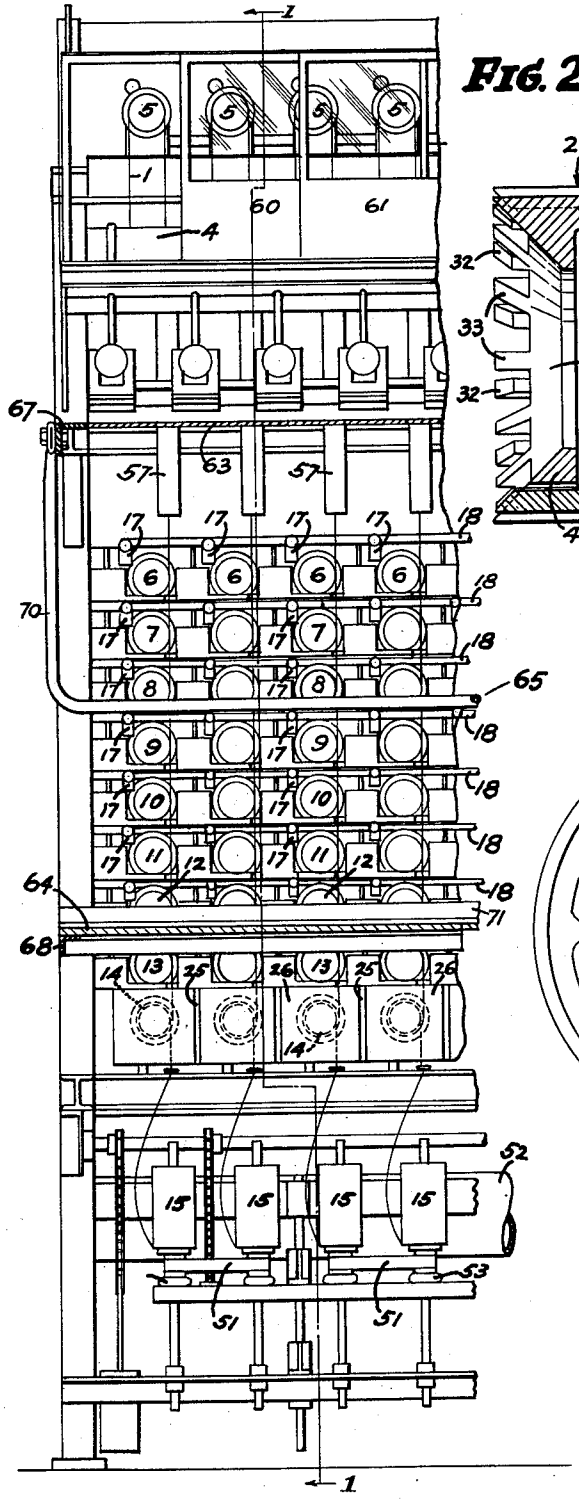


FIG. 2

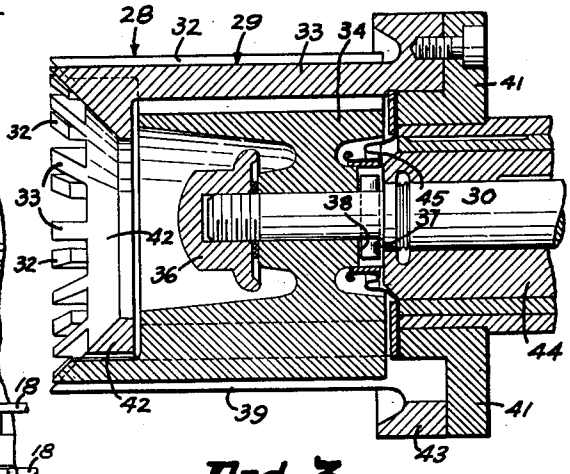


FIG. 3

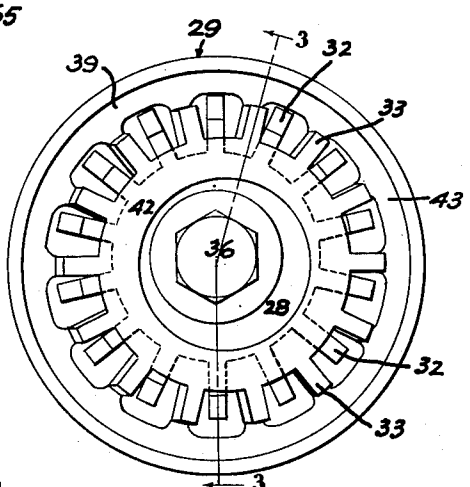


FIG. 4

Inventor

LAVERN J. JORDAN

Charles E. Morrison

Attorney

Patented Dec. 24, 1940 2,225,638

UNITED STATES PATENT OFFICE

2,225,638

APPARATUS FOR THE MANUFACTURE OF THREAD OR THE LIKE

Lavern J. Jordan, Fairview Village, Ohio, assignor to Industrial Rayon Corporation, Cleveland, Ohio, a corporation of Delaware

Application September 4, 1937, Serial No. 162,513

6 Claims. (Cl. 18—8)

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

More particularly, the invention relates to improved apparatus for manufacturing thread or the like in which the thread-forming means are positioned at the upper portion of the apparatus and the thread or the like passes from said thread-forming means to a descending series of thread-advancing thread store devices and thence to suitable collecting means. Apparatus operating on the principle outlined is shown, described, and claimed in prior application Serial No. 7,114, filed February 18, 1935, by Walter F. Knebusch and Alden H. Burkholder. The present invention pertains to apparatus of this type which provides advantages as to construction, operation, accessibility to the various portions of the apparatus for manipulation of the thread or the like, inspection, maintenance and repair, etc.

The present invention will be described as applied to apparatus for the continuous manufacture of viscose artificial silk thread, but it will be understood that the invention is not in any sense limited thereto.

In the drawings, in which is illustrated one form of apparatus embodying the invention, Figure 1 is a sectional elevation through said apparatus. Figure 2 is a front elevation of the apparatus from line 2—2 of Figure 1. Figure 3 is a sectional elevation on an enlarged scale of one form of thread-advancing thread store device which may be employed in apparatus embodying the present invention. Figure 4 is a front end elevation of the thread-advancing thread store device of Figure 3. In the drawings, like reference characters refer to like parts throughout.

In the illustrated apparatus, the thread 1 is formed by extrusion of viscose from the spinning nozzle 2 into the coagulating bath 3 contained in the trough 4 disposed at the upper portion of the apparatus. The thread is withdrawn from the trough 4 by a suitable thread-advancing thread store device 5 on which the thread is caused to wind and by which it is advanced axially of the device in a plurality of spaced generally helical turns. After leaving the thread-advancing thread store device 5, the thread passes downward to the first thread-advancing thread store device of a series of which the individual devices are designated 6 to 14, inclusive. After leaving the lowermost thread-advancing thread store device, the thread passes to suitable collecting means such as cap-twister 15.

The illustrated apparatus comprises a plurality of adjacent thread-producing units, each comprising a spinning nozzle, a thread-advancing thread store device 5, a series of like thread-advancing thread store devices 6 to 14, inclusive, and a cap-twister 15. Corresponding thread-advancing thread store devices in adjacent units are disposed in a series extending longitudinally of the machine. Inasmuch as corresponding devices are thus in corresponding positions, advantages are provided in the construction and operation of the apparatus. Among other things, the drive mechanism for the various portions of the apparatus may as a result of this arrangement be greatly simplified.

While the thread is stored on each of thread-advancing thread store devices 6 to 14, inclusive, one or more processing operations may be performed thereon, as, for example, desulphurizing, washing, bleaching, etc.

In the apparatus shown, the processing liquid applied to the thread on each of said thread-advancing thread store devices is supplied from a reagent distributor 17 which is supplied with liquid from a conduit 18 extending longitudinally of the machine and serving corresponding thread-advancing thread store devices in a horizontal series. The liquid is collected in the trough 19 disposed below the device, said trough extending longitudinally of the machine and likewise serving corresponding devices in a horizontal series. These troughs may communicate with the sewer, if the liquid is one which is to be employed only once, or with suitable recirculating and make-up means if the liquid is one which it is desired to re-use.

On thread-advancing thread store device 13 the thread may be stored to allow excess liquid to drip therefrom before the thread passes to thread-advancing thread store device 14.

In the illustrated embodiment of the invention, the thread is shown as dried on thread-advancing thread store device 14 by the action of heated air supplied from duct 20 through hollow drive shaft 21 to the interior of the device, from which, through suitable openings, the heated air passes outward to effect the drying of the thread. The air used for drying is withdrawn through conduit 23 and duct 24, of which the latter, like duct 20, extends longitudinally of the machine, thus serving a large number of thread-advancing thread store devices. Surrounding the thread-advancing thread store devices 14 is a housing 22 which is divided by suitable partitions 25 into cubicles provided, if desired, with doors 26.

The number of thread-advancing thread store devices on which the thread is processed may be

more or less than that shown, depending upon the number and kind of processing treatments which it is desired to apply.

The thread-advancing thread store devices above discussed may comprise reels of cantilever form, of which the reel of Figures 3 and 4 is illustrative. If the reels are so rotated that the thread is advanced from the supported end of each reel to the unsupported end thereof, the reels may advantageously be disposed in the stepped arrangement illustrated, with the unobstructed end of each reel in apposite relation to the supported end of the succeeding reel. Reels 6 to 14, inclusive, may thus be disposed in a bank which is inclined as a whole from the vertical, the reels being positioned in said stepped arrangement with their unsupported ends all extending toward the front of the bank.

The reel of Figures 3 and 4, which is typical of the reels that may be employed to advantage in apparatus embodying the present invention, operates on the same theory and in a manner generally similar to that of the reel shown, described and claimed in copending application Serial No. 652,089, filed January 16, 1933, in the name of Walter F. Knebusch. The illustrated reel comprises two rigid, generally cylindrical members 28 and 29. Member 28, which may be termed the concentric member, is mounted concentrically upon and for rotation with drive shaft 30, its periphery comprising a plurality of bar members 32. Member 29, which may be termed the eccentric member, is rotatably mounted with its axis slightly offset from and inclined to that of concentric member 28, its periphery comprising a plurality of bar members 33 equal in number to bar members 32 and alternately disposed therewith.

Concentric member 28 may be of the form shown, having the bar members 32 disposed on the periphery of the cylindrical body 34, in which case great rigidity is imparted to the bar members 32. While member 28 may be mounted on the drive shaft 30 in various ways, in that shown it is held against a shoulder formed on drive shaft 30 by a cap nut 36 which is threaded on the end of said drive shaft. Member 28 is caused to rotate with drive shaft 30 by means of a pin 37 which passes through drive shaft 30 and extends into slot 38 formed in the hub of concentric member 28.

Eccentric member 29 may be formed of a rigid cage-like member 39 mounted concentrically upon an annular supporting member 41. Said cage-like member 39 is formed of the aforesaid bar members 33 which are provided at their outer or unsupported ends with an internal annular reinforcing rib 42 and at their supported ends with an external annular supporting rib 43 by means of which the cage-like member 39 is mounted on said annular supporting member 41. Said annular supporting member is rotatably mounted on frame member 44 with its axis in the desired offset and inclined relation to the axis of concentric member 28, in which frame member 44 the drive shaft 30 may be journalled as shown. Flexible sealing means 45 may be provided, if desired, to prevent access of the processing liquid to the bearing members.

Rotation of the reel drive shaft 30 causes concentric member 28 to rotate, whereupon contact of the bar members 32 of said concentric member with bar members 33 of eccentric member 29 causes said eccentric member to rotate at the same angular speed. During such rotation, the thread supplied to the reel is wound thereon, the offset relationship of the axes of the two reel members causing the thread to transfer from the bar members of one generally cylindrical reel member to those of the other reel member. Simultaneously, the inclined relationship of the generally cylindrical reel members causes the thread to advance longitudinally of the reel in a plurality of spaced generally helical turns, the direction of the inclination of the reel members being, of course, such that the thread is caused to advance in the desired direction lengthwise of the reel during the rotation of said reel members in the desired direction.

All reels may be of the same general type and operate in the same manner, reel 14 being suitably modified to permit the heated drying air to be applied to the thread from the interior of the reel.

Each of reels 6 to 14, inclusive, in each vertical series may be driven through gears 46 and 47 from a drive shaft 48, which is driven by a drive shaft 49 extending longitudinally of the machine and is adapted to rotate the drive shafts 48 for the various series of reels. As illustrated in the drawings, the thread preferably passes directly from drying reel 14 to a cap-twister 15, which may be actuated in any suitable manner. In the apparatus illustrated, a belt 51 driven by a rapidly rotating drum 52 rapidly rotates the bobbin-supporting whirls 53 for a pair of adjacent cap-twisters, while said whirls are vertically reciprocated by suitable means, not shown.

In the illustrated apparatus, the reels 5 extend in the same direction as do processing reels 6 to 14, inclusive, the working face of the trough 4 in which the thread is formed; i. e., the face of the trough from which the operator has access to the trough, being accessible from the same side of the machine as are the processing reels. The reels 5 are thus disposed above the trough with their unsupported ends extending toward the working face of the trough. Each of said reels is supported from a housing 54 carried by a frame member 55 at the rear of the trough 4, being driven from a drive shaft 56 which extends longitudinally of the machine and drives the several reels 5.

Each thread 1 is withdrawn from the spinning nozzle in which it is formed by the corresponding reel 5, by which reel it is also advanced toward the working face of the trough. The thread leaves said reel at the unsupported end thereof and passes vertically downward through a channel 57 alongside the working face of said trough. In the illustrated embodiment of the invention, channel 57 is disposed outside of said trough on the same side thereof as working deck 58. The channel 57 protects and provides a clear passage for the thread as it passes to the succeeding reel 6, which is the first of the series of processing reels.

In the embodiment shown, the space above the coagulating bath is enclosed by a hood 59 which serves to collect and provide for the withdrawal of fumes given off during the spinning operation. Said hood 59 is provided with sliding doors 60, 61, which extend longitudinally of the apparatus by means of which access may be had to the trough 4, reels 5, etc. The doors 60, 61, may, as illustrated, be slidable in separate tracks disposed at the edge of the working deck and at the front of the hood, so that they may overlap when they are retracted to provide access to the trough. Thus, in Figure 2, the doors are disposed in a position in which one overlaps the other to pro-

vide access to the reel 5 at the left-hand end of the machine.

In the illustrated apparatus, platforms are provided from which operators may have access to the various parts of the machine. From platform 63, disposed adjacent the upper portion of the bank of reels 6 to 14, inclusive, access may be had to the thread-forming means including the coagulating trough 4, spinnerets 2, reels 5, the spinning pumps, etc., for operating and maintenance purposes. From platform 64, disposed below platform 63 and adjacent the lower portion of the series of processing reels, access may be had to the reels on which liquid processing treatments are applied to the thread. From the floor below platform 64 access may be had to the drying means and thread-collecting devices.

Platforms 63 and 64 may be supported in various ways. Thus in the apparatus shown, one end of each of platforms 63 and 64 is supported by stanchions 66 to which are fixed cross beams 67 and 68 carrying said platforms. The opposite ends of cross beams 67 for upper platform 63 are fixed to the frame of the machine, while the corresponding ends of cross beams 68 for lower platform 64 are supported by stanchions 69. A hand rail 65 for the convenience of the operators on platform 64 is shown as supported by members 70 from the cross beams 67 for the upper platform. Suitable guard rails 71 may be provided on the platforms. The design of the apparatus is preferably such, and the platforms 63 and 64 are preferably so spaced, that sufficient headroom for the operators is provided between the floor and lower platform 64 and between upper and lower platforms 63 and 64.

The machine as a whole therefore comprises a multi-stage machine in which the various operating steps may be performed by separate operators each performing specialized operations at which he is skilled. This makes for an advantageous sub-division of labor and permits the employment of labor which is less costly than would otherwise be the case. Thus an operator standing on upper platform 63 need work only at the thread-forming means. An operator standing on lower platform 64 may work only at the processing reels on which liquid processing treatments are applied. In the illustrated apparatus the lower platform 64 is so positioned that it lends itself to a scheme of operations in which the operator standing on said platform handles only the wet thread. The operator standing on the floor below said platform attends to the collecting means, the drying reels, etc., and handles only the dry thread.

There is no necessity for the operators to work simultaneously at the spinning nozzles, reels, collecting devices, etc., comprising a single thread-producing unit, with consequent loss of time, since each operator on upper platform 63 may tend a plurality of thread-forming units extending lengthwise of the machine. Each operator standing on lower platform 64 may work at several vertical series of reels, while each of the operators standing on the floor below the lower platform may likewise attend several drying reels and collecting devices. For instance, an operator on the upper platform may start several threads from the spinning nozzles over reels 5 and down through channels 57. An operator standing on the floor may, at his convenience, start the thread on the drying reels and collecting means.

Moreover, the present invention makes it possible for the operators to perform their duties without excessive movement about the apparatus, with a consequent savings in operators' time.

For such reasons, and since when each operator performs only those tasks at which he is skilled he will require less time for his duties than would otherwise be the case, it is apparent that a very economical utilization of the operators' time is made possible. Because of this fact and since, as explained above, a lower grade and consequently lower priced labor may be employed, the present invention makes possible great reductions in the labor costs required to produce the thread. Not only is the production of thread per man per hour greatly increased, but a great reduction is effected in the cost of production of the thread.

Furthermore, since the thread-forming means, processing reels, collecting devices, etc., are all accessible from the same side of the machine, numerous other advantages are derived from the invention. For instance, it is possible to construct a very compact machine which is extremely economical of floor space, such as is the machine illustrated, since the various operating stages are superposed. If, for instance, it were necessary to have access to the various thread-producing portions of the machine from both sides, it is apparent that much greater floor space would be required. It is likewise apparent that the arrangement of the present invention makes possible a machine which, due to its simplicity of design, may be constructed at low cost.

Other advantages of the invention will be apparent to those skilled in the art. It is obvious that various changes may be made in the illustrated embodiment without departing from the spirit of the invention. For instance, thread-advancing thread store devices other than the reel shown may be employed. In the appended claims, the term "thread" is intended to include, besides thread per se, all continuous length material capable of being manufactured by or handled by apparatus embraced by the claims.

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 comprising a coagulating trough having a working deck along one side thereof; thread-forming means in said trough, said thread-forming means being accessible from said working deck; a cantilever thread store device to which the thread passes from said thread-forming means disposed above said trough with its unsupported end extending toward said working deck; a descending series of cantilever thread store devices to which the thread passes from said first-mentioned thread store device, the unsupported ends of all said thread store devices extending toward the side of the apparatus on which said working deck is located; and means for collecting the thread.

2. Apparatus for the manufacture of thread comprising a coagulating trough having a working deck along one side thereof; thread-forming means in said trough, said thread-forming means being accessible from said working deck; a descending series of cantilever thread store devices to which the thread passes from said trough, the unsupported ends of all said thread store devices extending toward the side of the apparatus on which said working deck is located; and means for collecting the thread.

3. Apparatus for the manufacture of thread comprising a coagulating trough having a working deck along one side thereof; thread-forming means in said trough, said thread-forming means being accessible from said working deck; a descending series of thread store devices to which series the thread passes from said trough, said thread store devices being accessible for operating purposes from the side of the apparatus on which said working deck is located; and means for collecting the thread.

4. Apparatus for the manufacture of thread comprising a longitudinally extending coagulating trough having a working deck along one side thereof; means in said trough for forming thread, said thread-forming means being accessible from said working deck; a thread store device of cantilever form disposed above the level of liquid in said trough to which the thread passes from said thread-forming means, said thread store device having its unsupported end extending toward said working deck; and, disposed below said trough, a plurality of thread store devices of cantilever form mounted with their axes at an angle to a vertical plane passing through the longitudinal axis of said trough to which the thread passes in sequence from said first-mentioned thread store device, the unsupported ends of said thread store devices extending toward the side of the apparatus on which said working deck is located.

5. Apparatus for the manufacture of thread comprising a longitudinally extending coagulating trough having a working deck along one side thereof; means in said trough for forming thread, said thread-forming means being accessible from said working deck; means for withdrawing the thread from said trough and passing it downward beyond the lateral limits of said trough; and, disposed below said trough, a plurality of thread store devices of cantilever form mounted with their axes at an angle to a vertical plane passing through the longitudinal axis of said trough to which thread store devices the thread passes in sequence, the unsupported ends of said thread store devices extending toward the side of the apparatus on which said working deck is located.

6. Apparatus for the manufacture of thread comprising a longitudinally extending coagulating trough having a working deck along one side thereof; means in said trough for forming thread, said thread-forming means being accessible from the working face of said trough; and, disposed below said trough, a plurality of thread store devices of cantilever form mounted with their axes substantially at right angles to a vertical plane passing through the longitudinal axis of said trough to which thread store devices the thread passes in sequence, the unsupported ends of said thread store devices extending toward the side of the apparatus on which said working deck is located.

LAVERN J. JORDAN.