

Dec. 1, 1942.

L. J. JORDAN

2,303,696

APPARATUS FOR MANUFACTURING THREAD OR THE LIKE

Filed Dec. 18, 1939

7 Sheets-Sheet 1

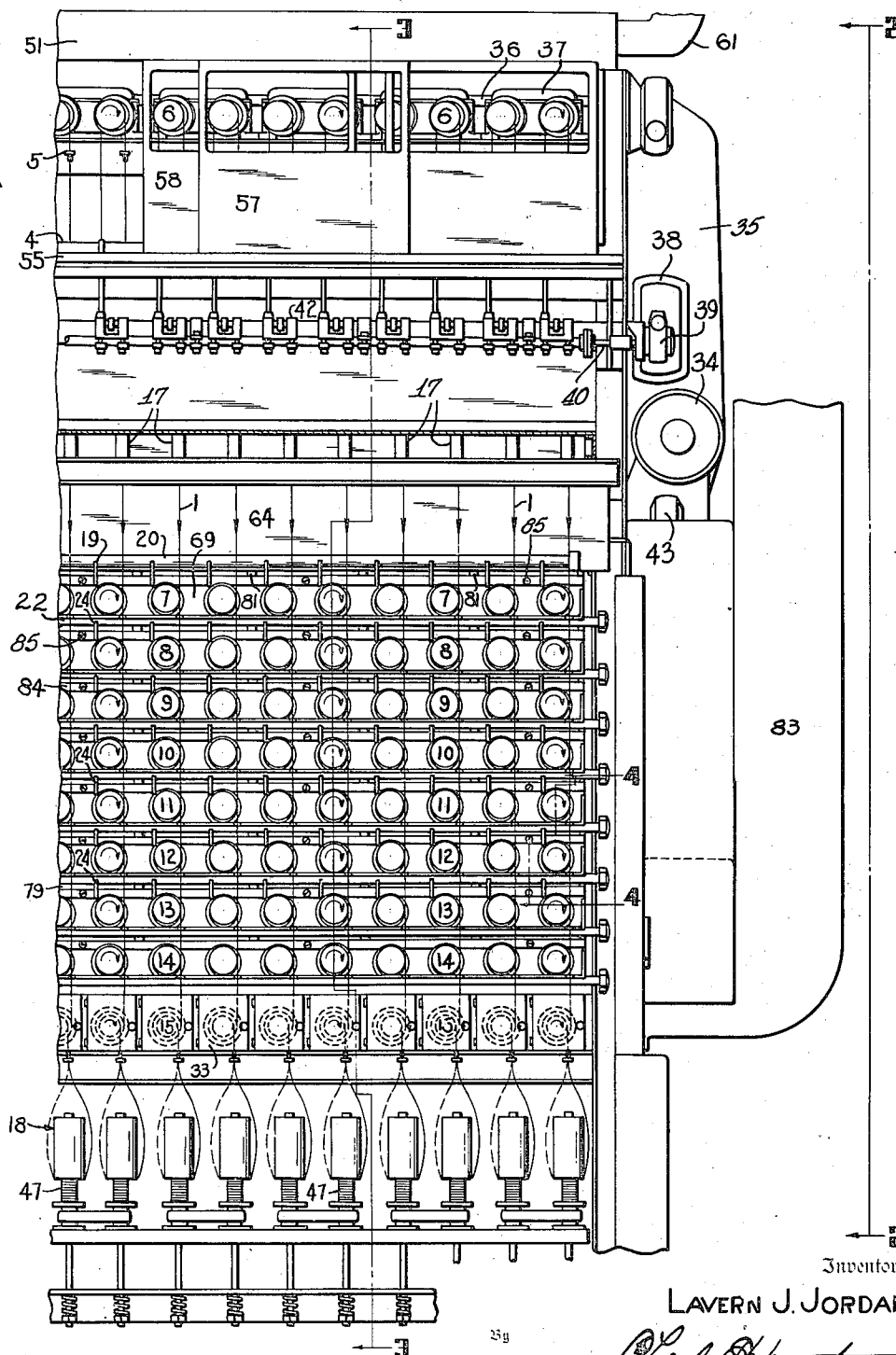


FIG. 1

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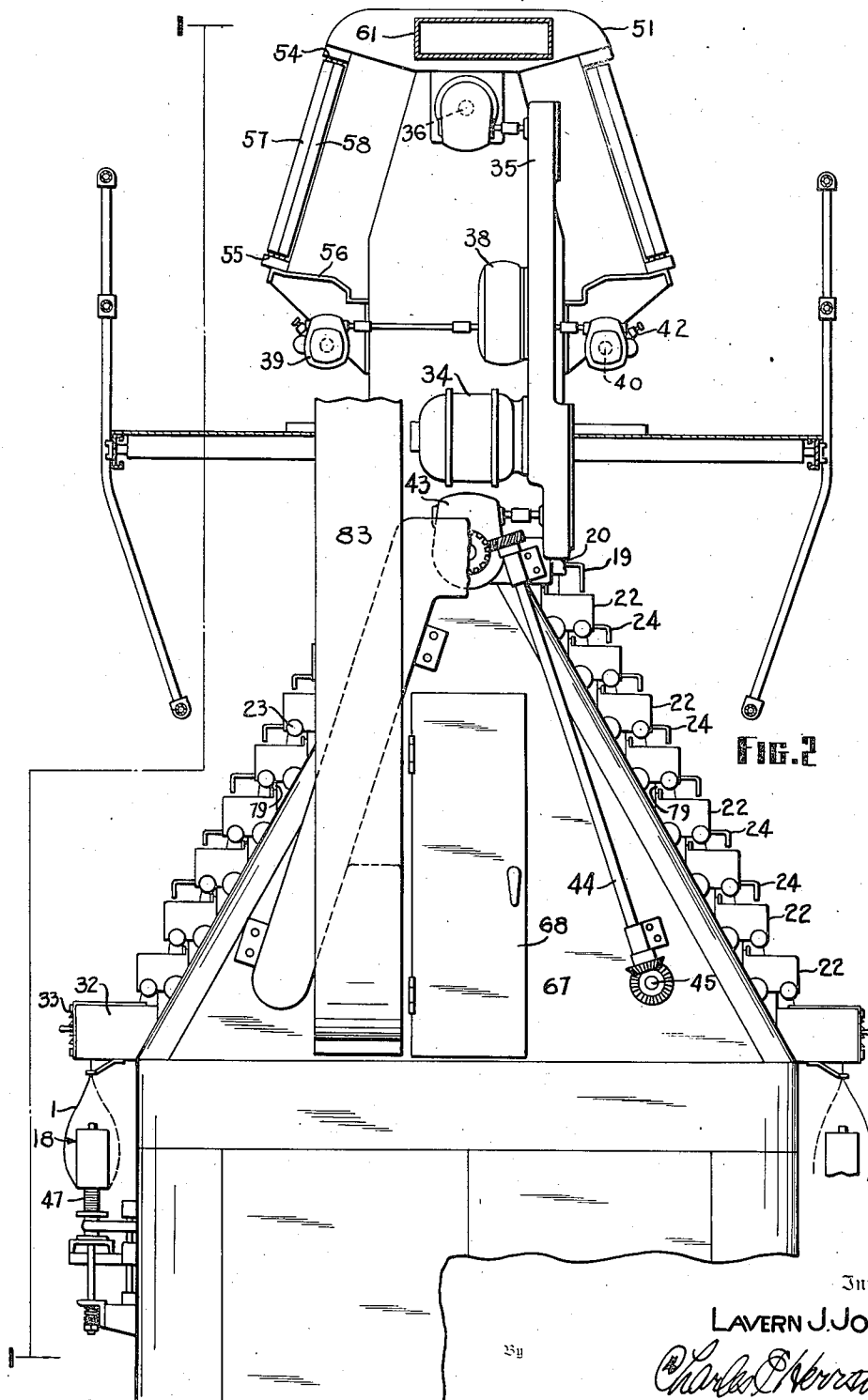
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APPARATUS FOR MANUFACTURING THREAD OR THE LIKE

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7 Sheets-Sheet 2



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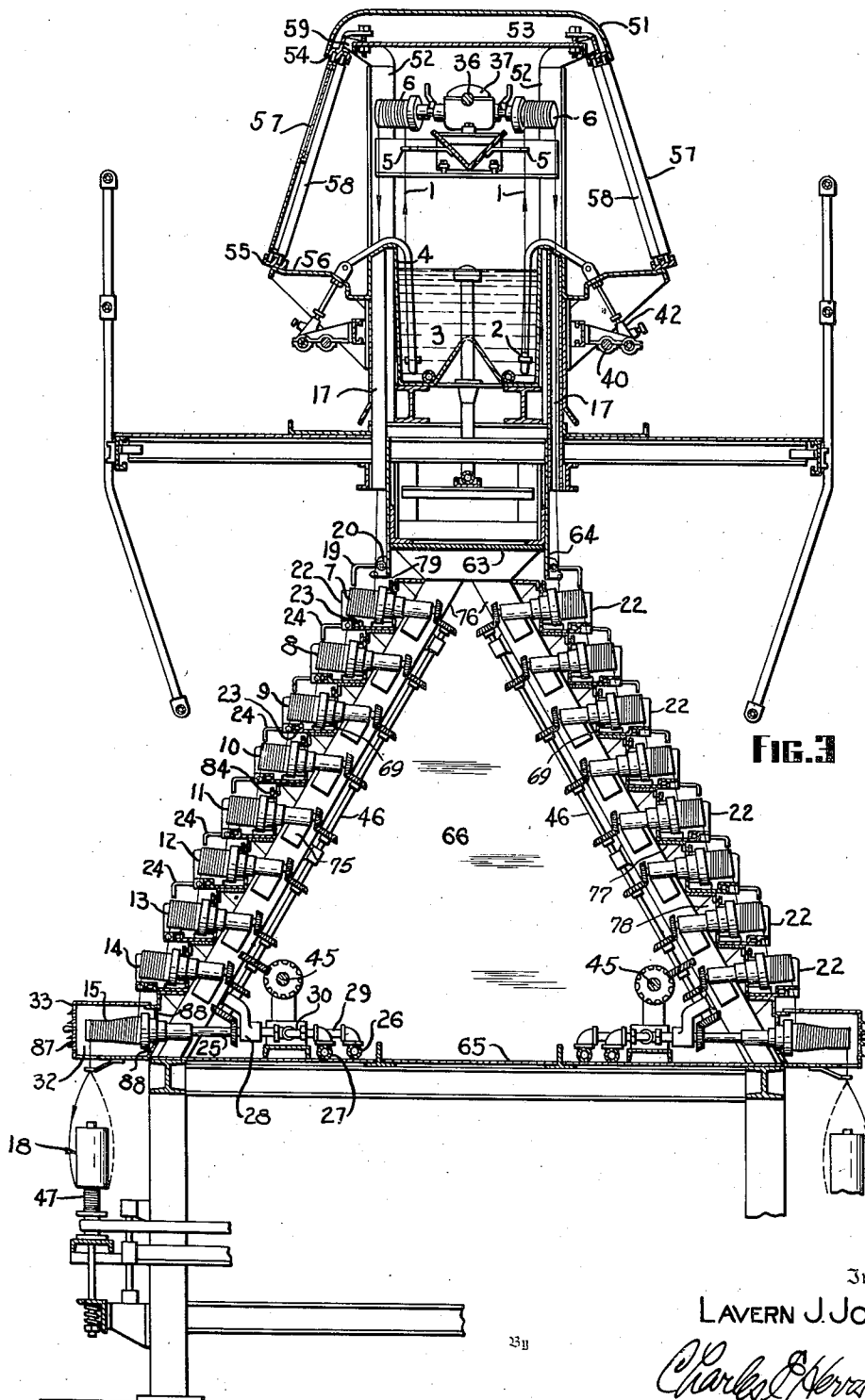
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APPARATUS FOR MANUFACTURING THREAD OR THE LIKE

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7 Sheets-Sheet 3



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APPARATUS FOR MANUFACTURING THREAD OR THE LIKE

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7 Sheets-Sheet 4

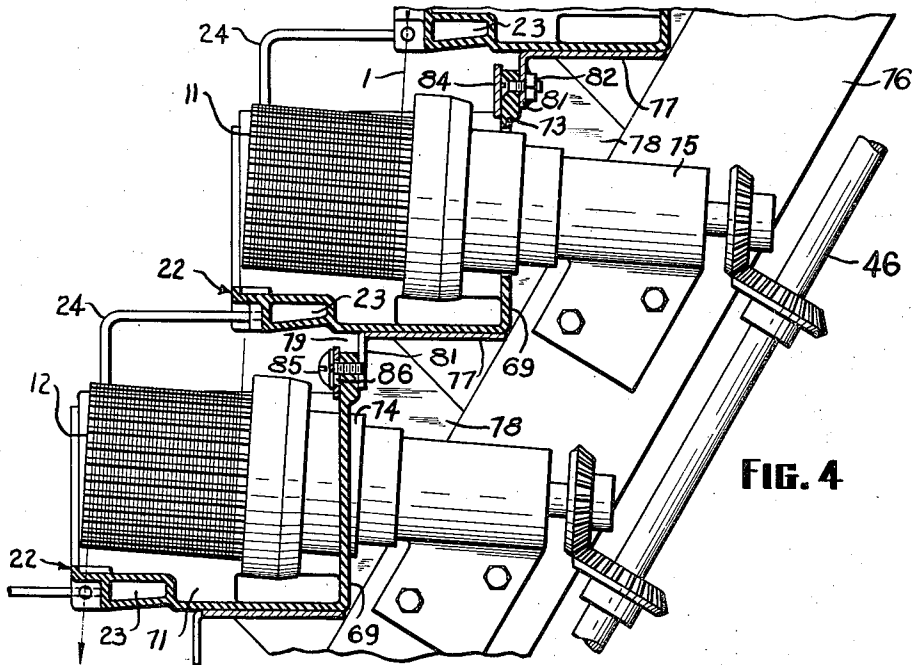


FIG. 4

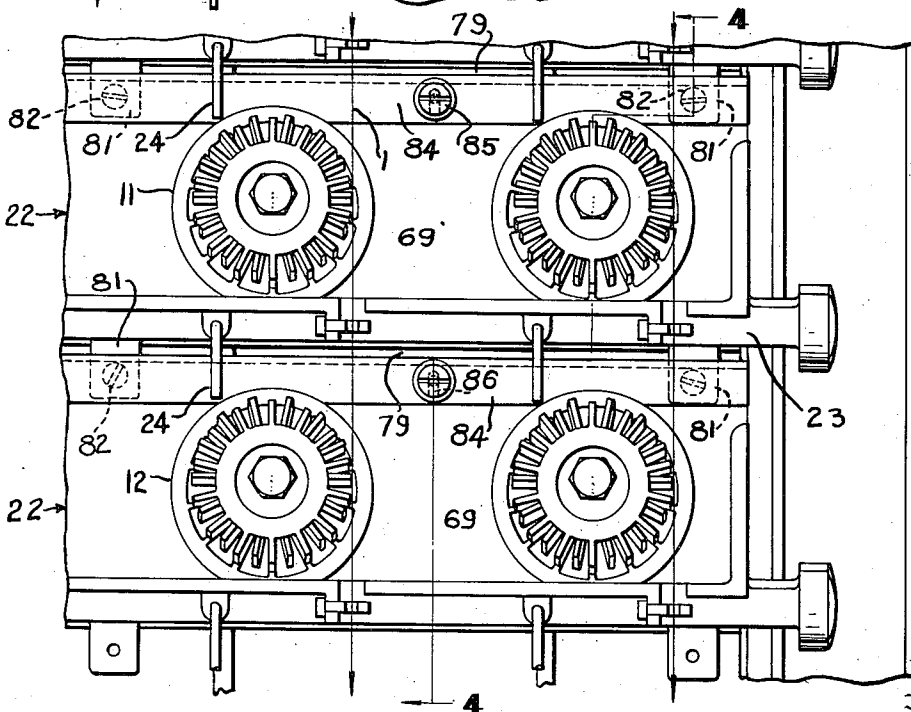


FIG. 5

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APPARATUS FOR MANUFACTURING THREAD OR THE LIKE

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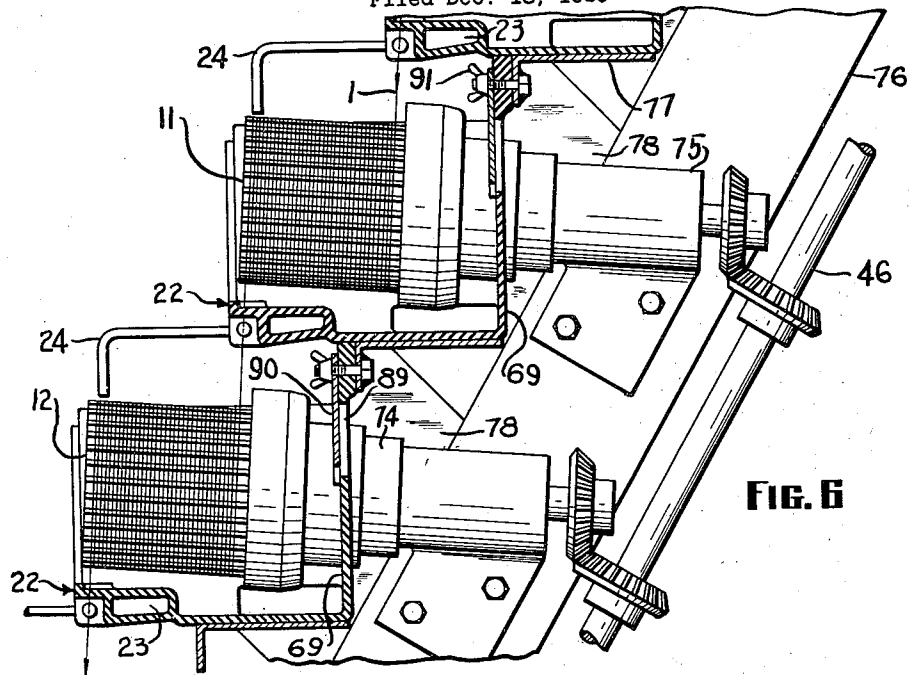


FIG. 6

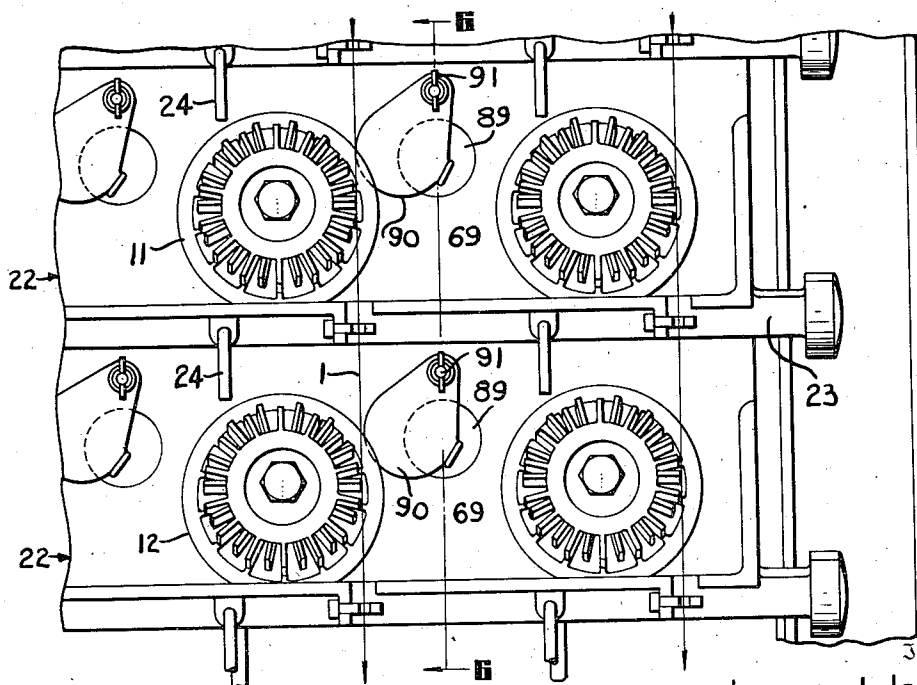


FIG. 7

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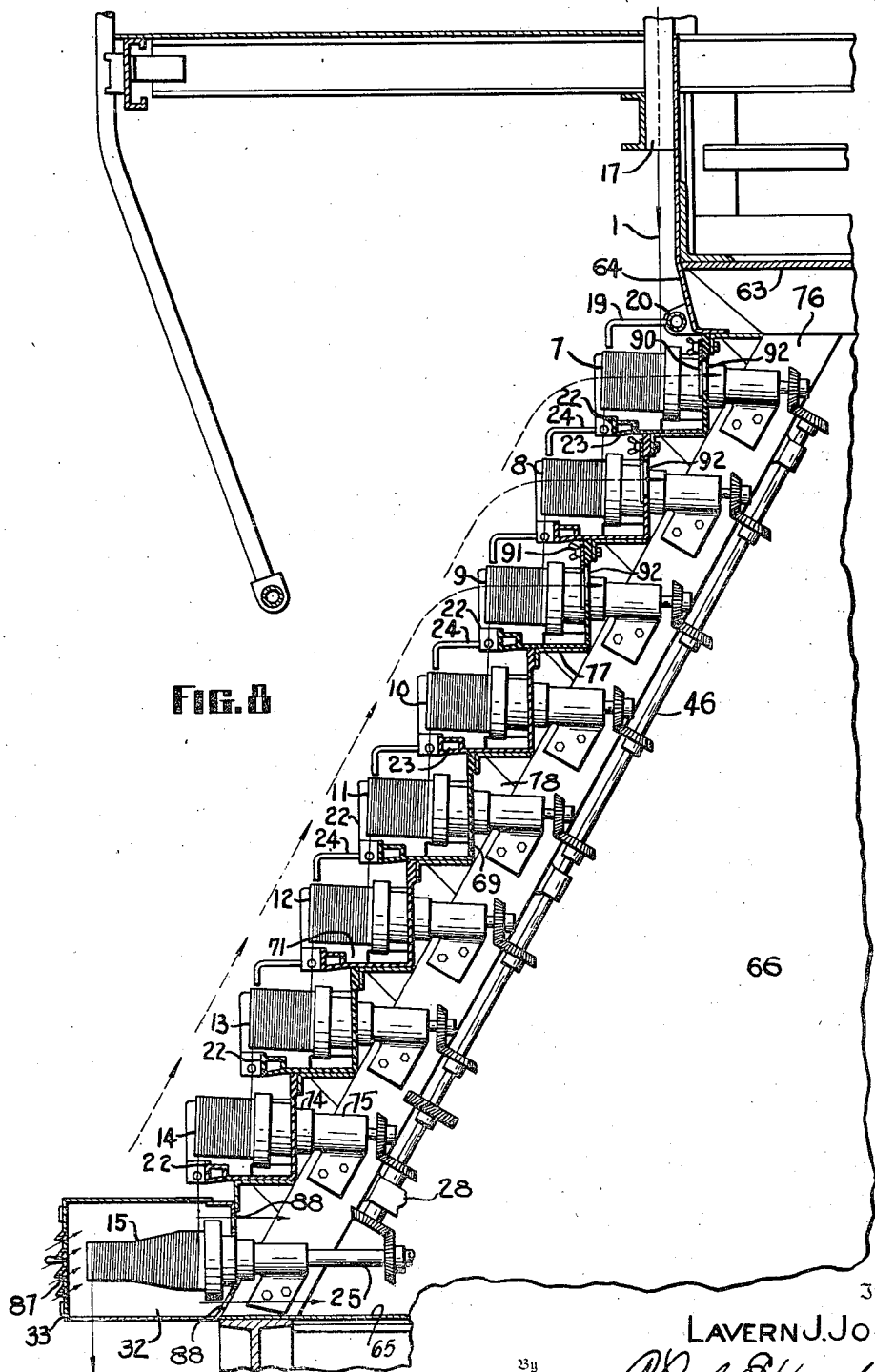
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APPARATUS FOR MANUFACTURING THREAD OR THE LIKE

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7 Sheets-Sheet 6



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APPARATUS FOR MANUFACTURING THREAD OR THE LIKE

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7 Sheets-Sheet 7

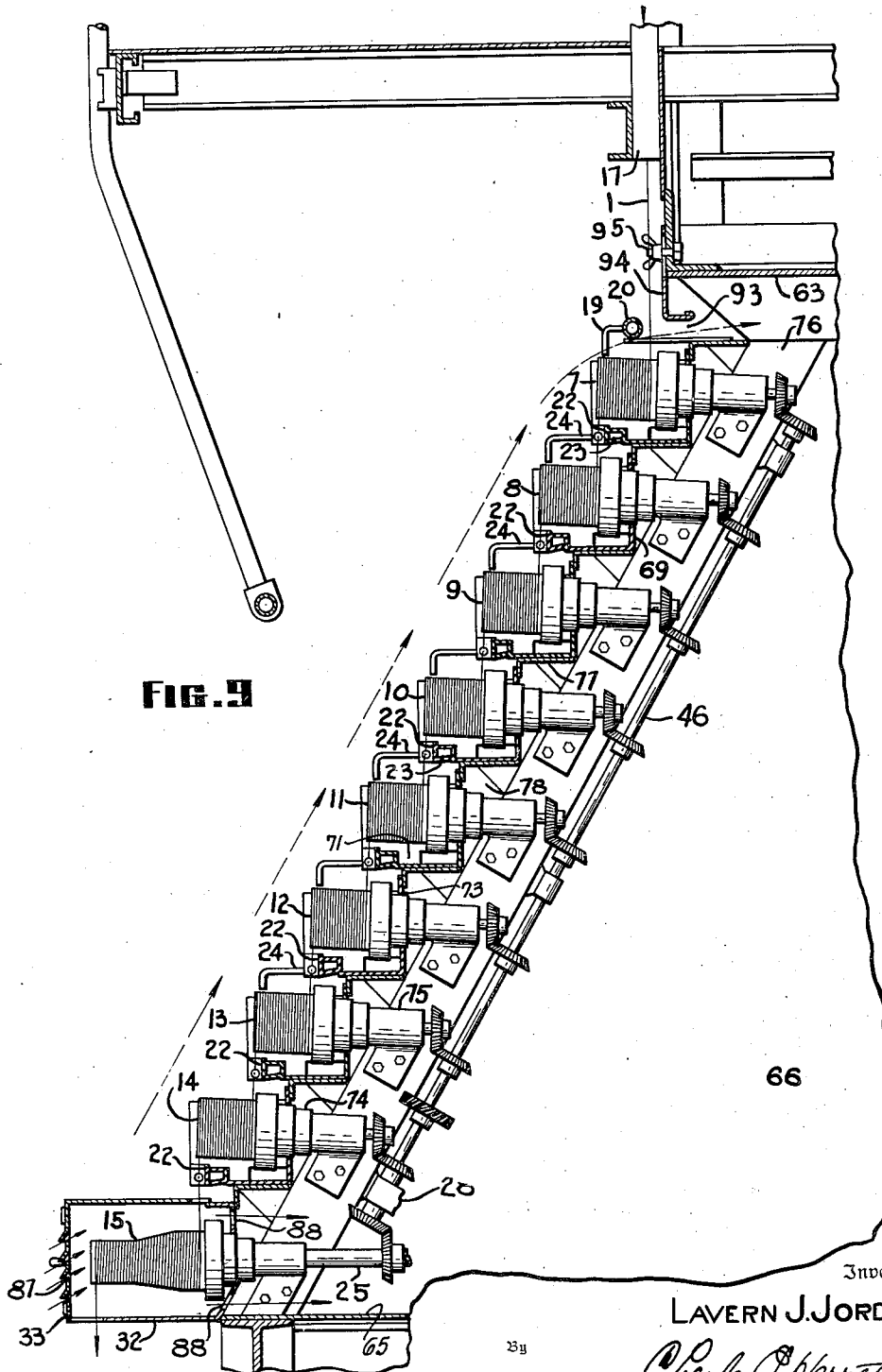


FIG. 9

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UNITED STATES PATENT OFFICE

2,303,696

APPARATUS FOR MANUFACTURING
THREAD OR THE LIKE

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Application December 18, 1939, Serial No. 309,733

12 Claims. (Cl. 18—8)

This invention relates to apparatus for the continuous processing of strip material such as thread or the like, hereinafter referred to as "thread." More particularly, it relates to means for ventilating such apparatus. For convenience, but in no sense of limitation, the invention will be described in connection with apparatus for the manufacture of viscose artificial silk thread by a continuous process generally similar to that shown, described and claimed in Knebusch et al. Patent 2,225,642.

In such a machine, a plurality of threads are formed by extrusion of viscose into a coagulating bath. Each thread is withdrawn from the bath and passed in sequence to a downwardly extending series of thread-advancing reels on each of which a long length of thread is continuously but temporarily stored in a plurality of generally helical turns. The thread is subjected to a processing liquid on each of a plurality of reels in said series, dried on another reel, and finally collected, as by a cap twister. The reels are arranged in banks one of which is disposed on each side of the machine.

As will appear, it is important to provide adequate ventilation of such apparatus.

Each machine may embody several hundred reels in a relatively small space; in a single room, several score may be disposed. Acid treating liquids are applied to the thread on some of the reels, while alkaline liquids are applied to the threads on others. Vapors are emitted by such liquids, particularly if, as is desired, such liquids are caused to spread in a thin layer over the thread on the reel. It is the practice to heat certain or all of the liquids to temperatures above room temperature, this in order to increase the speed of reaction induced by such processing liquids. Both of said factors tend to increase the rate of evaporation and hence increase the dissemination of vapors.

If no provision were made for ventilating the apparatus, the dissemination of vapors might constitute a serious problem.

Moreover, if the fullest benefits of the continuous processing operations are to be achieved, it is necessary to maintain as nearly uniform as possible the processing conditions to which the thread is subjected on each reel. This requires not only uniformity of the rates of application of the processing liquids and uniformity of the concentrations and temperatures of such liquids, but also uniformity of the atmospheric conditions surrounding the reels. For example, if the temperature or the humidity of the air surrounding

the reels varies, the processing conditions are correspondingly modified. Such variations in atmospheric conditions can occur as the result of vagrant air currents.

The condition of the air supplied to the room in which the apparatus is disposed will obviously have an effect upon processing conditions. Consequently, it is desirable, if not necessary, that the air supplied to the room in which the reels are disposed to be subjected to a conditioning operation so that it is in a predetermined condition as regards temperature and moisture content. It is desirable that the air be maintained at a relatively high temperature and a substantial moisture content, since this facilitates the handling of the thread on the apparatus. For the purposes of economy in the air conditioning operation, it is desirable that such air be recirculated, wherefore it should be recovered when it has served its purpose of ventilating the machines.

The present invention satisfies all of these requirements. Among other things, it provides an efficient apparatus for removing vapors. It provides means for efficiently maintaining predetermined atmospheric conditions in the vicinity of the reels on which processing treatments are applied to the thread. It provides for the recovery of the air and recirculation of such air, thereby rendering it possible to employ machines embodying the present invention in connection with efficient air conditioning apparatus.

The present invention provides the desired uniformity of atmospheric conditions in the vicinity of the processing reels by providing a controlled flow of air over or in the vicinity of such reels. According to one aspect of the present invention, it provides for a flow of air through the bank of reels in the vicinity of one or more of such reels in each series of reels on which a thread is treated. According to another aspect of the present invention, the air is drawn into the interior of the machine. This may be accomplished according to the present invention by drawing the air through the bank of reels into the space between the banks of reels.

These aspects of the invention and the advantages flowing therefrom, as well as other features and advantages of the invention, will be apparent from the following description in which are described several embodiments of the invention.

In the drawings, Figure 1 is a side elevation from line I—I of Figure 2 of one form of apparatus for the manufacture of viscose artificial silk thread embodying the invention and operat-

ing on the principle of the machine described in Patent 2,225,642. Figure 2 is an end elevation of the apparatus of Figure 1 from line 2—2 of Figure 1. Figure 3 is a sectional elevation of the apparatus from line 3—3 of Figure 1. Figure 4 is an enlarged detail sectional elevation of a portion of the apparatus of Figures 1 to 3, inclusive, taken from lines 4—4 of Figures 1 and 5. Figure 5 is a front elevation of the portion of the apparatus shown in Figure 4.

Figure 6 is an enlarged detail sectional elevation, corresponding generally to that of Figure 4, of another embodiment of the invention, while Figure 7 is a front elevation on the same scale of the portion of the apparatus shown in Figure 6. Figure 8 is a sectional elevation of one bank of reels on one side of such an apparatus illustrating another modification of the invention. Figure 9 is a sectional elevation on the same scale as Figure 8 of one bank of reels on one side of apparatus showing still another modification of the present invention.

In the drawings, like reference characters refer to like parts throughout.

In the apparatus of Figures 1 to 5, inclusive, each thread 1 is produced by extrusion of viscose from a spinneret 2 into a coagulating bath 3 contained in a trough 4 which extends longitudinally of the upper portion of the apparatus. Each of said threads 1 is drawn upward from the bath 3 through a guide 5 to a thread-advancing reel 6 disposed above the bath. Said reel, as are all reels on the apparatus, is of cantilever form in that it is supported and driven from one end only. As does each of the other reels on the illustrated apparatus, it advances the thread lengthwise thereof toward its unsupported end in a large number of closely spaced, generally helical turns. Each reel 6, of which one is provided for each thread, is disposed so that the point adjacent its supported end at which the thread starts on the reel is positioned substantially above the spinneret 2 from which the thread is extruded and so that the point at its unsupported end from which the thread leaves the reel is disposed beyond the lateral limits of the trough 4.

The thread passes downward from reel 6 to the first reel 7 of a downwardly extending series of reels, nine in the embodiment illustrated, bearing reference numerals 7 to 15, inclusive. A tubular passage 17 is provided for each thread at the edge of trough 4, this in order to provide a protected passageway for the thread from a point above to a point below the trough. The thread passes in sequence to each of said reels, being stored on each reel in a large number of generally helical turns which are advanced toward the unsupported end of the reel during rotation thereof. A downwardly extending series of such reels is provided for each thread, each reel in the series being employed to perform a desired step in the sequence of processing operations.

In the apparatus shown in Figures 1 to 5, inclusive, each machine produces a plurality of threads on each side thereof, the coagulating trough 4 being common for the threads produced on both sides of the apparatus. In the plurality of downwardly extending series for the plurality of threads produced on each side of the apparatus, corresponding reels are arranged in series extending longitudinally of the apparatus, as shown in Figure 1. Reels 6 to 15, inclusive, in each series on each side of the apparatus are disposed in stepped arrangement with the discharge end of each preceding reel in apposite

relation to the supported or receiving end of the succeeding reel, the axes of the reels being horizontal or substantially horizontal.

Since the unsupported ends of all reels on each side of the apparatus are presented toward the operator, advantages in the manipulation of the thread on the reels, particularly in the starting of the thread thereon, are provided. Among other things, the stepped arrangement of reels in each downwardly extending series makes it possible for the thread to pass directly from each reel to the succeeding reel substantially without bending, which feature eliminates the necessity of guides for changing the direction of and thus deleteriously stressing the thread. Furthermore, each of the illustrated machines comprises two inclined banks of reels on the opposite sides of the apparatus. At the upper portion of these banks are disposed the thread-forming means and between said banks is a substantially unobstructed space in the interior of the machine.

In the apparatus shown in Figures 1 to 5, inclusive, no processing liquid is applied to the thread on the reel 6, which is employed to provide a period for coagulation of the thread. Mildly acid liquids are applied to the thread on the succeeding reels 7 and 8, one or both of these liquids being heated considerably above room temperature to promote the reaction. On reel 9, desulphurizing liquid is applied to the thread for the purpose of removing sulphur formed during the regeneration of the cellulose from the viscose; on reel 10, washing water is applied to the thread. Bleaching liquid is applied to the thread on reel 11. Washing water is again applied on reel 12. If desired, an oiling or soaping liquid may be applied on reel 13. No liquid is applied to the thread on reel 14, this reel being employed to store the thread for a sufficient period to permit excess liquid to drip therefrom before the thread is dried on reel 15. The liquids applied on reels 8 to 13, inclusive, are preferably heated somewhat above room temperature to hasten their action upon the thread.

On each reel 7 the liquid is applied from a tube 19 communicating with a conduit 20 extending longitudinally of the apparatus and serving like reels in adjacent series. Said conduit is connected to a suitable source of liquid (not shown). A collecting trough 22 is disposed below a plurality of reels 7 extending in a longitudinal series to receive the liquid dripping from said reels. A plurality of such troughs, suitably interconnected, may extend lengthwise of the machine beneath corresponding reels and the liquid received therein may be recirculated, if desired. The liquid applied to the thread on each reel 8 is shown as supplied from a conduit 23 formed integrally with the collecting trough 22 for the preceding reel, a distributing tube 24 communicating with said conduit 23 to supply each reel 8 in the horizontal series extending longitudinally of the machine.

In a similar manner, liquid is applied to each of the succeeding reels on which the thread is to be treated from a tube 24 communicating with a conduit 23 formed integrally with the collecting trough 22 below the preceding reel.

Each of the reels on which a processing liquid is applied to the thread is preferably inclined slightly from the horizontal, the unsupported end being elevated slightly above the supported end. By such means it is possible to apply the liquid to one end only of the reel, the inclination of the reel causing the liquid to flow over the entire

thread-bearing surface of the reel. A counter-current flow of liquid along the reel, opposite the direction of travel of the thread, is thus achieved. This feature makes for economical use of processing liquid and efficiency of processing.

Each drying reel 15 on the same side of the apparatus is internally heated by means of suitable heating fluid circulated through its drive shaft 25 from supply and drain conduits 26 and 27 extending longitudinally of the apparatus and serving all the drying reels 15 in the same horizontal series. A suitable fitting 28 and tubes 29 and 30 are provided to conduct the heating fluid to and remove it from the drive shaft for each reel 15. An enclosure 32 surrounds each of the drying reels 15 to aid in maintaining the desired drying conditions in the vicinity of the reel. Each of said enclosures has a hinged door 33 which, when opened, exposes the front and top of each reel 15 to permit access thereto.

The drive mechanism for the reels in the embodiment of Figures 1 to 5, inclusive, comprises a motor 34 mounted at the end of the apparatus which, through a chain contained in housing 35, drives the upper drive shaft 36. The latter extends longitudinally of the apparatus and is common to and drives the upper reels 6 on both sides of the apparatus. It passes through gear boxes 37 containing gears and clutch means for driving said reels from said shaft. Through suitable speed changing means 38 and gear reducers 39, motor 34 drives shafts 40 for spin pumps 42.

Motor 34 also drives the shafts 44 at one end of the apparatus, in this case through gear reducer 43. One of said shafts 44 is provided in order to drive each of the shafts 45 extending longitudinally of one side of the apparatus. An inclined drive shaft 46 drives all of reels 7 to 15, inclusive, of each downwardly extending series of reels, all said drive shafts 46 for the reels on one side of the apparatus being driven from the common longitudinally extending shaft 45.

The bobbins 47 of the cap twisters 18 may be rotated and reciprocated by any suitable means such, for example, as that shown, described and claimed in Bergmann et al. Patent 2,203,655.

As shown in Figures 1 and 3, the embodiment of the invention illustrated in Figures 1 to 5, inclusive, has the space above the coagulating trough 4 substantially completely enclosed. The longitudinally extending hood 51 is mounted above the coagulating trough 4 and above the reels 6, being supported by the spaced uprights 52 which carry the coagulating trough from the lower portion of the frame of the apparatus. As shown in Figure 3, a duct 53 is formed in said hood.

Uprights 52 support an upper longitudinally extending track 54 on each side of the apparatus, a corresponding lower track 55 being mounted on the apron 56 disposed on each side of the apparatus adjacent the coagulating trough 4. Doors 57, 58 are slidably mounted in overlapping relation in said upper and lower tracks on each side of the apparatus in such manner that they can be slid open, as shown in Figure 1, to permit access to coagulating trough 4, spinnerets 2, reels 6, and associated apparatus. In ordinary operation, after the threads 1 are started from the spinnerets to and from the reels 6, the doors are kept closed.

The vapors emanating from the coagulating bath 3 in trough 4 are drawn upward through slots 59 into duct 53, from which they are exhausted by duct 61. A negative pressure is main-

tained in duct 61 by suitable means, not shown, such as an exhaust fan. The vapors of the coagulating bath are thus prevented from escaping into the room.

In the apparatus of Figures 1 to 5, inclusive, the space between the banks of reels on opposite sides of the apparatus is substantially enclosed and serves as a duct or chamber into which the air is drawn from reels on the outside of the apparatus. In the apparatus of these figures, the top of this space is enclosed by top partition 63 and side partitions 64, while the bottom is closed by floor 65. One end of the space between the banks is closed by partition 66 (Figure 3) while the other end is closed by partition 67 (Figure 2), in which a door 68 is provided to permit access of operators to the interior of the apparatus.

As shown in Figures 3 and 4, the space between the reels in each bank is substantially enclosed by the back portions 69 of the collecting troughs 22 and by the back portions of the drier enclosures 32. As shown in Figures 4 and 5, each collecting trough 22 is formed with a lower channel-like portion 71 to contain liquid and back portion 69 provided with openings 73 therein through which pass the rear hub portions 74 of the reels associated with said trough. The reels themselves are carried by brackets 75 mounted on inclined beams 76 forming parts of the frame of the machine. Each of the troughs 22 is mounted on a longitudinally extending bracket 77 carried by said inclined beams 76. The space between the back portion 69 of each trough and the corresponding inclined beam 76 at each end of the trough is closed by a partition 78.

The back portion 69 of the trough 22 for each of the reels 8 to 14, inclusive, extends upward to within a short distance below the bottom portion of the trough above it, thus forming therebetween a slot 79. The upper edge of the back portion 69 of the collecting trough 22 for reel 7 likewise forms a slot 79 with the downwardly extending side partition 64 on each side of the apparatus. Trough-supporting brackets 77 are formed at spaced points with downwardly extending tabs 81 to which the back portions 69 of the collecting troughs 22 are fixed by bolts 82. When a negative pressure is maintained in the space between the banks, as by the exhaust duct 83 (Figures 1 and 2), air is drawn through the slots 79 into said space.

If desired, each of the slots 79 may be provided as shown in Figures 4 and 5 with an associated closure plate 84 by means of which the size of said slot can be adjusted. In the embodiment of the invention shown in Figures 1 to 5, inclusive, each of the closure plates 84 is supported at intervals by bolts 85 passing through slots 86 in said plate 84 and threaded into the back portion 69 of the collecting trough 22. By adjustment of the bolts 85, the sizes of the slots 79 can be varied or entirely closed, if desired.

When the air is exhausted from the interior of the apparatus from one end thereof, it may be desirable to have the slots 79 progressively wider at the end of the apparatus remote from the exhaust duct 83 than at the end near said duct, to cause substantially the same quantity of air to be drawn into the apparatus along the length of each horizontal series of reels and thus provide for uniform ventilation lengthwise of the machine. As is shown in Figures 1 and 5, the closure plates 84 mounted on the back portion 69 of each trough are mounted at a slight angle so

that the size of the slot 79 increases along the length of the apparatus in a direction away from the end thereof at which the exhaust duct 83 is disposed.

It may be desirable, moreover, to have the slots adjacent certain reels in the series wider than the slots adjacent other reels. Thus it may be desirable that the slots adjacent the upper reels 7 and 8 be somewhat wider than the slots adjacent other reels in view of the fact that in the illustrated embodiment of the invention these reels emit most of the vapors. With wider slots adjacent such reels, more air will be drawn into the interior of the machine from these reels than from the other reels which do not emit equal quantities of vapors.

Furthermore, it is possible to graduate the slots 79 in size from one end of each series of reels to the other. In the apparatus illustrated in Figures 1 to 5, inclusive, for instance, it may be desirable to have the slots narrowest for the lowermost reels, gradually increasing in size for the uppermost reels 7. More air may thus be drawn into the interior of the machine adjacent the reels emitting the most vapors. Since the duct 83 communicates with the interior of the machine adjacent the lower end of the series, any pressure drop effect between the lower ends of the series and the upper ends may be compensated for in this manner. In the apparatus shown in Figure 1, the slots 79 increase in width as the distance away from the end at which the exhaust duct 83 is disposed increases, and, moreover, the slots 79 increase in width from the lower end of the downwardly extending series of reels to the upper end.

To permit the entrance of air therein, the drier enclosures 32 may be provided with louvre slots 87 shown in Figure 3, while the rear portions of said enclosures may communicate with the interior of the apparatus through openings 88. In this manner, the maintenance of a negative pressure within the apparatus will cause exterior air to flow along the drying reels and into the interior of the apparatus. It has been found that under certain circumstances the drying of the thread is facilitated by such a countercurrent flow of air.

In the modification of the invention shown in Figures 6 and 7, the slots 79 are not present since the back portion 69 of each trough 22 contacts the bottom of the preceding trough. Instead, the back portion 69 of the trough 22 associated with reels from which it is desired to withdraw vapors is provided with openings 89. Such openings 89 may communicate with the interior of the apparatus as in the preceding embodiment of the invention so that the vapors emanating from such reels can be drawn into the interior of the apparatus. Such openings may be provided for each of the reels in the downwardly extending series or only for certain reels, as desired.

In this embodiment of the invention, closure means 90 are associated with each of said openings. By such closure means 90, which are adapted to be held in any desired position by thumb screws 91, the size of the openings 89 can be adjusted or, if desired, closed entirely. It is thus possible to vary the size of the openings associated with a given horizontal series of reels from one end of the machine to the other, as to compensate for the pressure drop lengthwise of the machine if air is withdrawn from the interior of the machine from one end thereof only. Sim-

ilarly, the size of the openings can be adjusted, for the reasons described above, so that they increase in area from one end to the other of the downwardly extending series of reels. Of course a combination of these methods may also be employed.

As is apparent from the embodiment of the invention shown in Figure 8, it is not necessary that all of the reels in the series be provided with means adjacent such reels for drawing the air through the bank. It is possible, for example, to draw the air through the bank and into the interior of the apparatus in the vicinity of only certain reels in the series, particularly in the vicinity of those on which processing liquids are applied which emit the most vapors. Thus in the arrangement shown in Figure 8, openings 92 similar to openings 89 shown in Figures 6 and 7 are provided in the vicinity of each of the reels 7 to 9, inclusive.

Moreover, in this embodiment of the invention the door 33 of the enclosure 32 for each drying reel 15 is provided with louvre slots 87. Openings 88 are provided in the rear wall of said enclosure so that air may be drawn through said enclosure into the interior of the apparatus. It is to be understood that the remainder of the apparatus, of which only a portion is shown in Figure 8, may be similar to that of Figures 1 to 5, inclusive, so that air may be drawn into the interior of the apparatus and withdrawn therefrom by suitable means which maintains a negative or sub-atmospheric pressure inside the apparatus.

In the embodiment of the invention shown in Figure 9, no openings are provided in the vicinity of any of the reels except the reels 7 at the top of the bank. In this arrangement, a slot 93 is provided adjacent the uppermost reels 7, the size of which slot may be adjusted by the closure plate 94 held by a plurality of thumb screws 95 spaced therealong. Said closure plate 94 may be so adjusted that the width of the slot varies from one end of the apparatus to the other. As indicated by the arrows, the current of air caused by the flow of air into said slot 93 when a negative or sub-atmospheric pressure is induced in the space between the reel banks sweeps across the inclined bank and entrains the vapors rising upwardly from the stepped reels so that such vapors pass into the interior of the apparatus, from which they may be withdrawn by a suitable means, such as a duct adapted to maintain a negative pressure in the interior of the apparatus. The apparatus is so designed that the interior thereof is substantially completely enclosed except for said slot 93, louvre slots 87 in the door of each drier reel enclosure 32 and openings 88 in the rear of each of said housings.

In all other respects, the apparatus of Figure 9 may be similar to that of Figures 1 to 5, inclusive.

Since the present invention provides for the flow of air through and/or across a bank of reels, it makes it possible to control accurately the atmospheric conditions in the vicinity of each of such reels, which, for the reasons indicated, is extremely important in the continuous processing of thread. Moreover, since the present invention also provides for a flow of air from each of the banks of reels on the opposite sides of the machine into a common space between said banks wherein a negative pressure is maintained, it is possible to insure identical flows of ventilating air on both sides of the apparatus, which also makes for uniformity of processing of the

threads on both sides of the apparatus. Since the machine itself is used as a ventilating duct, a compact structure is provided.

It is apparent that the above-described embodiments of the present invention are purely illustrative and that various changes may be made in said embodiments and, in fact, that various other embodiments may be employed without departing from the spirit of the invention. The invention may be applied to apparatus other than that for the manufacture of viscose artificial silk thread or to apparatus of a design different from that illustrated. The term "vapors" in the appended claims is intended to include all gaseous substances which it may be desired to remove; similarly, the term "thread" is intended to include, besides thread per se, all forms of strip material capable of being handled on apparatus embodying the present invention.

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 two spaced banks of thread-advancing thread store devices the operating faces of which banks are disposed on opposite sides of the apparatus; means enclosing at least one thread store device in each bank; means substantially enclosing the space between said banks, said last-mentioned enclosing means communicating with said first-mentioned enclosing means; and means for exhausting air from said last-mentioned enclosing means, said exhausting means creating a constant flow of air from said first-mentioned enclosing means to said last-mentioned enclosing means.

2. Apparatus for the manufacture of thread comprising two spaced banks of thread-advancing thread store devices the operating faces of which banks are disposed on opposite sides of said apparatus; means having an opening therein in the vicinity of one or more of said thread store devices in each bank substantially enclosing the space between said banks; means enclosing at least one thread store device in each bank, said last-mentioned enclosing means communicating with said first-mentioned enclosing means; and means for exhausting the air from said first-mentioned enclosing means, said exhausting means creating a constant flow of air into said first-mentioned enclosing means both from said last-mentioned enclosing means and through said openings.

3. Apparatus for the manufacture of thread comprising means for spinning one or more threads; a housing substantially completely surrounding said spinning means; a duct associated with said housing, said duct being disposed adjacent said spinning means; air inlet means in said duct; means for producing in said duct a sub-atmospheric pressure creating a constant flow of air from said housing into the air inlet means in said duct; two spaced banks of thread-advancing thread store devices associated with said spinning means, the operating faces of said banks being disposed on opposite sides of the apparatus; means substantially enclosing the space between said banks, said enclosing means including one or more openings on each side thereof through which air may be drawn through the associated bank of thread store devices into the interior of said enclosing means; and means for

exhausting air from the interior of said enclosing means.

4. Apparatus for the manufacture of thread comprising means for spinning one or more threads; a housing substantially completely surrounding said spinning means; a duct associated with said housing, said duct being disposed adjacent said spinning means; air inlet means in said duct; means for producing in said duct a sub-atmospheric pressure creating a constant flow of air from said housing into the air inlet means in said duct; two spaced banks of thread-advancing thread store devices associated with said spinning means, the operating faces of said banks being disposed on opposite sides of the apparatus; means substantially enclosing the space between said banks, said enclosing means including one or more openings adjacent one end of each of said banks of thread store devices through which air may be drawn across a substantial portion of the operating face of each of said banks into the interior of said enclosing means; and means for exhausting air from the interior of said enclosing means.

5. Apparatus for the manufacture of thread comprising a coagulating trough; means in said trough for forming one or more threads; a housing substantially completely surrounding said coagulating trough; a duct associated with said housing, said duct being disposed above said coagulating trough; air inlet means in said duct; means for maintaining a sub-atmospheric pressure in said duct creating a constant flow of air from said housing into said duct through the air inlet means therein; two spaced banks of thread-advancing thread store devices disposed on opposite sides of the apparatus; means substantially enclosing the space between said banks, said enclosing means including an opening in the vicinity of each of a plurality of thread-advancing thread store devices in each bank; and means for withdrawing air from the interior of said enclosing means creating a constant flow of air through said openings past the thread store devices adjacent thereto into the interior of said enclosing means.

6. Apparatus for the manufacture of thread comprising means for spinning one or more threads; a housing substantially completely surrounding said spinning means; a duct associated with said housing, said duct being disposed adjacent said spinning means; air inlet means in said duct; means for producing in said duct a sub-atmospheric pressure creating a constant flow of air from said housing into the air inlet means in said duct; two spaced upright banks of thread-advancing thread store devices associated with said spinning means the operating faces of which are disposed on opposite sides of said apparatus, each of said banks comprising at least one downwardly extending series of thread store devices to each of which a thread from said spinning means passes in sequence; means including an opening in the vicinity of each of a plurality of thread store devices substantially enclosing the space between said banks, the openings associated with the series of thread store devices in each bank varying in size from one end of the series to the other; and means for withdrawing air from the interior of said enclosing means creating a constant flow of air through said openings past the thread store devices adjacent thereto into the interior of the apparatus.

7. Apparatus for the manufacture of thread comprising means for spinning one or more

threads; a housing substantially completely surrounding said spinning means; a duct associated with said housing, said duct being disposed adjacent said spinning means; air inlet means in said duct; means for producing in said duct a sub-atmospheric pressure creating a constant flow of air from said housing into the air inlet means in said duct; two spaced, laterally extending upright banks of thread-advancing thread store devices associated with said spinning means, the operating faces of said thread store devices being disposed on opposite sides of said apparatus and each of said banks comprising a plurality of adjacent downwardly extending series of thread store devices; means including openings in the vicinity of at least some of said thread store devices in each of said banks substantially enclosing the space between said banks, said openings varying in size laterally of the bank from one end thereof to the other; and means for withdrawing air from the interior of said enclosing means from a point at the end of the structure defined by said banks at which said openings are smallest creating a constant flow of air past the thread store devices into the interior of said enclosing means.

8. Apparatus for the manufacture of thread comprising means for spinning one or more threads or the like; a housing substantially completely surrounding said spinning means; a duct associated with said housing, said duct being disposed adjacent said spinning means; air inlet means in said duct; means for producing in said duct a sub-atmospheric pressure creating a constant flow of air from said housing into the air inlet means in said duct; two spaced banks of thread-advancing thread store devices associated with said spinning means, the operating faces of said banks being disposed on opposite sides of the apparatus; means substantially enclosing the space between said banks, said enclosing means including one or more openings on each side thereof associated with each of said banks; and means for effecting a pressure differential between the air in said enclosing means and that outside the apparatus.

9. Apparatus for the manufacture of thread or the like comprising means for spinning one or more threads; a housing substantially completely surrounding said spinning means; a duct associated with said housing, said duct being disposed adjacent said spinning means; air inlet means in said duct; means for producing in said duct a sub-atmospheric pressure creating a constant flow of air from said housing through said air inlet means into said duct; a bank of thread-advancing thread store devices associated with said spinning means, all of said thread store devices being presented to a common operating face; a substantially closed chamber on the side of said bank of thread store devices opposite the operating face but communicating with the operating face of said bank by means of openings between said thread store devices; and means for removing air from said chamber creating a flow of air through said openings in the bank of thread store devices into said chamber.

10. Apparatus for the manufacture of thread comprising means for spinning one or more threads; a housing substantially completely surrounding said spinning means; a first duct associated with said housing, said duct having one

or more air inlet means therein; means for maintaining a sub-atmospheric pressure in said first duct causing air to be drawn from said housing through said inlet means into said duct; a bank of thread-advancing thread store devices associated with said spinning means, said thread store devices being arranged in the form of at least one series of devices from one to another of which the thread proceeds in sequence; a second duct disposed adjacent said bank of thread store devices; an opening in said second duct; and means for maintaining in said second duct a sub-atmospheric pressure creating across a substantial portion of said bank a constant flow of air into the opening in said duct in a direction opposed to the direction of travel of the thread along said series of thread store devices.

11. Apparatus for the manufacture of thread comprising means for spinning one or more threads; a housing substantially completely surrounding said spinning means; a first duct associated with said housing, said duct having one or more air inlet means therein; means for maintaining a sub-atmospheric pressure in said first duct causing air to be drawn from said housing through said inlet means into said duct; an upwardly extending bank of thread-advancing thread store devices associated with said spinning means, said thread store devices being arranged in the form of at least one series of devices from one to another of which the thread proceeds in sequence; a second duct disposed adjacent the uppermost thread store devices in said bank; an opening in said second duct; and means for maintaining in said second duct a sub-atmospheric pressure creating across a substantial portion of the upper end of said bank a constant flow of air into the opening in said duct in a direction opposed to the direction of travel of the thread along said series of thread store devices.

12. Apparatus for the manufacture of thread comprising means for spinning one or more threads; a housing substantially completely surrounding said spinning means; a first duct associated with said housing above said spinning means, said duct having one or more air inlet means therein; means for maintaining a sub-atmospheric pressure in said first duct causing air to be drawn from said housing through said inlet means into said duct; an inclined bank of thread-advancing thread store devices associated with said spinning means, said thread store devices being arranged in the form of at least one downwardly extending series of devices from one to another of which the thread proceeds in sequence; means for subjecting the thread on each of a plurality of said thread store devices to a processing operation resulting in the production of vapors; a second duct disposed adjacent the upper end of said bank of thread store devices; an opening in said second duct; and means for maintaining in said second duct a sub-atmospheric pressure creating across a substantial portion of the upper end of said bank a constant flow of air which conducts said vapors through said opening into said duct in a direction opposed to the direction of travel of the thread along said series of thread store devices.

LAVERN J. JORDAN.

CERTIFICATE OF CORRECTION.

Patent No. 2,303,696.

December 1, 1942.

LAVERN J. JORDAN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 3, first column, line 46, for "Patent 2,203,655" read --Patent 2,203,665--; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 19th day of January, A. D. 1943.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.