July 2, 1940. A. H. BURKHOLDER 2,206,834

WASTE COLLECTION APPARATUS

Filed Oct. 26, 1937 2 Sheets-Sheet 1

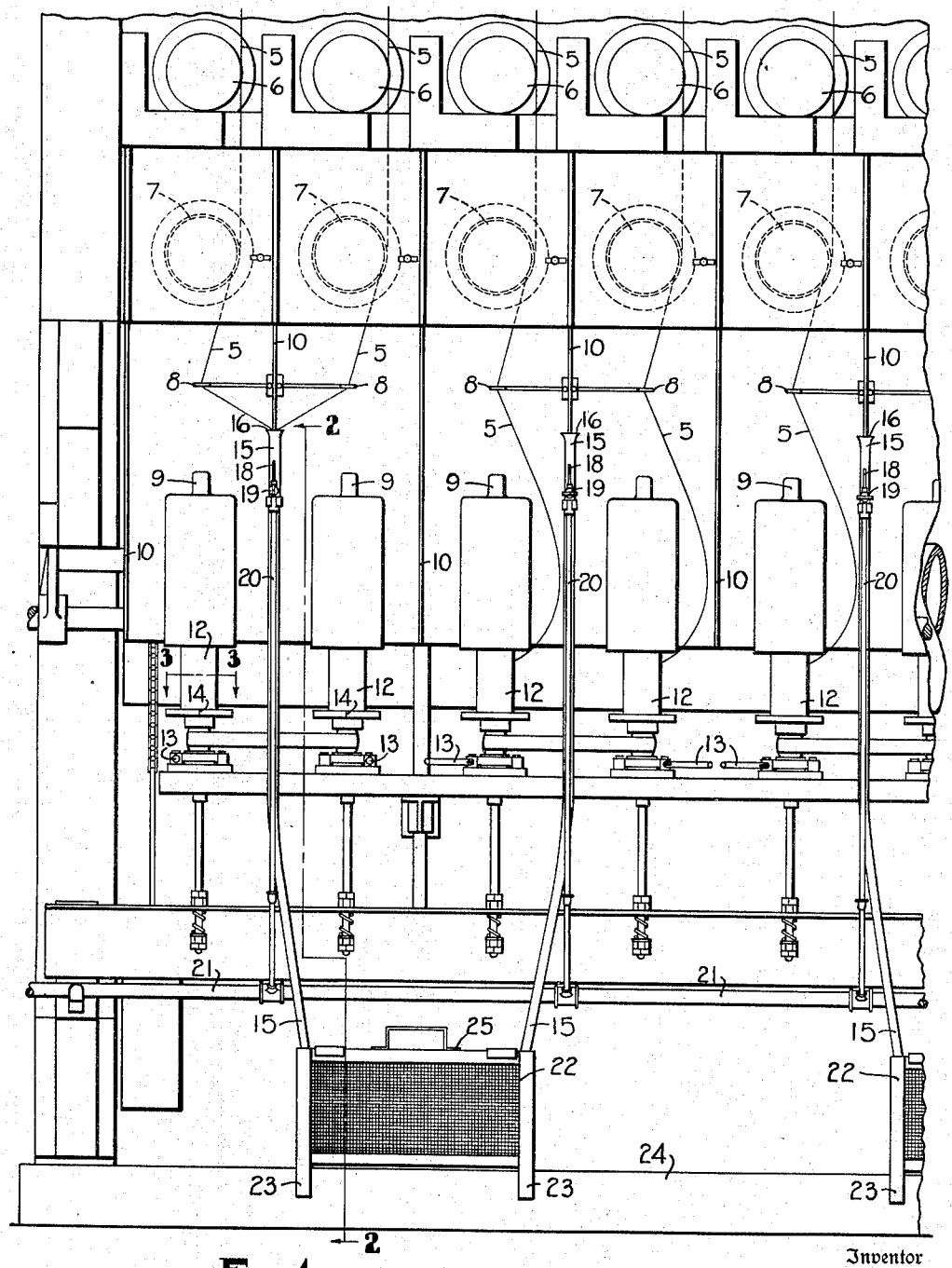


FIG. 1

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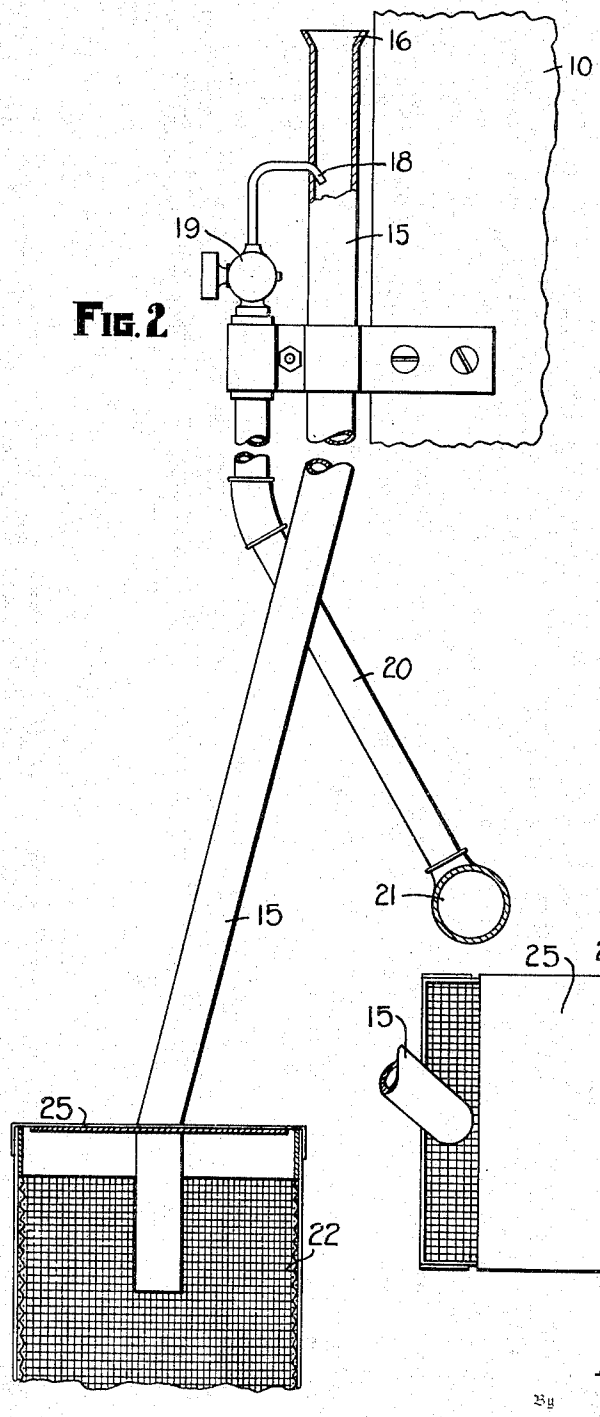


FIG. 2

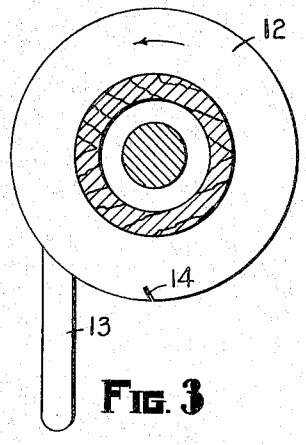
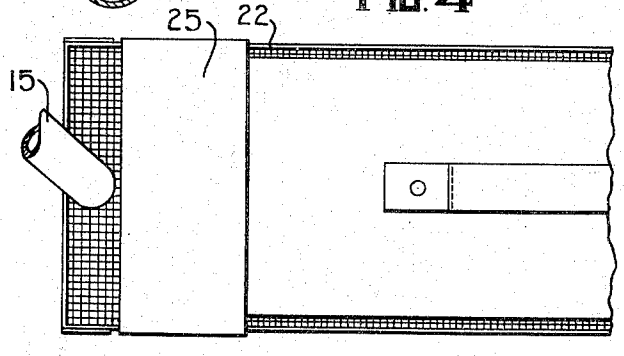


FIG. 3

FIG. 4



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UNITED STATES PATENT OFFICE

2,206,834

WASTE COLLECTION APPARATUS

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Application October 26, 1937, Serial No. 171,159

17 Claims. (Cl. 57—1)

This invention relates to methods of and apparatus for collecting thread or the like.

In handling threads of either natural or synthetic origin it is frequently desirable that the thread be collected temporarily by an auxiliary thread-collecting device rather than by the regular collecting apparatus, as when the regular thread collecting apparatus is being doffed. For example, in a machine which is continuously producing artificial silk thread it has been found advantageous according to the present invention to associate an auxiliary thread-collecting device with the regular thread-collecting apparatus, such as a twisting device, to facilitate the use of the latter. The present invention is beneficial because it eliminates the difficulty of starting a continuously supplied thread upon the spool of a twisting device, this difficulty arising out of the fact that the thread is often supplied at a faster rate than it can be handled manually in applying it to the twisting device and in setting the twisting device in operation. The auxiliary thread-collecting device of the invention thus can withdraw the continuously produced thread while the twisting device is being threaded and started.

Further difficulty arises in the operation of a continuous thread-producing machine in that, since the thread is being constantly supplied, the thread may collect at some possibly undesirable point if it is not constantly removed during the time that a completed thread package, such as a filled collecting spool is being removed from the collecting device and, for instance, an empty spool is put in place to collect the thread. The auxiliary thread-collecting device of the invention provides a convenient means for collecting thread being supplied by a continuous thread-producing machine during the time required to doff the thread collecting device.

To illustrate the invention the accompanying drawings shows a preferred embodiment of the present invention as applied to a continuous thread-processing machine. In these drawings, Figure 1 is an elevation of the lower portion of a continuous thread-processing machine with the device of the invention in its preferred position. Figure 2 is a section on the line 2—2 of Figure 1 on an enlarged scale, parts being broken away. Figure 3 is a section on the line 3—3 of Figure 1 on an enlarged scale. Figure 4 is a plan of a fragmentary portion of the collecting receptacle.

The continuous thread-processing machine with which the device of the invention is associated is illustrated as being of the general type disclosed in the Walter F. Knebusch and Alden H. Burkholder application Serial No. 7,114, filed February 18, 1935. In said machine each thread after formation is subjected to several processing treatments for producing a finished thread on each of a series of thread-storage, thread-advancing devices or reels. In the illustrated embodiment the thread 5 eventually reaches drip reel 6 which affords the thread, on passing thereover, an opportunity to lose some of its free moisture. Reel 7, to which the thread next passes in the apparatus shown, is heated and is enclosed in an enclosure to remove the remaining moisture from the thread passing over said reel. The dry thread then passes through guide eye 8 to cap twister 9 upon which it is collected. In a complete thread-processing machine of the type illustrated a plurality of threads 5 will be manufactured side by side each by its own descending series of reels and each thread will be collected upon its individual cap twister 9. Because of the "balloon" caused by the threads about the cap twisters during operation thereof, it is desirable that they be separated by vertical partitions 10 to prevent thread entanglement.

To stop rotation of its winding spool 12 each cap twister 9 is provided with a brake controlled by lever 13 which acts upon the whorl of the cap twister. In the drawings, the two cap twisters 9 at the left end of the machine are represented as having been stopped, and braking levers being shown in the "on" position by applying their brakes while the remaining cap twisters are represented as being in motion. As best shown in Figure 3, the lower flange of each winding spool 12 is preferably formed with a slot 14 extending inwardly from its periphery at an angle away from the direction of rotation indicated by the arrow. In starting a thread upon one of the winding spools 12, the thread is caught in the slot 14 while the spool is halted and the brake lever 13 is then released.

In the apparatus illustrated as embodying the invention a tube 15 is secured to the partitions 10 between adjacent pairs of the cap twisters 9. In this manner each tube 15 serves the two cap twisters between which it is disposed. The upper end of each tube 15 is preferably located slightly below the guide eye 8 since by so locating the tube 15 its entrance end is well above the top of the cap twister 9 and thread being brought to or passing into the tube 15 will not interfere with the "balloon" of an adjacent cap twister. In order that the thread may pass freely into

the tube its entrance end may be formed as shown with a flared portion 16.

To cause a current to flow through the tube 15 a jet 18 delivers fluid, such as air, under pressure into the tube in the direction toward the discharge end thereof. It is preferable that the jet 18 enter tube 15 at some point between its ends, as shown, so that the flared entrance end 16 of the tube is not obstructed. To control the admission of fluid to the jet 18 a petcock 19 may be provided in the supply pipe 20. In the illustrated apparatus supply pipe 20 is connected to a conduit 21 which extends longitudinally of the thread-processing machine and serves all of the branch supply pipes 20. Conduit 21 may be supplied with compressed air, although any other compressed fluid may be utilized if desired, it being desirable that the fluid be under such pressure that when petcock 19 is open a strong current will be induced throughout the length of tube 15.

In the illustrated apparatus, the lower end of tube 15 enters a receptacle, such as basket 22. The wall of the basket preferably has a large number of openings therethrough so that the fluid issuing from tube 15 will pass freely out of the basket but the thread will be retained. This may be accomplished by utilizing as side walls, perforated sheet metal, expanded metal or a woven wire fabric. Baskets 22 preferably are located below the cap twisters so that they are in a position out of the way of the operator and so that the tubes 15 will be as long as possible. The longer that tube 15 is in length the greater will be the force acting upon the thread to draw it through the tube since a longer length of thread will be acted upon by the current flowing through the tube. In the drawings, the baskets are shown provided with legs 23 which straddle and clamp against opposite sides of a curbing 24 surrounding the base of the machine. To permit removal of the thread collected in each basket 22 it may be provided with a removable cover 25.

Inasmuch as one of the baskets 22 may hold a considerable quantity of thread, a single basket may be provided for two of the tubes 15. In the illustration, the ends of two adjacent tubes 15 are shown entering opposite ends of each basket. If desired, however, each tube may have its individual collecting basket or more than two tubes may enter a single basket. It is desirable, however, that the basket be as large as is convenient and that the total opening therefrom be as great as possible since turbulence within the basket is thereby reduced and fluid may more readily escape from the basket without tending to displace the thread.

In using the auxiliary thread-collecting device of the illustrated embodiment of the invention to assist in the doffing operation, the petcock 19 is opened to deliver fluid into the tube 15 which is nearest the winding spool 12 to be doffed. A bight is then formed in the thread passing from guide eye 8 to the spool 12 to be doffed and is then delivered to the entrance end of this tube 15 so that the thread will come under the influence of the current flowing through the tube. The length of thread between the entrance end of the tube and the cap twister is then held firmly so that the rotation of the spool breaks the thread in said length. When the severed end of the thread is released it will be drawn through the tube 15 into the collecting basket 22. The thread will now continue to run from the guide eye 8 into the tube 15 as shown by the two left-hand threads in Figure 1. By operating brake lever 13, rotation of the winding spool 12 may then be stopped so that the full spool may be removed and be replaced by an empty winding spool.

To cause the thread to be wound upon the empty winding spool a bight is formed in the length of thread between the guide eye 8 and the entrance end of tube 15, the bight in the thread being carried down and located in the slot 14 of this spool. During this time the thread is allowed to continue to run through the guide eye 8, through the slot 14 and into the tube 15 so that no slack occurs in the thread. The brake lever 13 is then released and the thread between slot 14 and the tube 15 is held so that the thread will break due to rotation of the spool. From then on the thread will be collected upon the winding spool in orderly fashion. When the held thread end is released, the thread passes into the tube 15 and into the collecting basket 22. The petcock 19 may then be turned to off position.

In the event that a thread being wound upon a spool becomes broken, the leading end of the thread may again be wound upon the spool by following through the above-described procedure for starting the thread upon a new spool. That is, the petcock 19 is turned on and the thread from guide eye 8 is delivered to the entrance end of the tube 15. Then the spool is stopped, the thread is caught into the slot 14, and the spool again is set in rotation. As soon as the thread is winding upon the spool the petcock 19 may be turned off.

Since the auxiliary thread-collecting device of the invention exerts an impositive drawing force upon the thread, its association with thread-collecting apparatus is thus very advantageous. An impositive drawing force is exerted upon the thread because it is acted upon only by the fluid current flowing through the tube. Because of this, the thread may be supplied rapidly or slowly to the tube, may be stopped, or may even be drawn backward through the tube without stressing the thread beyond its strength or breaking it. It is thus possible to assure that the thread will be collected at the fastest rate at which it is delivered without the likelihood of any slack occurring in the thread. Likewise, when the thread is manually carried down to be caught in slot 14, the thread may be drawn backward through the tube if this is necessary to obtain a sufficient thread length, without danger of breaking the thread.

The thread-collecting device of the invention may have wide application in associations other than those here illustrated. For example, the device may be associated with various types of collecting or twisting machines to temporarily collect thread during the time that the filled packages are being doffed and the thread is started on the apparatus for the formation of a new package, as when a filled collecting spool is being replaced with an empty one which is put into operation. Employment of the present invention may also be desirable when the thread from such a source is to be inspected for a determination of its quality. Other uses of the invention will occur to those skilled in the art.

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. Thread-producing apparatus comprising a

source of thread of substantially continuous length; rotatable means for collecting the thread; and, associated therewith, an auxiliary thread-collecting device comprising a tubular passageway having its entrance end in proximity to said rotatable thread-collecting means, means for causing a flow of fluid through said passageway whereby thread brought to the entrance end thereof will be carried through said passageway, and means at the discharge end of said passageway for gathering the thread issuing therefrom.

2. Thread-producing apparatus comprising a source of thread of substantially continuous length; rotatable means for simultaneously twisting and collecting the thread; and, associated therewith, an auxiliary thread-collecting device comprising a tubular passageway having its entrance end located above the uppermost portion of said rotatable thread-collecting means, means for causing a flow of fluid through said passageway whereby thread brought to the entrance end therof will be carried through said passageway, and means at the discharge end of said passageway for gathering the thread issuing therefrom.

3. Thread-producing apparatus comprising a source of thread of substantially continuous length, a cap twister for collecting the thread, a tubular passageway associated with the cap twister having its entrance end located adjacent the cap of the cap twister and its discharge end located below the cap twister, means for causing a flow of fluid through the passageway from its entrance to its discharge end whereby thread brought to the entrance end will be carried through the passageway, and means below the cap twister surrounding the discharge end of the passageway for gathering the thread issuing therefrom.

4. Thread-producing apparatus comprising a source of thread of substantially continuous length, a twisting device for collecting the thread, an auxiliary thread-collecting device associated with the twisting device comprising a tubular passageway in which is induced a flow of fluid serving to carry thread through the passageway, means for controlling the flow of fluid in the tubular passageway, and independent means for controlling the twisting device, whereby either the twisting device or the auxiliary thread-collecting device may be operated during periods of non-operation of the other.

5. Thread-producing apparatus comprising a plurality of independent sources of thread of substantially continuous length, a plurality of independent thread-winding means upon each of which one of the threads is collected, a plurality of independent auxiliary thread-collecting devices comprising tubular passageways located between and serving adjacent pairs of thread-winding means, and a thread-collecting receptacle common to a plurality of tubular passageways.

6. In combination with a twisting device, thread-collecting apparatus comprising a tubular passageway of relatively great length as compared with its cross section, a jet delivering fluid into said passageway at a point below but in proxmity to the entrance end thereof so that the entrance end of the passageway is free, said jet being directed away from the entrance end of the passageway so that a current will be induced through the entire length of the passageway and thread brought to the entrance end thereof will be carried throughout the passageway, means for controlling the jet of fluid, and means at the discharge end of the passageway for collecting the thread issuing therefrom.

7. In combination with a twisting device, thread-collecting apparatus comprising a tubular passageway of relatively great length as compared with its cross section, a jet delivering fluid into said passageway between its ends near the entrance end of said passageway and in the direction of the discharge end of the passageway whereby thread brought to the entrance end of the passageway will be carried through the passageway, and a foraminous receptacle located at the discharge end of the passageway for collecting the thread issuing therefrom in a tangled mass.

8. The method of doffing a device which collects a thread in package form and to which such thread is continuously supplied comprising passing the thread from said collecting device to an auxiliary take-up device, subjecting the thread to a hydraulic force which exerts an impositive drawing action thereon and severing the thread so that it passes to said auxiliary take-up device alone, removing the filled package from said thread-collecting device and preparing said thread-collecting device to form another package, forming a bight in the thread passing to said auxiliary take-up device, and passing said bight to and starting the thread on said thread-collecting device and severing the length of thread between the auxiliary take-up device and the thread-collecting device so that the thread passes to said thread-collecting device alone.

9. The method of doffing a rotary device which collects a thread in package form and to which such thread is continuously supplied comprising passing the thread from said rotary thread-collecting device to an auxiliary take-up device, subjecting the thread to a hydraulic force which exerts an impositive drawing action thereon such that it may be readily withdrawn therefrom and severing the thread so that it passes to said auxiliary take-up device alone, stopping the rotation of the rotary thread-collecting device, removing the filled package from said rotary thread-collecting device and preparing said rotary thread-collecting device to form another package, forming a bight in the thread passing to said auxiliary thread-collecting device, passing said bight to and starting the thread on said rotary thread-collecting device, starting the rotation of said rotary thread-collecting device, and severing the length of thread between the auxiliary thread-collecting device and the rotary thread-collecting device so that the thread passes to said rotary thread-collecting device alone.

10. The method of doffing a rotary device which collects a thread in package form on a spool and to which such thread is continuously supplied comprising passing the thread from said rotary thread-collecting device to an auxiliary take-up device including a tubular passageway through which said thread is drawn by the flow of a fluid therethrough and severing the thread so that it passes to said auxiliary take-up device alone, stopping the rotation of the rotary thread-collecting device, replacing the filled spool with an empty one, forming a bight in the thread passing to said auxiliary take-up device and passing said bight to and starting the thread on said rotary thread-collecting device, and starting the rotation of said rotary thread-collecting device and severing the length of thread between the auxiliary take-up device and the

rotary thread-collecting device so that the thread passes to said rotary collecting device alone.

11. The method of doffing a device which collects a thread in package form and to which such thread is continuously supplied comprising forming a bight in the thread passing to said thread-collecting device, passing said bight to an auxiliary device and subjecting the thread to a hydraulic force which exerts an impositive drawing action thereon, severing the length of thread between said auxiliary device and said thread-collecting device so that the thread passes to said auxiliary device alone, removing the filled package from said thread-collecting device and preparing said thread-collecting device to form another package, forming a bight in the thread passing to said auxiliary device and passing said bight to and starting the thread on said thread-collecting device, and severing the length of thread between said auxiliary device and said thread-col'ecting device so that the thread passes to said thread-collecting device alone.

12. The method of doffing a rotary device which collects a thread in package form and to which such thread is continuously supplied comprising forming a bight in the thread passing to said thread-collecting device, passing said bight to an auxiliary device and subjecting the thread to a hydraulic force which exerts an impositive drawing action thereon, severing the length of thread between said auxiliary device and said thread-collecting device so that the thread passes to said auxiliary device alone, stopping the rotation of the rotary thread-col'ecting device, removing the filled package from said thread-collecting device and preparing said thread-collecting device to form another package, forming a bight in the thread passing to said auxiliary device and passing said bight to and starting the thread on said rotary thread-collecting device, and starting the rotation of the device and severing the length of thread between the auxiliary device and the rotary thread-collecting device so that the thread passes to the rotary thread-collecting device alone.

13. The method of doffing a rotary device which collects a thread in package form on a spool and to which such thread is continuously supplied comprising forming a bight in the thread passing to said thread-collecting device, passing said bight to an auxiliary device and subjecting the thread to a hydraulic force which exerts an impositive drawing action thereon, severing the length of thread between the auxiliary device and the thread-collecting device so that the thread passes to said auxiliary device alone, stopping the rotation of the rotary thread-collecting device, removing the filled spool and replacing it with an empty spool, forming a bight in the thread passing to said auxiliary device and passing said bight to and starting the thread on said rotary thread-collecting device, and starting the rotation of the device and severing the length of thread between the auxiliary device and the rotary thread-collecting device so that the thread passes to said thread-collecting device alone.

14. The method of starting a thread on a thread-receiving device to which the thread is continuously supplied which includes the steps of passing the thread to an auxiliary device, subjecting the thread to a hydraulic force which exerts an impositive drawing action upon the thread, forming a bight in the thread passing to said auxiliary device and passing said bight to the thread-receiving device, starting the thread on said thread-receiving device so that the thread passes to and from said auxiliary device, and severing the length of thread between the thread-receiving device and the auxiliary device so that the thread passes to said thread-receiving device alone.

15. The method of starting a thread on a rotary thread-receiving device to which the thread is continuously supplied which includes the steps of passing the thread to an auxiliary take-up device comprising a passageway through which said thread is drawn by a flow of fluid therethrough, forming a bight in the thread passing to said auxiliary take-up device, passing said bight to and starting the thread on said receiving device, and severing the length of thread between said auxiliary take-up device and the rotary thread-receiving device while the thread-receiving device is rotating.

16. The method of removing the thread from a thread-receiving device to which a thread is continuously supplied comprising forming a bight in the thread passing to said thread-receiving device, passing said bight to an auxiliary device, subjecting the thread to a hydraulic force which exerts an impositive drawing action thereon, so that the thread passes to said auxiliary device and from it to said thread-receiving device, and severing the length of thread between said auxiliary device and said thread-receiving device, so that the thread passes to said auxiliary device alone.

17. Thread-producing apparatus comprising a source of thread which continuously supplies thread, primary means for packaging the thread, and an auxiliary means which subjects the thread to a hydraulic force capable of exerting an impositive drawing action thereon and is adapted to receive the thread during the period that said primary thread-receiving means does not function to package the thread.

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