

Jan. 7, 1941.

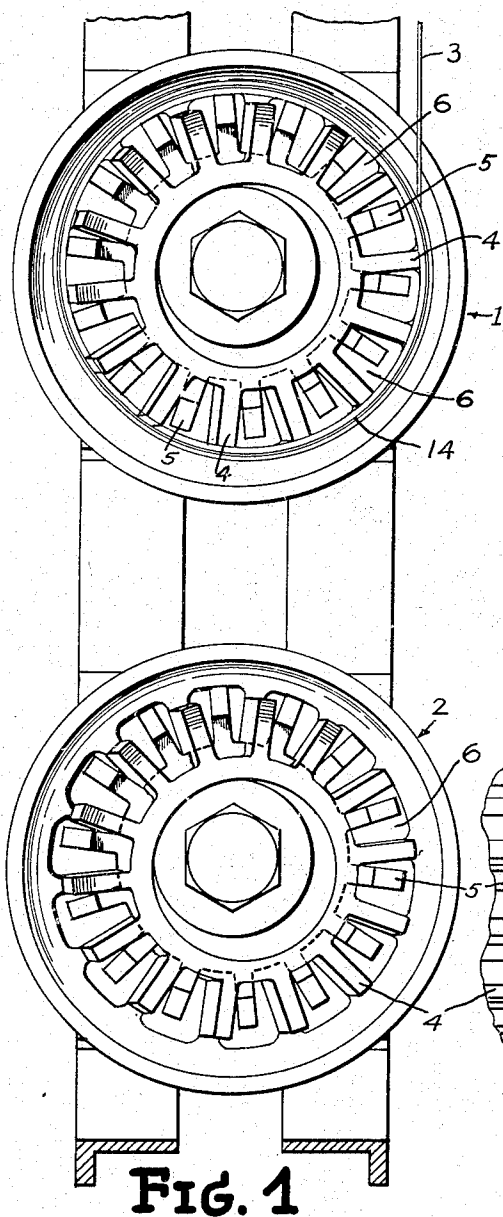
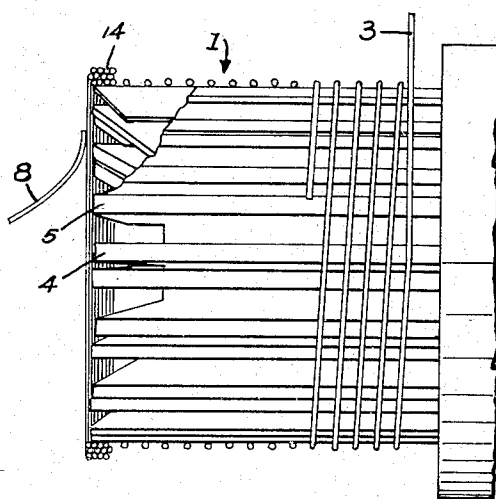
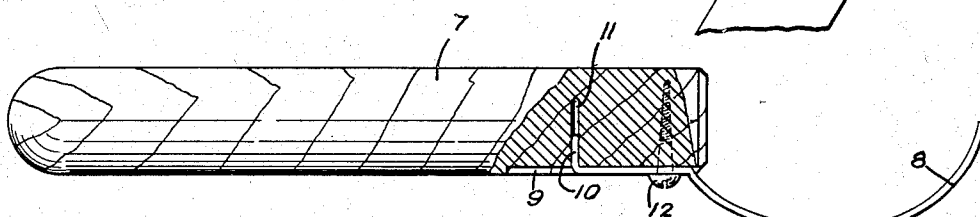
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2,227,718

METHOD OF MANIPULATING THREAD OR THE LIKE

Original Filed Dec. 24, 1936

3 Sheets-Sheet 1



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METHOD OF MANIPULATING THREAD OR THE LIKE

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3 Sheets-Sheet 2

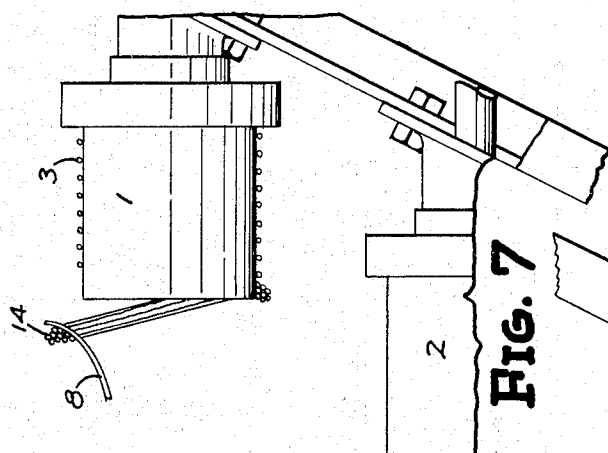


FIG. 7

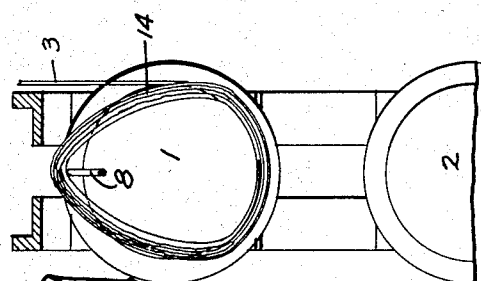


FIG. 6

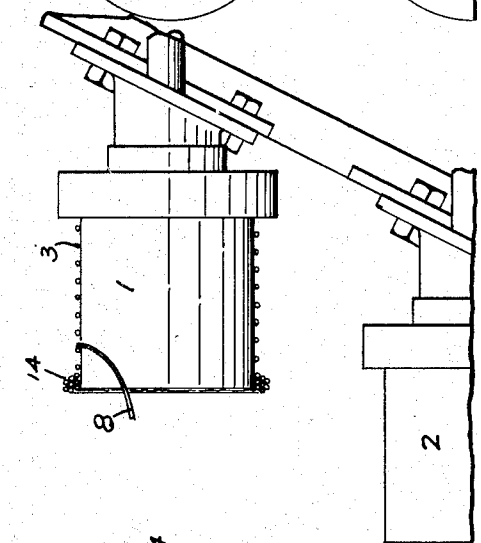


FIG. 5

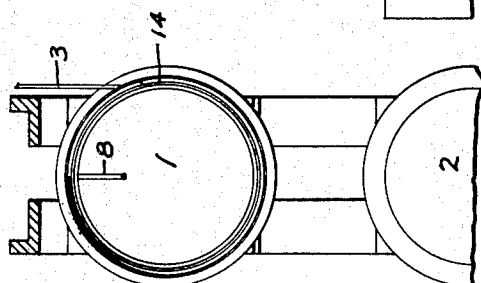


FIG. 4

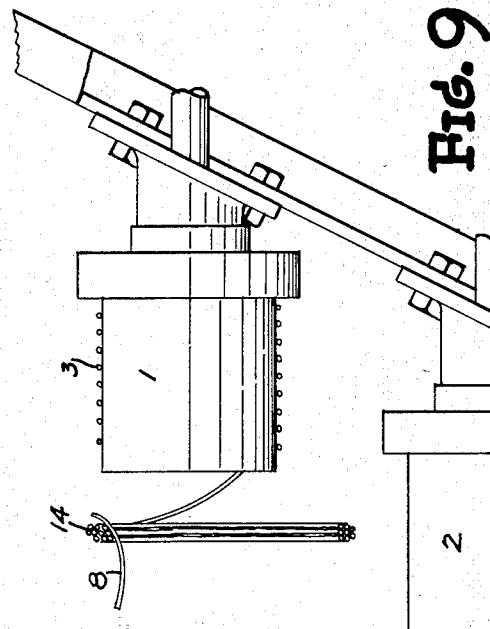


FIG. 9

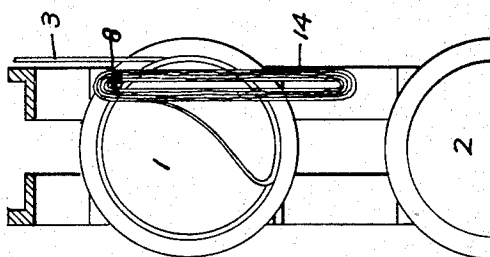


FIG. 8

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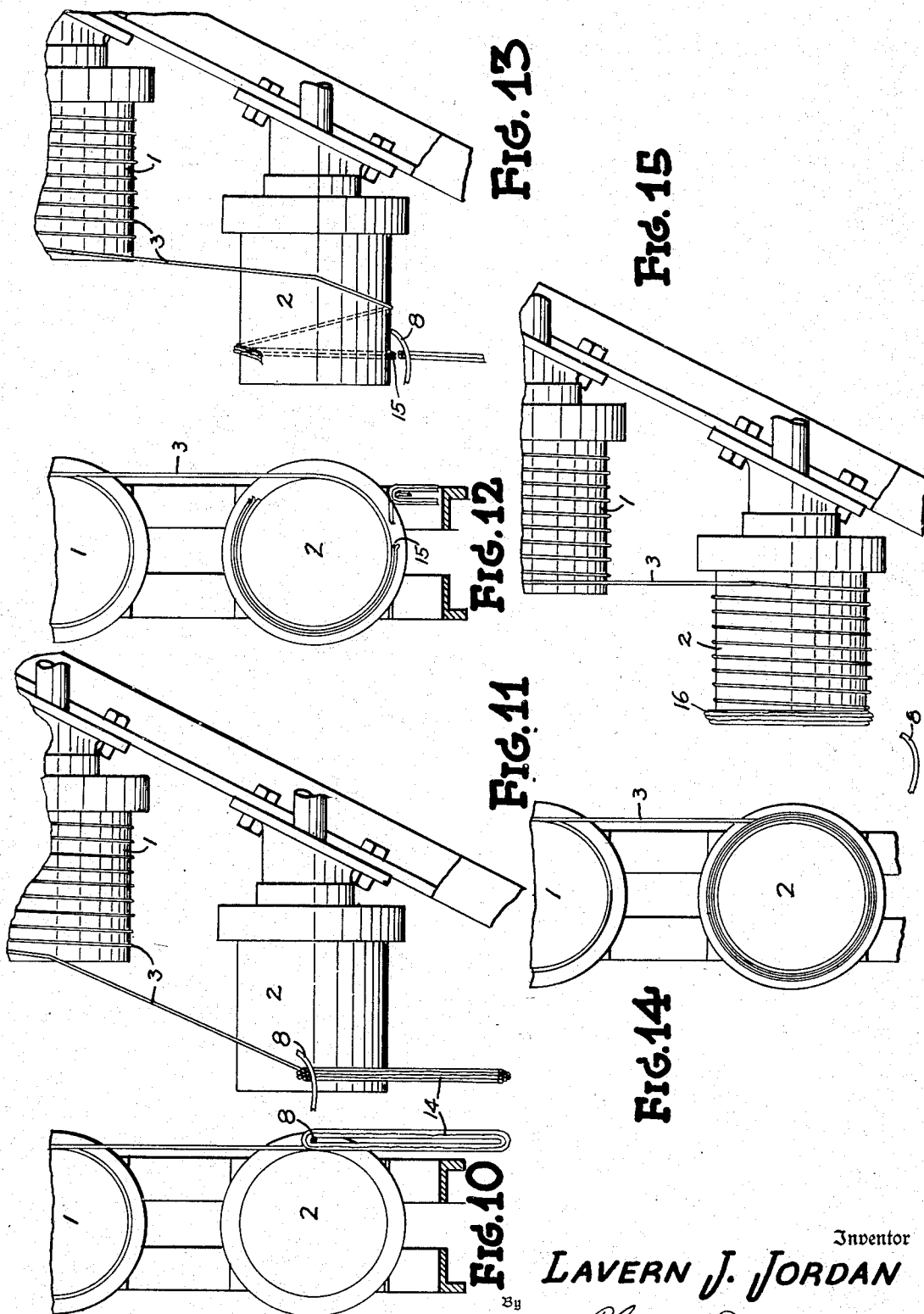
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METHOD OF MANIPULATING THREAD OR THE LIKE

Original Filed Dec. 24, 1936

3 Sheets-Sheet 3



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2,227,718

METHOD OF MANIPULATING THREAD OR THE LIKE

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Application December 24, 1936, Serial No. 117,503
Renewed June 12, 1940

7 Claims. (Cl. 242—53)

This invention relates to a method of and means for manipulating thread or the like, hereinafter referred to as "thread."

The invention has especial utility in connection with the production of artificial silk thread or the like by the process according to which the artificial silk thread or the like is subjected to each of its necessary liquid processing treatments while it is being advanced in the form of a plurality of generally helical turns along the exterior of a thread-advancing reel. In this process, the artificial silk thread or the like is advanced in turn over each of a large number of reels, after which it is gathered in or on a collecting device. Since the reels are spaced some distance apart, it is necessary to transfer the artificial silk thread or the like from one reel to another throughout the series, an operation which the large number of reels makes it important to effect in an expeditious manner. Such transfer from reel to reel is necessary not only in initially threading up the reels of the series but in the event of thread breakage.

Heretofore, the practice has been to transfer the artificial silk thread or the like from one reel to another by a purely manual operation pursuant to which the operator picks the advancing thread end, which may or may not be washed under, off a preceding reel, brings it into juxtaposition with the reel on which it is to be caused to wind, and applies it to the surface thereof, after which it winds itself thereon in more or less orderly fashion. As will be recognized, this is a difficult and time-consuming task. The difficulty involved in accomplishing this transfer is magnified by the fact that the artificial silk thread or the like must be removed from a rapidly rotating reel and applied to another rapidly rotating reel. Moreover, artificial silk thread or the like tends, when wet, to cling tenaciously to the reel, making difficult its removal without breakage.

According to the present invention, thread or the like, particularly artificial silk thread or the like, may be readily removed from a rapidly rotating thread-advancing reel and passed to receiving means comprising another thread-advancing reel or some other form of thread-handling device, thus effecting an expeditious thread transfer. Although the invention is obviously capable of use in connection with the manipulation of thread of all kinds, it finds particularly advantageous use in the manufacture of artificial silk thread by the so-called continuous process. It will be described hereinafter for

illustrative purposes as employed in the manufacture of viscose artificial silk thread, although it may, if desired, be employed in the cellulose acetate, cuprammonium and nitrocellulose processes.

In the drawings, which illustrate a preferred embodiment of the invention, Figure 1 is a front elevation of a portion of a viscose thread-processing apparatus comprising a plurality of thread-advancing devices of cantilever form; Figure 2 is a corresponding side elevation; Figure 3 is a side elevation, partly broken away, of a thread-removing tool capable of use in the practice of the invention; Figure 4 is a diagrammatic representation, in front elevation, of one of the steps involved in effecting a thread transfer; Figure 5 is a side elevation corresponding to Figure 4; Figure 6 is a front elevation representation of the next succeeding step; Figure 7 is a side elevation corresponding to Figure 6; Figure 8 similarly illustrates in diagrammatic fashion the next step involved in making the transfer; Figure 9 is a side elevation corresponding to Figure 8; Figure 10 is a like diagrammatic representation of the following step involved in transferring the thread; Figure 11 is a corresponding side elevation; Figure 12 is a diagrammatic representation of the last procedural step necessary to making a transfer of the thread; Figure 13 is a side elevation corresponding to Figure 12; Figure 14 is a diagrammatic representation of the completed thread transfer, the same being shown in end elevation; and Figure 15 is a side elevation corresponding to Figure 14.

Referring first to Figures 1 and 2 of the drawings, the thread-advancing reels 1 and 2 are disposed adjacent each other in stepped relation in the manner shown, each being adapted to receive a continuous thread intended to be processed thereon. The latter, after it has had time to complete its passage over the upper reel 1, is to be removed therefrom and passed to reel 2. After completing its passage over reel 2, the thread is to be passed to a succeeding reel disposed in the same relationship to reel 2 as that which exists between reels 1 and 2 or, if desired, to a collecting device. In the drawings, the thread is designated by the character 3.

Each of these reels consists of one set of bar members 4 and a second set of interdigitating bar members 5, these two sets of bar members being disposed about axes which are offset and inclined with respect to each other. Between the adjacent bar members are radially disposed spaces 6. The thread is automatically advanced 55

in general helical form along the reels, in consequence of which fact the reels may be described as self-threading. The reels are supported and driven at one end only, the other end being

free and unobstructed. A reel of this general construction is shown and described in detail in application Serial No. 7,114, filed February 18, 1935, in the names of Walter F. Knebusch and Alden H. Burkholder.

To accomplish the removal of the thread 3 from the upper reel, the tool illustrated in Figure 3 is utilized. It embodies an elongated handle portion 7 and a thread-engaging portion 8. The thread-engaging portion 8 preferably takes the form of a wire lying within a groove 9 extending longitudinally of the handle portion 7 which has an inturned end 10 positioned within a recess 11 in the handle portion 7. To retain the wire in place, the overlying head of a screw 12 may be employed. It is preferable that the outer end of the thread-engaging portion 8 be of hooked formation as, for example, of the arcuate shape shown, although it may be practicable, if desired, to utilize a tool in which the thread-engaging portion 8 of the wire is straight.

Before attempting to make the thread transfer, it is desirable to allow the thread to advance over the upper reel and accumulate as an annular bundle 14 at the free end thereof. The presence of this bundle 14 materially assists in accomplishing the thread transfer inasmuch as it provides a mass which is more compact and strong than a single thread, in consequence of which fact it may be more easily handled. At the start of the thread-removing operation, the thread-engaging portion 8 of the tool is poised as shown in Figure 2 forward of the free end of the upper reel. From the position shown in Figure 2, the tool is quickly thrust into the reel and given a simultaneous upward motion through one of the spaces 6 to assume the position shown in Figures 4 and 5. As shown in these figures, the bundle 14 at the end of the reel is about to be engaged by the tool, as are also several turns of thread immediately behind it.

By rapidly drawing the tool axially of the reel toward the unobstructed end thereof so as to cause the tool to assume the position shown in Figures 6 and 7, the upper portion of the leading thread turns are pulled away from the reel. It will be noted that not only the turns of thread going to make up annular bundle 14 but the several turns immediately behind the annular bundle 14 are pulled off the reel in this manner. Continued movement of the tool away from the reel pulls all the turns of thread engaged by the tool entirely away from the reel, as shown in Figures 8 and 9. The thread so removed being entirely free of the reel, it may be carried either to a next succeeding reel or to some suitable collecting device, which may take any desired form.

As shown in Figures 10 and 11, the thread 3 removed from the upper reel 1 has been carried down to and into juxtaposition with the reel 2 along which it is desired that the thread shall next advance. The location of the point of initial contact of the thread with the lower reel 2 is of little importance, it being necessary only that there be satisfactory contact between the thread 3 and the exterior of the reel 2. Since the transfer must necessarily be accomplished rapidly, it is convenient to bring the thread into contact with the reel 2 at a point near the free end thereof. Due to the contact of the thread

3 with the reel 2 and the tendency of the wet thread to cling to the surface of the reel, it is carried by the rotation thereof around the reel in the manner shown in Figures 12 and 13. Inasmuch as some of the thread must remain upon the tool due to its being caught thereon, continued rotation of the reel 2 will serve to break the thread between the tool and the reel, freeing the tool. The thread end 15 which remains on the reel is caused by rotation thereof to advance toward the unobstructed end of the reel.

Since the thread, after having once become established on a succeeding reel, tends to run toward the succeeding reel in a direction which is perpendicular to the axis of that reel, the thread being supplied from the upper reel 1 feeds back on its own accord toward the supported end of the lower reel 2, as shown in Figure 13. After a sufficient amount of rotation of the lower reel 2 has occurred, the thread coming from the upper reel 1 will have moved back on the lower reel 2 to a point vertically below the point from which the thread leaves the upper reel 1. Thereafter, the thread will advance in orderly fashion along the lower reel 2 and a uniform spacing of the thread in generally helical turns will be produced. When the thread has advanced along the lower reel 2 and has accumulated at the free end thereof to form a bundle 16, as shown in Figures 14 and 15, this bundle 16 may be removed for transfer to another reel or to some thread-handling device in the manner above outlined.

While it is not essential that the turns immediately behind the bundle 14 at the unobstructed end of the reel be caught by the tool as above explained, this is a preferable procedure inasmuch as it peels back the thread from the free end of the reel. By the time the leading end of thread has been passed either to a succeeding thread-advancing reel or to some other form of thread-collecting device, the thread remaining upon the upper reel 1 will have advanced along the reel to a point close to the unobstructed end thereof. If the several turns of thread behind the bundle are not caught by the tool at the time of thread transfer; that is, if they are allowed to remain upon the reel while the removed thread is being transferred, it is likely that these turns of thread will have advanced to the free end of the reel and have either fallen off or started to form a bundle which will interfere with the transfer of the thread. It has been found that, by peeling several thread turns off the free end of the reel with the bundle 14, by the time the thread has started to advance in normal manner along the lower reel, the regularly spaced turns upon the upper reel will have about reached the free end of the reel; so that normal operation may be instituted.

While it has been suggested above that the tool be thrust toward the center of the reel and moved in an upward direction, it is by no means necessary to do it in this fashion in order to carry out the invention. Thread removal can be effected equally well by thrusting the tool either laterally or downward with respect to the reel. It is only of importance that the turns of thread which are to be removed from the reel be caught upon the tool. It has, however, been found that because of the rapidity with which thread removal must be effected, the operation in question is best accomplished by thrusting the tool upward.

The removal of thread from the upper reel

must necessarily be accomplished rapidly inas-
 much as the reel is being rotated; that is, the
 succeeding steps represented by Figures 2, 5, 7
 and 9 follow each other in rapid order and ordi-
 narily will be carried out as part of one continu-
 5 ous motion. The fact that the thread removal
 and transfer as here described can be accom-
 plished while the reel is rotating is of particu-
 lar advantage since the thread being handled
 10 is ordinarily being supplied continuously from its
 source. It should be understood that while the
 steps illustrated are preferably parts of a con-
 tinuous motion, the interval of time represented
 15 between the steps is not necessarily equal, the
 particular steps being shown to illustrate the
 more important stages in the operation without
 attempting to select steps at uniformly timed
 intervals.

It is intended that the patent shall cover, by
 20 suitable expression in the appended claims,
 whatever features of patentable novelty reside
 in the invention.

What is claimed is:

1. The method of removing thread from a
 25 thread store device supported only at one end
 thereof along the periphery of which the thread
 is advanced in a large number of generally heli-
 cal turns comprising allowing several turns of
 thread to accumulate as a bundle at the un-
 30 supported end of the device, separating said bun-
 dle from succeeding turns of thread by means
 of a tool, and drawing said bundle by means of
 said tool off the unsupported end of the device.

2. The method of removing thread from a
 35 thread store device supported only at one end
 thereof along the periphery of which the thread
 is advanced in a large number of generally heli-
 cal turns comprising allowing several turns of
 thread to accumulate as a bundle at the unsup-
 40 ported end of the device, picking up said bundle,
 together with one or more of the turns follow-
 ing said bundle, with a tool, and drawing said
 bundle and said turns by means of said tool off
 the unsupported end of the device.

3. The method of removing thread from a
 45 thread store device supported only at one end
 thereof along the periphery of which the thread
 is advanced in a large number of generally heli-
 cal turns comprising simultaneously hooking a
 50 plurality of turns of the thread at the unsup-

ported end of the device on a tool and then
 drawing the tool with thread turns hooked there-
 on clear of the device.

4. The method of removing thread from a
 cantilever thread-advancing reel supported only 5
 at one end thereof along the periphery of which
 the thread is advanced in a large number of
 generally helical turns comprising allowing sev-
 eral turns of thread to accumulate as a bundle
 at the unsupported end of the reel, inserting 10
 a hook back of said bundle, and drawing said
 bundle off the unsupported end of the reel by
 means of said hook.

5. The method of removing thread from a
 cantilever thread-advancing reel supported only 15
 at one end thereof along the periphery of which
 the thread is advanced in a larger number of
 generally helical turns comprising allowing sev-
 eral turns of thread to accumulate as a bundle
 at the unsupported end of the reel, thrusting a 20
 thread-engaging tool into the interior of the reel
 from the unsupported end thereof, picking up
 said bundle with said tool by moving said tool
 in a generally radial direction with respect to the
 axis of said reel, and drawing said bundle by 25
 means of said tool off the unsupported end of the
 reel.

6. The method of removing thread from a
 thread store device supported only at one end
 thereof along the periphery of which the thread 30
 is advanced in a large number of generally heli-
 cal turns comprising engaging a plurality of said
 turns with a thread-engaging tool by inserting
 said tool between two successive turns of thread
 upon the periphery of said thread store device, 35
 said thread-engaging tool being inserted from
 the interior of the device, and drawing said turns
 off the unsupported end of the device.

7. The method of removing thread from a
 thread store device supported only at one end 40
 thereof along the periphery of which the thread
 is advanced in a large number of generally heli-
 cal turns comprising engaging a plurality of
 turns with a thread-engaging tool by thrusting
 said tool between two successive turns of thread 45
 upon the periphery of said thread store device,
 the direction of thrust being from the exterior
 to the interior of said device, and drawing said
 turns off the unsupported end of the device.

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CERTIFICATE OF CORRECTION.

Patent No. 2,227,718.

January 7, 1941.

LAVERN J. JORDAN.

It is hereby certified that error appears in the printed specification of the above numbered patent requiring correction as follows: Page 2, second column, line 17, for the word "on" read --of--; page 3, second column, line 1, claim 3, strike out "then"; line 2, same claim, after "with" insert --the--; line 17, claim 5, for "larger" read --large--; 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 25th day of February, A. D. 1941.

(Seal)

Henry Van Arsdale,
Acting Commissioner of Patents.