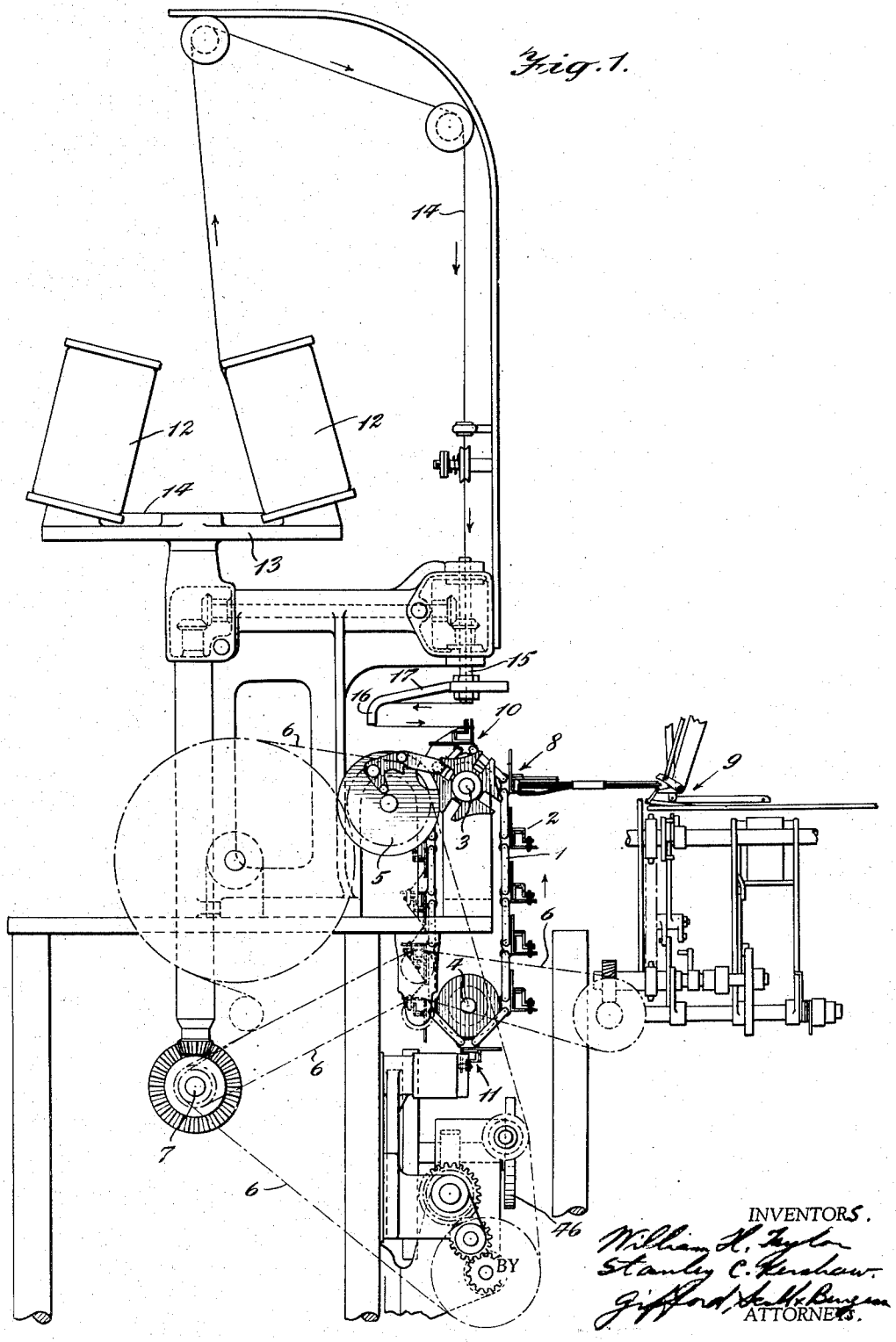
June 24, 1941. W. H. TAYLOR ET AL 2,246,608

SKEIN-FORMING MACHINE

Filed Sept. 9, 1937 8 Sheets-Sheet 1

Fig. 1.



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SKEIN-FORMING MACHINE

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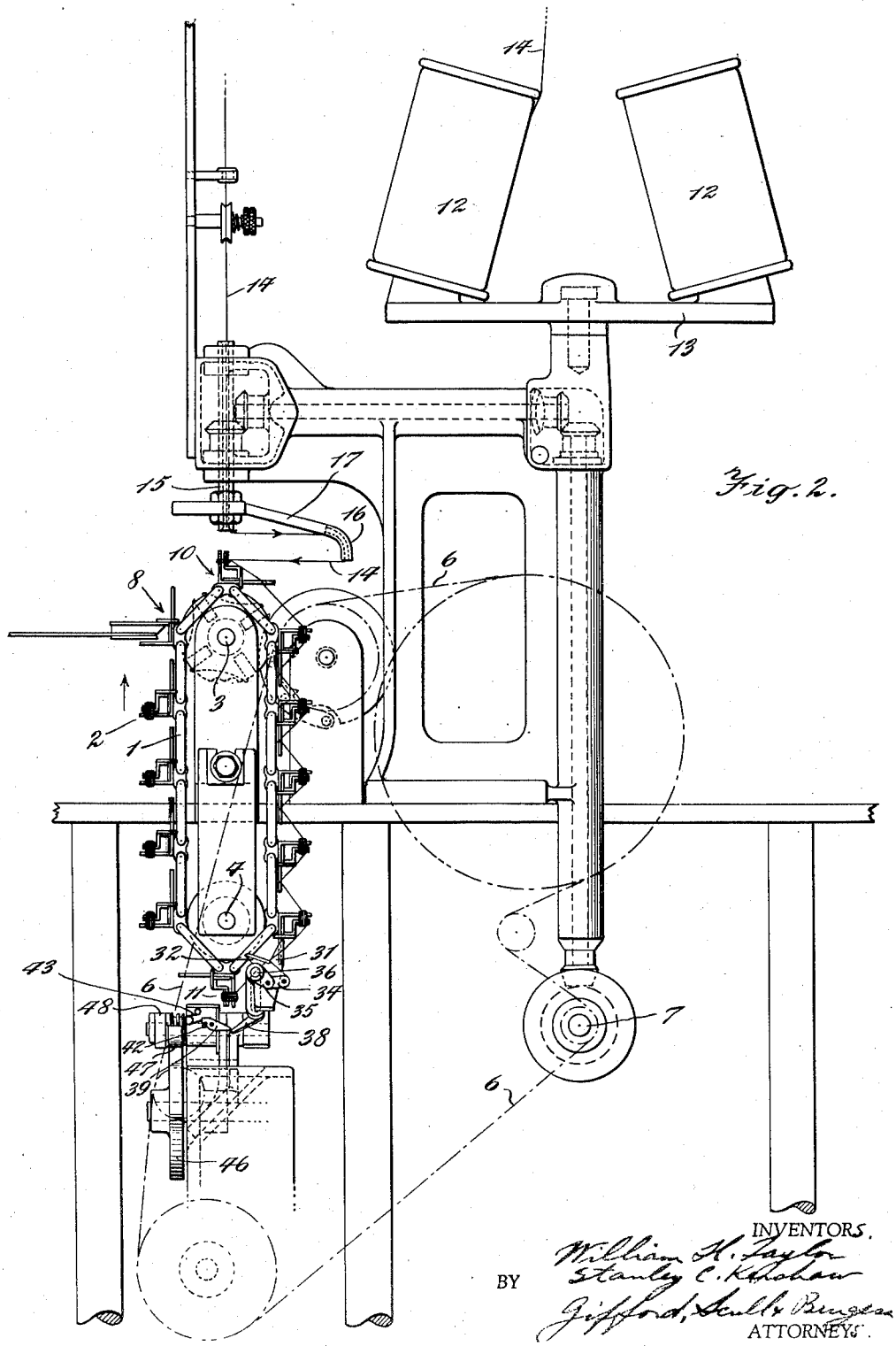


Fig. 2.

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June 24, 1941. W. H. TAYLOR ET AL 2,246,608

SKEIN-FORMING MACHINE

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Fig. 4.

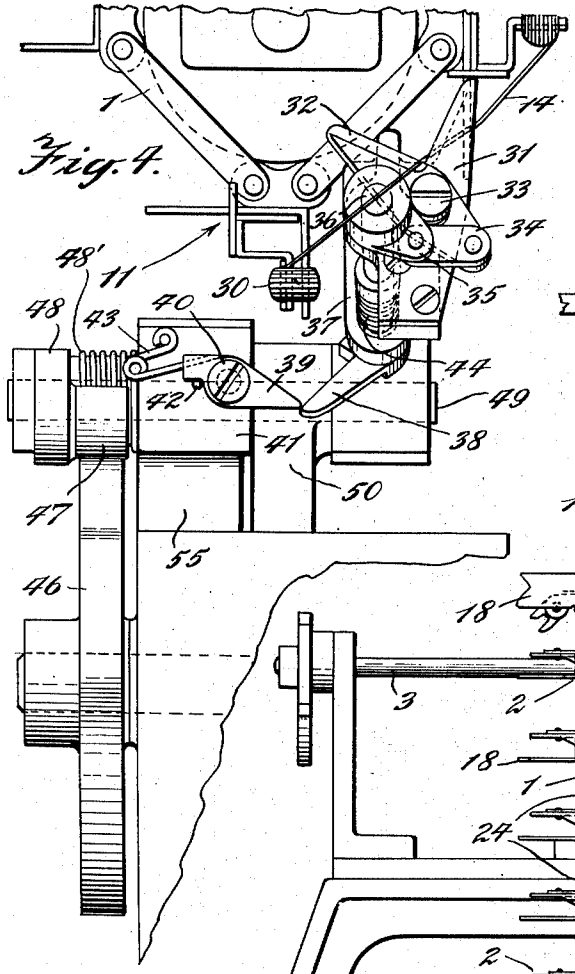
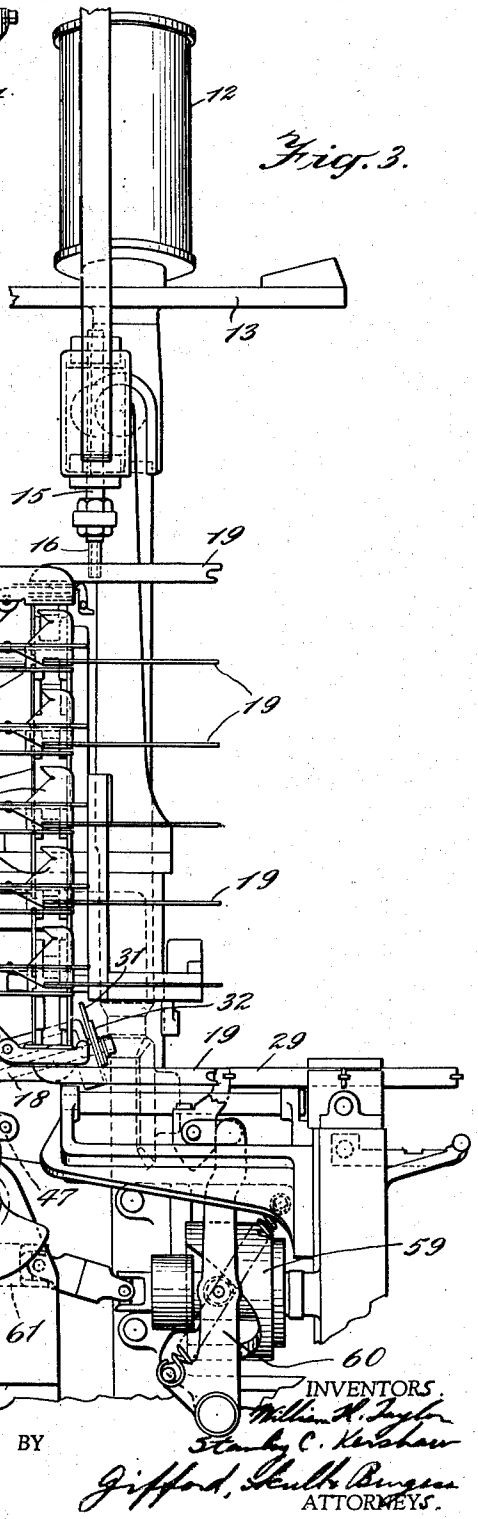


Fig. 3.



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SKEIN-FORMING MACHINE

Filed Sept. 9, 1937 8 Sheets-Sheet 4

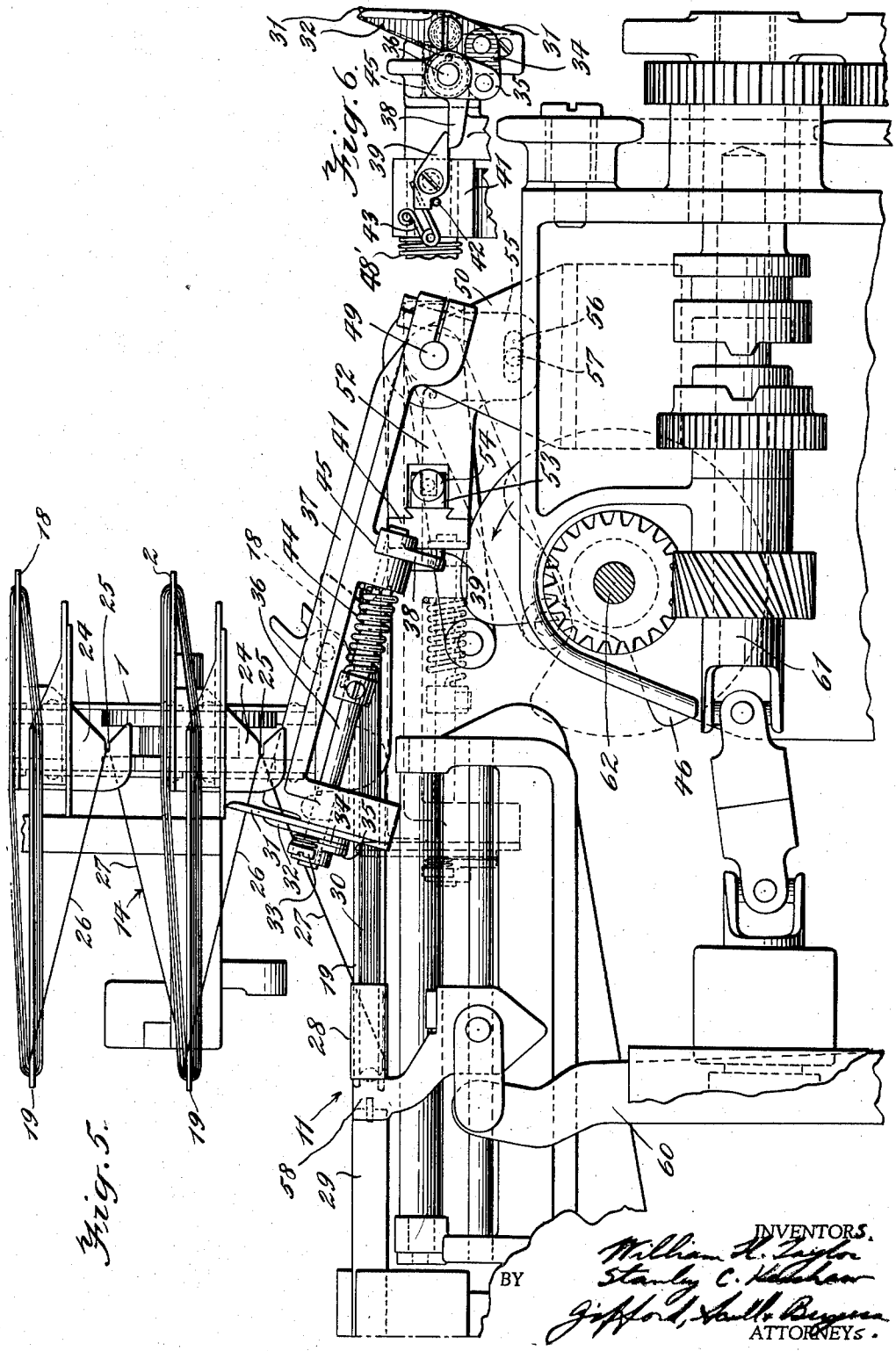


Fig. 5.

Fig. 6.

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SKEIN-FORMING MACHINE

Filed Sept. 9, 1937 8 Sheets-Sheet 5

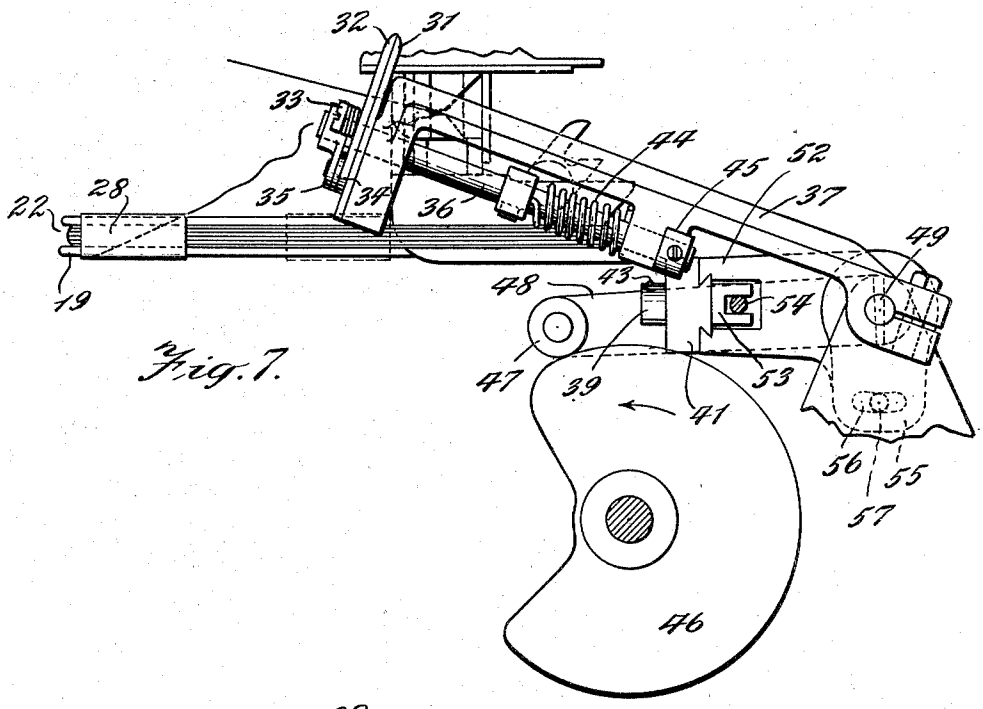


Fig. 7.

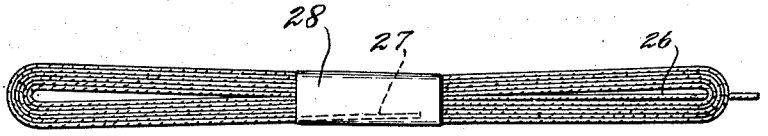


Fig. 15.

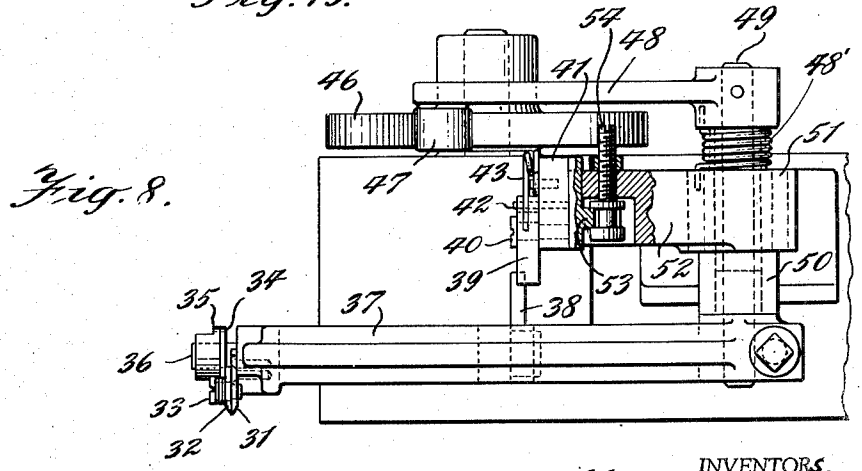


Fig. 8.

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SKEIN-FORMING MACHINE

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Fig. 9.

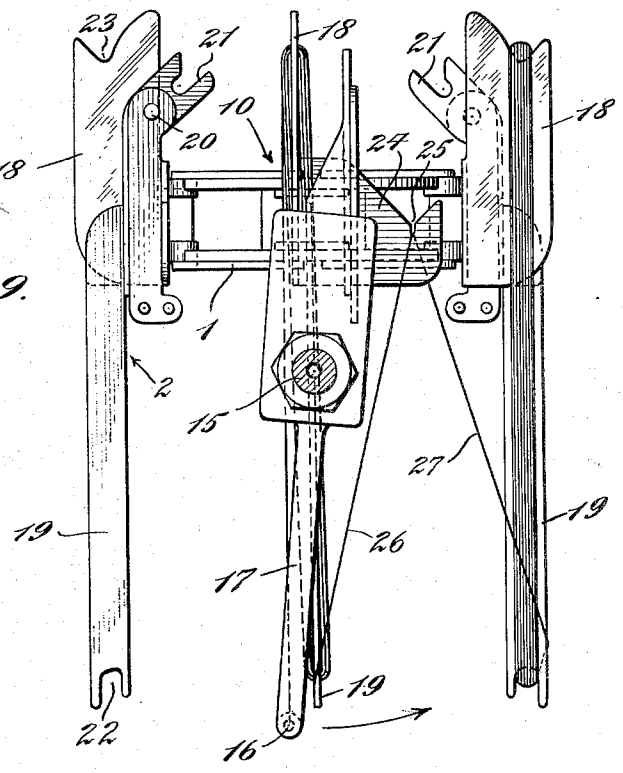
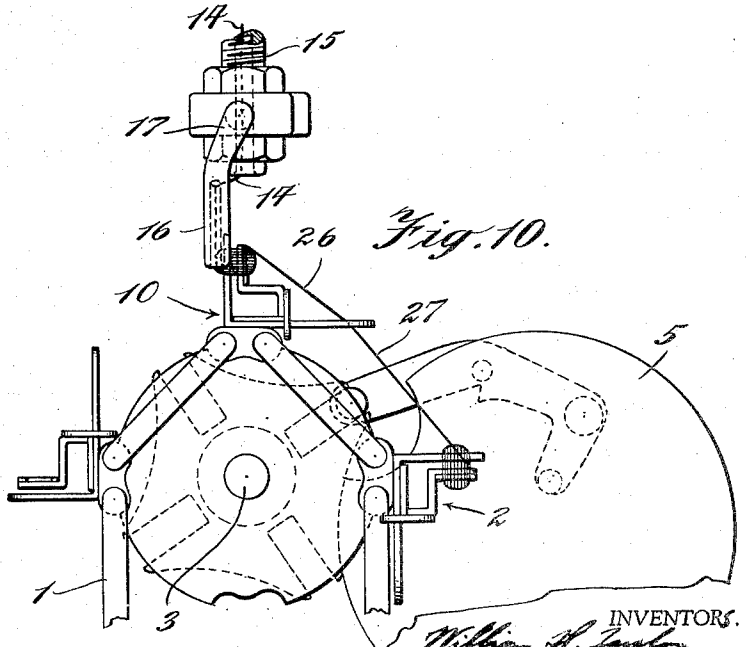


Fig. 10.



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June 24, 1941. W. H. TAYLOR ET AL 2,246,608

SKEIN-FORMING MACHINE

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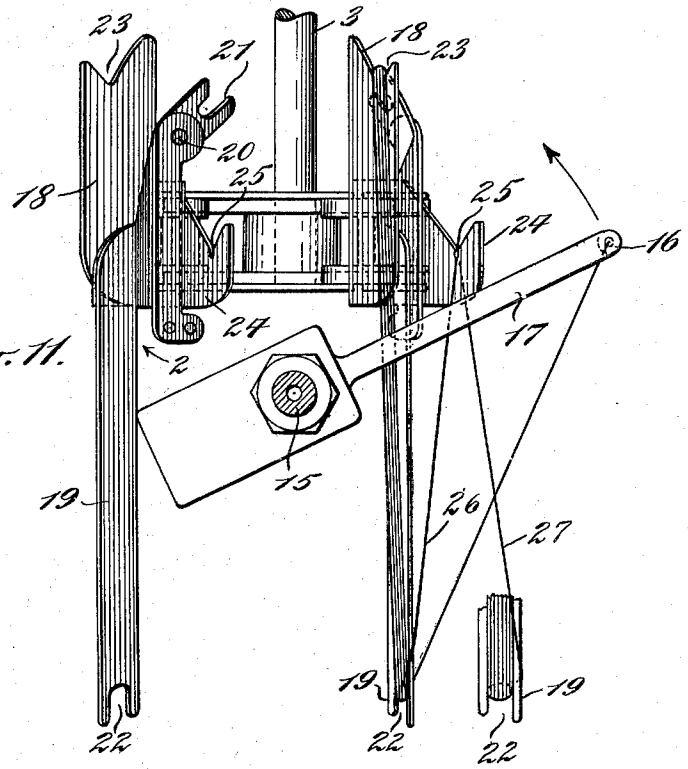


Fig. 11.

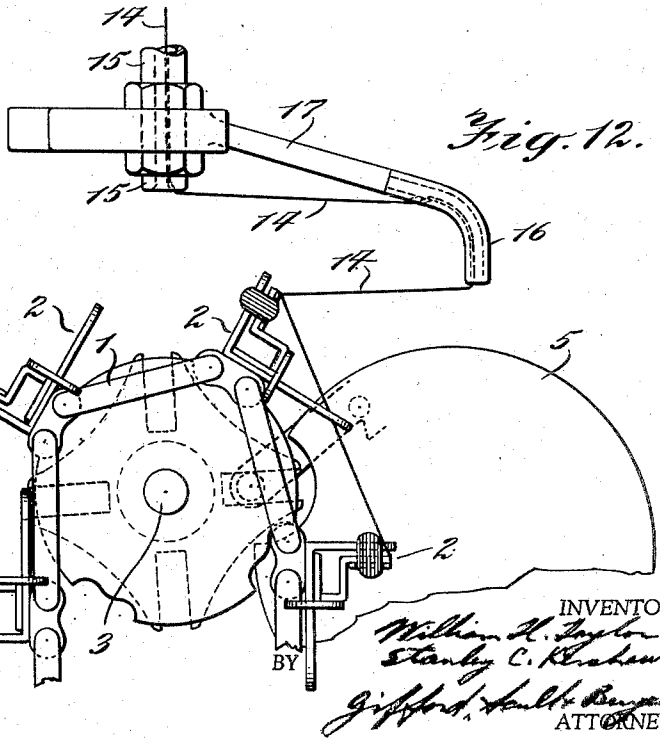


Fig. 12.

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SKEIN-FORMING MACHINE

Filed Sept. 9, 1937 8 Sheets-Sheet 8

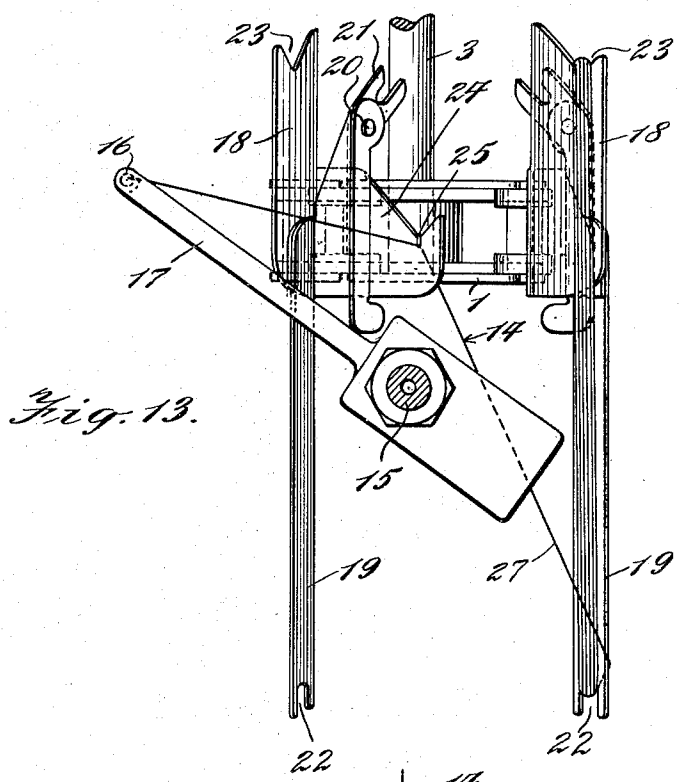


Fig. 13.

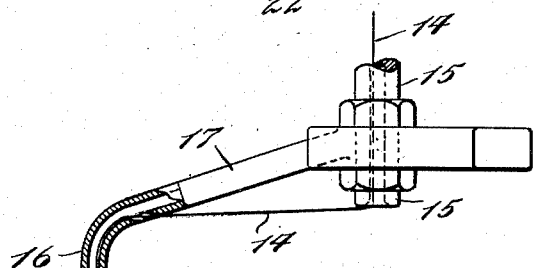
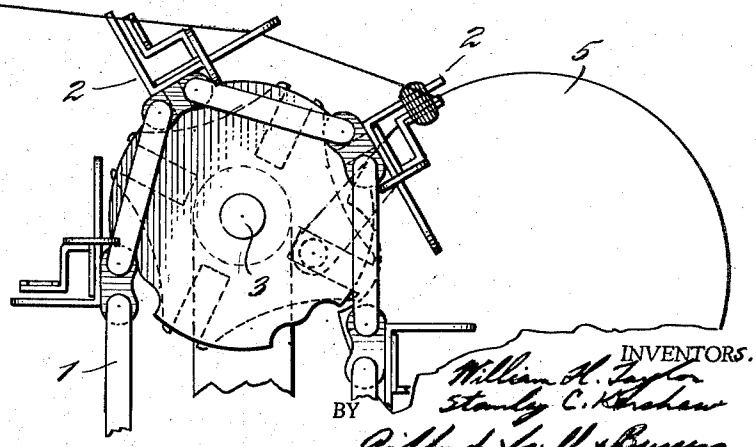


Fig. 14.



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Patented June 24, 1941 2,246,608

UNITED STATES PATENT OFFICE

2,246,608

SKEIN-FORMING MACHINE

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Application September 9, 1937, Serial No. 163,006

14 Claims. (Cl. 28—21)

This invention relates to a novel and improved form of skein forming machine and will be best understood from the following description and the annexed drawings, in which we have shown a selected form of mechanism for producing the novel form of skein. In those drawings:

Fig. 1 is an elevation of the rear of the machine, it being understood that only such parts of the machine are shown as are necessary for an understanding of the invention;

Fig. 2 is a view on an enlarged scale showing part of the mechanism appearing in Fig. 1 as viewed from the front of the machine;

Fig. 3 is a side elevation of the structure appearing in Fig. 2 as viewed from the left of that figure;

Fig. 4 is a view on a still further enlarged scale taken on the same plane as Fig. 2, but showing the cutting mechanism;

Fig. 5 is an elevation of the structure appearing in Fig. 4, together with additional structure, all as viewed from the right of Fig. 4;

Fig. 6 is a view on the same plane as Fig. 4 and showing certain parts in that figure in different positions;

Fig. 7 is a view showing certain of the parts appearing in Fig. 5, but in different positions;

Fig. 8 is a plan view of the mechanism appearing in Fig. 7 but with the parts in different positions, certain parts being broken away and shown in section and certain parts being omitted for the sake of clearness;

Figs. 9 and 10 are, respectively, plan and elevation of the winding mechanism at the start and at the end of the indexing of the conveyor;

Figs. 11 and 12 are views corresponding to Figs. 9 and 10 but showing the conveyor as being approximately one-third indexed;

Figs. 13 and 14 are views corresponding to Figs. 9 and 10 and showing the parts when the conveyor is two-thirds indexed;

Fig. 15 is a view illustrating the winding of the complete skein.

The machine shown herein is of the same general type as that described and claimed in our copending application Ser. No. 74,034, filed April 13, 1936, and before that in the patents to Clauss 1,401,515 and 1,401,516, in which the skeins are removed and bundled in the same manner as in the Clauss Patent 1,401,520. In the machines shown in that application and in those patents, however, the skein has been wound in a certain way, resulting in the provision of two loose ends adjacent one end of the skein which were fastened together by a paper clip or binder. According to the present application, the skein is so formed and wound as to avoid the necessity of using such paper clip or binder, as will be more fully explained later.

The machine comprises a conveyor 1 upon which are mounted skein-supports 2, upon which yarn may be wound to form the skeins. The conveyor is shown as of the chain type and is mounted upon two parallel and horizontal shafts 3 and 4, one above the other and one of which, here shown as the shaft 3, is intermittently rotated to index the conveyor. The intermittent operation may conveniently be performed by means of a Geneva cross secured to the shaft 3 and operated by a pin on the continually rotating disk 5. The disk 5 and other parts of the mechanism are shown as being operated by a chain drive 6 from a drive shaft 7.

The indexing movement of the conveyor causes the supports 2 to be successively brought to a position 8 wherein the supports are moved outwardly so that the skeins thereon may be removed from the supports by mechanism indicated generally at 9 and the details of which are not necessary to an understanding of this invention. Likewise, the means for moving the supports outwardly are known in the art, and since the details are not necessary for an understanding of the invention claimed herein, they will not be described further.

After the skein has been removed from a support at the position 8, that support is returned to its normal position relative to the conveyor and is then moved by the indexing of the conveyor to a position 10, wherein a new skein is wound thereon, and then is moved to a banding position 11 where a band is applied to the skein by being slipped over the end of the skein and its support, all as described and claimed in our aforesaid copending application. It will be noted that the winding position of a support is shown at the top of the conveyor and the banding position at the bottom thereof, and that the support at winding position is next adjacent the support at the position 8 where the skeins are removed from the supports.

Yarn is supplied from any suitable source of supply, here indicated as spools 12 mounted on a table 13. While we shall use the expression "yarn," it is of course to be understood that that term is used in a broad sense to include any thread or other material with which the invention may be practiced. From the spools the yarn 14 is led through suitable guides and tension members, through a tubular guide 15 arranged

vertically above the position 10 and thence through a guide 16 on the end of a flier arm 17 which, with the guide 15, is rotated about the vertical axis of the guide 15. The driving connections from the shaft 7 to the guide 15 are plainly shown in Figs. 1 and 2 and need not be described in detail.

Referring now more particularly to Figs. 9 to 14, inclusive, it will be seen that each support comprises a stalk having parts 18 and 19 which are pivoted together at 20 so that the part 19 may be moved outwardly when the skein is removed from the support, this being done by engagement of a suitable operating element with the forked end 21 of the arm 19, it being understood that the part 18 is rigidly secured to the conveyor. At the opposite ends of the stalk are notches 22 and 23 to receive the thread, and the axis of the guide 15 is substantially midway of the stalk, as plainly shown, particularly in Fig. 9. Therefore, as the flier rotates about its vertical axis, it will wind the yarn in a skein on the support at the winding position 10. The winding will be what is known as straight winding, with the skein built up from the center thereof which lies adjacent the support on which the skein is wound.

Rigidly secured to the part 18 of each support and forming a part thereof is a catch 24 shown in the form of a hook having a narrow slit 25 therein adapted to receive yarn and small enough so that the yarn will be detachably held therein but capable of being pulled therefrom by a moderate force.

In Figs. 9 and 10, the parts are shown after the conveyor has been indexed and after the winding of the skein has been substantially completed at the position 10, this winding all taking place substantially entirely while the conveyor is stationary or during the dwell of the Geneva movement.

In Figs. 9 to 14, inclusive, the skein-support at the left of the various figures is shown as empty, it being assumed that the skein has just been removed therefrom. The parts are so designed and timed that after the skein is substantially wound as shown in Fig. 9, the indexing movement then begins and proceeds from the position shown in Fig. 9 through the successive positions shown in Figs. 11 and 13 until the empty support at the left of those figures reaches the position 10. As best shown in Figs. 13 and 14, as the empty support comes upwardly to the winding position 10, the flier arm 17 brings the yarn 14 into the slot or slit 25 of the catch 24 on the empty support and thence into the notch 22 at the front end of that support. Then by the time that the flier arm 17 has reached the approximate position shown in Fig. 9, the empty support will reach the position 10 so that winding may continue as the flier arm rotates about the axis of the guide 15.

It will be seen that the yarn 14 is stretched between each two adjacent supports and is uncut. It will also be seen that this uncut yarn is stretched between the catch 24 located between those two supports and the front ends of the supports. For convenience, the part of the yarn between the catch and the support following that catch or behind it, according to the movement of the conveyor, will be identified as 26 and that between the catch and the other support will be designated 27. The yarn is cut, as will be described presently, between the catch 24 and said other support and therefore the part 26 will be longer than the part 27 after the cutting. Therefore the part 26 will be referred to as the long end and the part 27 as the short end.

The cutting of yarn is done adjacent the banding position 11. Referring to Fig. 5, we have shown therein a band 28 being slipped over a skein at the banding position while it is still upon its support, this being done by removing the band from a mandrel 29 upon which it has been previously formed, all as more fully described and claimed in our aforesaid copending application, Ser. No. 74,034. Substantially simultaneously with the placing of the band over the skein 30 at the position 11, the yarn is cut between that skein and the catch 24 on the following support. The end 26 thus formed will be retained by the catch until the skein is removed at the position 8 to which it is next brought by successive indexing movements of the conveyor. As the skein is removed from its support, the end 26 will easily slip out of the slot 25 in the catch 24.

The cutting may conveniently be done by means which we have devised for that purpose and which will now be described, particular reference being had to Figs. 3 to 8, inclusive.

The cutting apparatus shown comprises a relatively fixed knife 31 and a relatively movable knife 32 pivoted on the fixed knife at 33. The movable knife is moved on its pivot by means of a link 34 connected to an arm 35 mounted on a rock shaft 36 supported in suitable bearings on an oscillating arm 37. The shaft 36 may be rocked by means of a finger 38 secured to one end thereof and adapted to engage a pawl 39 pivoted at 40 on a block 41 which is relatively fixed with regard to the arm 37, although capable of slight movement, as will be explained presently. Counterclockwise movement of the pawl 39 is limited by a stop 42 against which the pawl is normally held, as by means of a spring 43. The rock shaft 36 is urged in a clockwise direction, as viewed in Figs. 4 and 6, by means of the spring 44, this spring thus tending to close the shears formed by the two knives 31 and 32, this movement being limited by a suitable stop, here shown as a flattened surface 45 on the hub of the finger 38 adapted to engage a cooperating surface on the arm 37.

In operation, the spring 44 will normally keep the shears closed, as indicated in Fig. 6, but as the arm 37 is rocked upwardly by means to be described presently, the shears reach some such position as indicated in Fig. 4, where it will be seen that the pawl 39 has caused the finger 38 to turn the rock shaft 36 and thus open the shears to receive the yarn 14. In Fig. 4, the parts are shown just as the finger is about to snap past the pawl 39, after which the spring 44 will cause a quick closing of the shears by moving the knife 32 about its pivot 33, which, of course, will result in a quick snipping or cutting of the yarn. Then, in the down movement of the rock arm which immediately follows, the finger 38 may pass the pawl 39, the spring 43 permitting limited movement of the pawl for that purpose.

The arm 37 is raised and lowered by means of a cam 46 engaging a roller 47 on an arm 48 which is keyed to a shaft 49 to which is also secured the arm 37. This shaft 49 is rotatably mounted in a bearing 50 on the frame of the machine, and on the same shaft is rotatably mounted a bell crank lever 51, one arm 52 of which extends forwardly and slidably supports the block 41 to which the pawl 39 is pivoted.

As plainly shown in Figs. 5, 7, and 8, the block 41 has a tongue and groove connection with the arm 52, and on the rear face of the block is provided a tongue 53 to which is swiv-

eled an adjustment screw 54 threaded into the arm 52. By turning the screw 54, the pawl 39 may thus be brought towards and away from the finger 38.

The other arm 55 of the bell crank lever 51 extends downwardly, as is best shown in Fig. 3, and is provided with a slot 56 in which is received an adjusting screw 57 secured to the bearing 50, whereby the lever 51 may be adjusted on the shaft 49 and held in adjusted position. The spring 48' acts between the lever 51 and the arm 48 to maintain the roller 47 against the cam.

The shears are operated in synchronism with the mechanism for applying bands to the skeins, and this mechanism, as more fully brought out in our aforesaid copending application, comprises mandrels 29 upon which are formed bands and then the mandrels are periodically brought into alignment with skein-supports to which the bands are removed by elements 58 which engage the band on a mandrel and slide it over the skein on a support which is at that moment aligned with the mandrel from which the band is removed. The elements 58 may be reciprocated by means of a cam 59 operating a lever 60 which is connected to the elements 58, and the cam 59 in turn is operated by a shaft 61 which, as best shown in Figs. 3 and 5, is geared to the shaft 62 upon which is secured the cam 46.

Referring now to Fig. 15, we have shown therein diagrammatically a skein which has been completed and to which a band 28 has been applied. The yarn end has been cut at such a place that the short end 27 will be disposed beneath the band 28 or, at the most, projecting slightly from under the band, whereas the long end 26 is disposed adjacent one end of the skein. It will thus be seen that the user is presented with only one end of the yarn. This end, being on the inside of the skein, normally does not project from the skein enough to be detrimental, but at the same time it is readily available and readily found by the user. When this long end 26 is pulled, the skein will unwind from the center until the desired length of yarn has been obtained, after which it may be cut and the remainder of the skein will be in such shape that it may remain within the band in compact form ready for further use. No clip or binder to secure loose ends is required.

While we have shown the invention as embodied in a specific form, it is to be understood that various changes in details may be made without departing from the scope of the invention, as defined by the appended claims.

We claim:

1. A skein-forming machine comprising a conveyor having thereon a plurality of skein-supports, means for intermittently indexing said conveyor to bring said supports in sequence into position to have the skeins removed therefrom, then into winding position to wind skeins thereon, and then into banding position to apply bands thereto, a flier adjacent said winding position and adapted to form a skein of yarn on a support at said position, the yarn between each two supports located between said winding and banding positions being uncut, means stretching said uncut yarn rearwardly from the front ends of said two supports, means at said banding position to slip bands over the front ends of said skeins on said supports when they reach that position, and means to cut the previously uncut yarn.

2. A skein-forming machine comprising a conveyor having thereon a plurality of skein-supports, means for intermittently indexing said conveyor to bring said supports in sequence into position to have the skeins removed therefrom, then into winding position to wind skeins thereon, and then into banding position to apply bands thereto, a flier adjacent said winding position and adapted to form a skein of yarn on a support at said position, the yarn between each two supports located between said winding and banding positions being uncut, means stretching said uncut yarn rearwardly from the front ends of said two supports, means at said banding position to slip bands over the front ends of said skeins on said supports when they reach that position, and means to cut the previously uncut yarn substantially when the band is applied.

3. A skein-forming machine comprising a conveyor having thereon a plurality of skein-supports, means for intermittently indexing said conveyor to bring said supports in sequence into position to have the skeins removed therefrom, then into winding position to wind skeins thereon, and then into banding position to apply bands thereto, a flier adjacent said winding position and adapted to form a skein of yarn on a support at said position, said flier being further adapted to stretch the yarn from the wound support leaving said winding position to the empty support approaching said position during indexing movement of the conveyor, a catch between each two adjacent supports and adapted to catch the yarn stretched therebetween, and means adjacent said banding position to sever the yarn between said catch and one of said supports.

4. A skein-forming machine comprising a conveyor having thereon a plurality of skein-supports, means for intermittently indexing said conveyor to bring said supports in sequence into position to have the skeins removed therefrom, then into winding position to wind skeins thereon, a flier adjacent said winding position and adapted to form a skein of yarn on a support at said position, said flier being further adapted to stretch the yarn back from the front end of the wound support leaving said winding position towards the rear end of the empty support approaching said position during indexing movement of the conveyor, and a catch between each two adjacent supports in position to engage said yarn and cause the flier to bring the yarn into engagement with the front end of said empty support.

5. A skein-forming machine comprising a conveyor having thereon a plurality of skein-supports, means for intermittently indexing said conveyor to bring said supports in sequence into position to have the skeins removed therefrom, then into winding position to wind skeins thereon, and then into banding position to apply bands thereto, a flier adjacent said winding position and adapted to form a skein of yarn on a support at said position, said flier being further adapted to stretch the yarn from the wound support leaving said winding position to the empty support approaching said position during indexing movement of the conveyor, a catch between each two adjacent supports and adapted to catch the yarn stretched therebetween, means to cut the yarn between the catch and one of the two supports, and means to slip bands over said front ends of said supports to hold the cut ends of said yarn.

6. A skein-forming machine comprising a conveyor having thereon a plurality of skein-supports, means for intermittently indexing said conveyor to bring said supports in sequence into position to have the skeins removed therefrom, then into winding position to wind skeins thereon, a flier adjacent said winding position and adapted to form a skein of yarn on a support at said position, said flier being further adapted to stretch the yarn back from the front end of the wound support leaving said winding position towards the rear end of the empty support approaching said position during indexing movement of the conveyor, a catch between each two adjacent supports in position to engage said yarn and cause the flier to bring the yarn into engagement with the front end of said empty support, and means to cut said stretched yarn between said catch and one of said supports, said catch being adapted to detachably hold one of the cut ends therein.

7. A skein-forming machine comprising a conveyor having thereon a plurality of skein-supports, means for intermittently indexing said conveyor to bring said supports in sequence into position to have the skeins removed therefrom, then into winding position to wind skeins thereon, a flier adjacent said winding position and adapted to form a skein of yarn on a support at said position, said flier being further adapted to stretch the yarn back from the front end of the wound support leaving said winding position towards the rear end of the empty support approaching said position during indexing movement of the conveyor, a catch between each two adjacent supports in position to engage said yarn and cause the flier to bring the yarn into engagement with the front end of said empty support, means to cut said stretched yarn between said catch and one of said supports, said catch being adapted to detachably hold one of the cut ends therein, and means to slip a band over the skein on said one support to hold the other cut end.

8. In a skein-forming machine, a conveyor, a plurality of skein-supports carried on said conveyor and spaced apart lengthwise thereof, each support comprising a relatively fixed part secured to the conveyor and a second part pivoted to the first part, and a catch rigid with said fixed part and extending towards an adjacent skein-support and adapted to hold a yarn end.

9. In a skein-forming machine, a conveyor, a plurality of skein-supports carried on said conveyor and spaced apart lengthwise thereof, and a catch between each two adjacent supports and adapted to hold a yarn end.

10. In a skein-forming machine, a conveyor having thereon a plurality of skein-supports spaced apart lengthwise of the conveyor, means to wind yarn into skeins on said supports, with the yarn stretched between adjacent supports, means to move said conveyor to bring said supports with the skeins thereon successively to a banding position, means at said banding position to slide a band over a skein to the approximate center thereof, and cutting means operating in synchronism with said band-applying means to cut the yarn between the support at the banding position and the next following support at substantially the same time as said band is applied.

11. In a skein-forming machine, a conveyor having thereon a plurality of skein-supports spaced apart lengthwise of the conveyor, means to wind yarn into skeins on said supports, with the yarn stretched between adjacent supports, means to intermittently move said conveyor, an arm pivoted on the machine adjacent the path of travel of the conveyor, a relatively fixed knife on said arm, a relatively movable knife on said arm and adapted to cooperate with said fixed knife to cut the yarn between adjacent supports, means to move said arm on its pivot to bring said knives into and out of cutting position, and means actuated by said movement of said arm to operate said movable knife when at said cutting position.

12. In a skein-forming machine, a source of supply of yarn, a plurality of skein supports, means for leading yarn from said source to one of said supports, means for straight-winding the yarn into a skein on that support and for then straight-winding yarns on successive supports, with the yarn uncut between supports, means for sliding a band over the skein formed on the first-named support to the approximate center thereof, and means acting substantially simultaneously with said band-sliding means for cutting the yarn between that support and an adjacent support to form a short end located substantially under said band.

13. In a skein-forming machine, a source of supply of yarn, a plurality of skein supports, means for leading yarn from said source to one of said supports, means for straight-winding the yarn into a skein on that support and for then straight-winding yarns on successive supports, with the yarn uncut between supports, means for sliding a band over the skein formed on the first-named support to the approximate center thereof, and means acting substantially simultaneously with said band-sliding means for cutting the yarn between that support and an adjacent support to form a short end located substantially under said band and to form a long end on said adjacent support located away from the band thereon.

14. In a skein-forming machine, a conveyor having thereon a plurality of skein-supports spaced apart lengthwise of the conveyor, means to wind yarn into skeins on said supports, with the yarn stretched between adjacent supports, means to intermittently move said conveyor, an arm pivoted on the machine adjacent the path of travel of the conveyor, a relatively fixed knife on said arm, a relatively movable knife on said arm and adapted to cooperate with said fixed knife to cut the yarn between adjacent supports, means to move said arm on its pivot to bring said knives into and out of cutting position, a spring normally holding said movable knife in a position overlapping said fixed knife, and means actuated by said movement of said arm to move said movable knife against the action of said spring to separate said knives and then to release said movable knife to allow said spring to move it to perform a cutting operation.

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