Jan. 5, 1954 F. LAMBACH ET AL 2,664,724

WARP KNITTING MACHINE

Filed Dec. 28, 1951 5 Sheets-Sheet 1

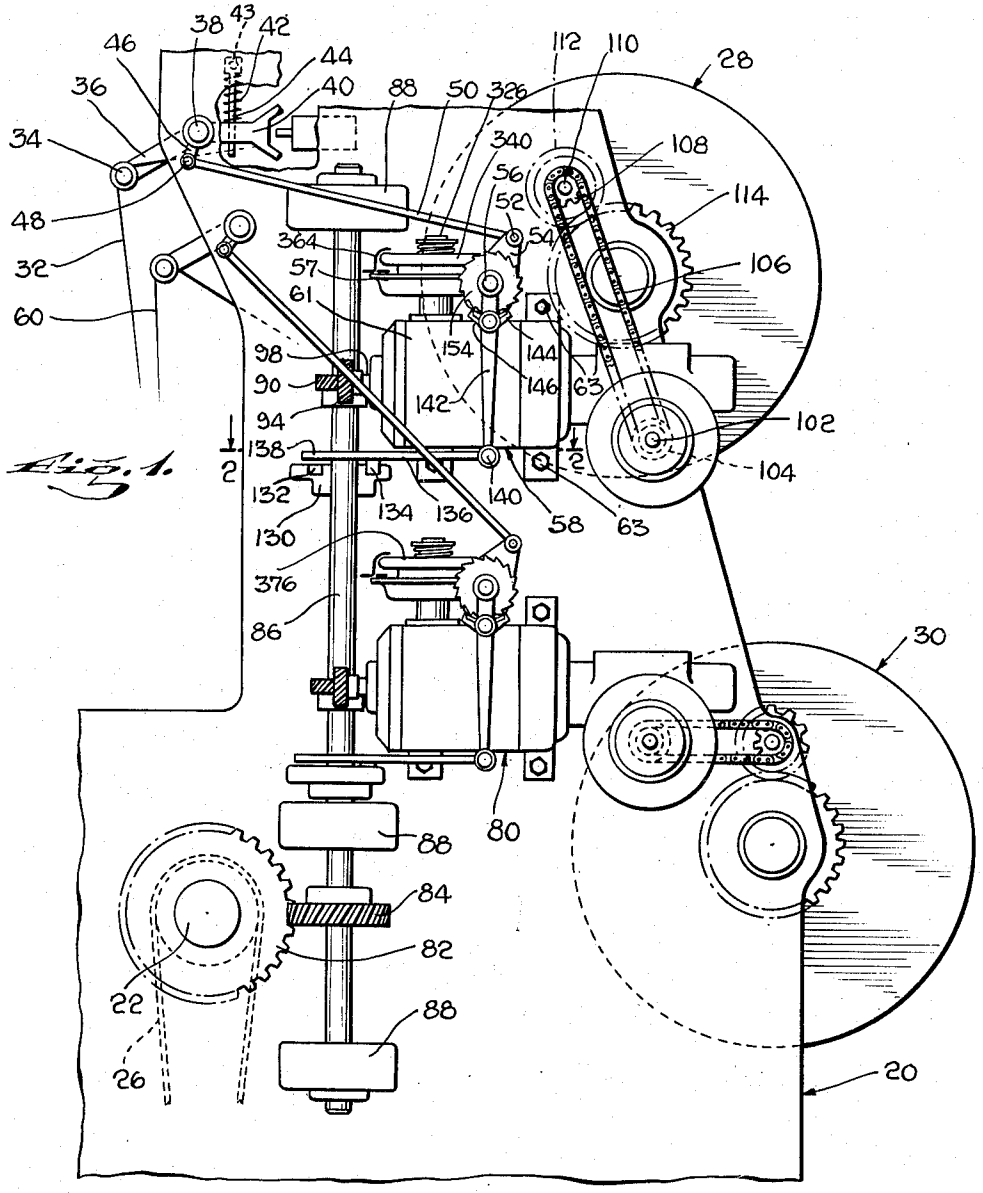


Fig. 1.

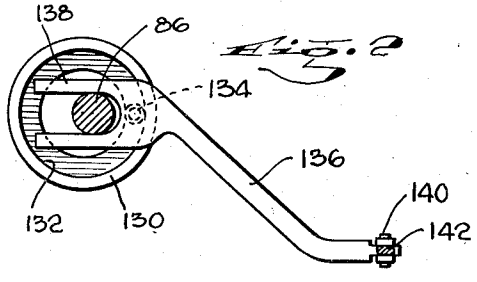


Fig. 2

INVENTORS
FRITZ LAMBACH
WALTER SIEGEL

BY

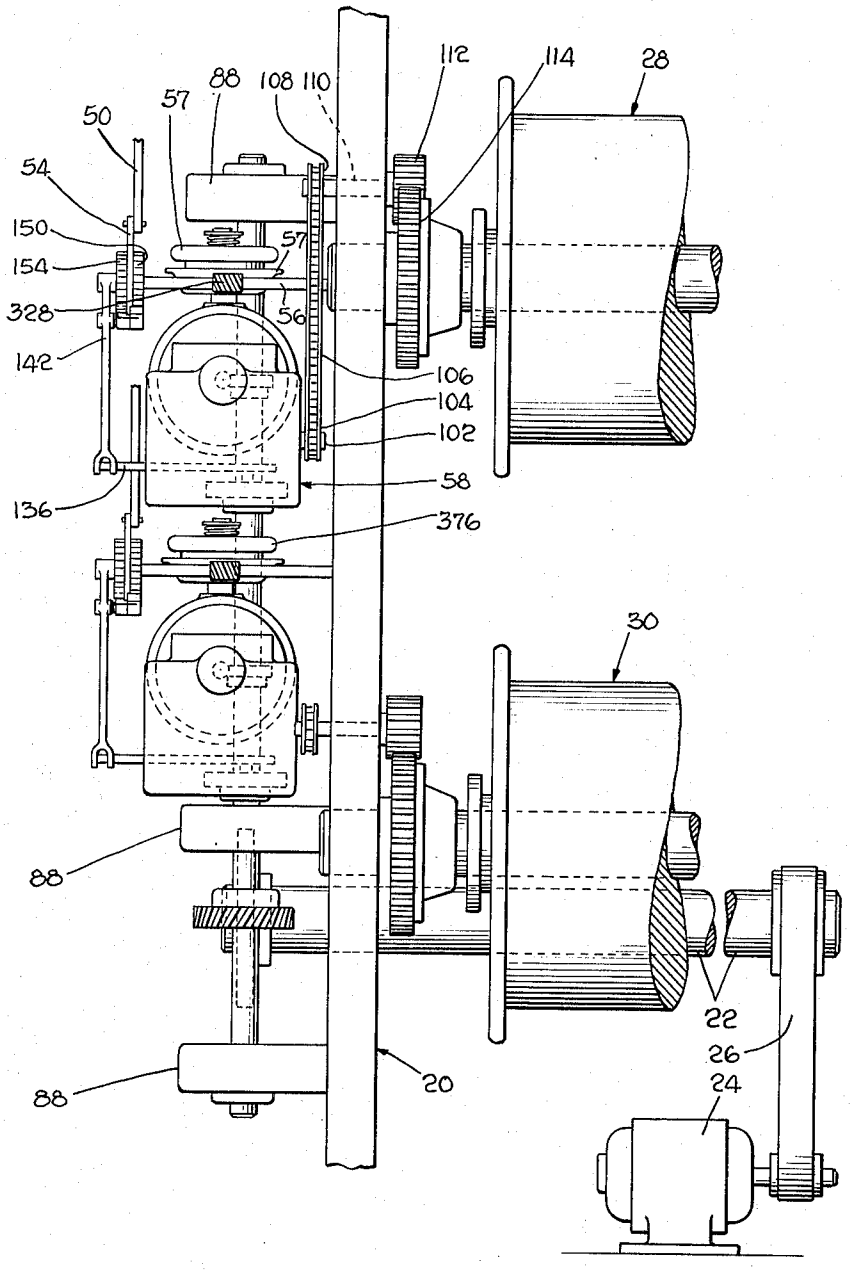
ATTORNEY

Jan. 5, 1954 F. LAMBACH ET AL 2,664,724

WARP KNITTING MACHINE

Filed Dec. 28, 1951 5 Sheets-Sheet 2

Fig. 3.



INVENTORS
FRITZ LAMBACH
WALTER SIEGEL
BY
ATTORNEY

Jan. 5, 1954 F. LAMBACH ET AL 2,664,724

WARP KNITTING MACHINE

Filed Dec. 28, 1951 5 Sheets-Sheet 3

Fig. 4.

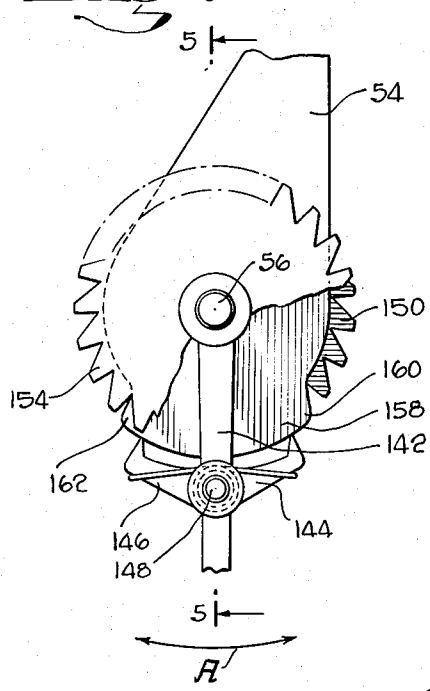


Fig. 5.

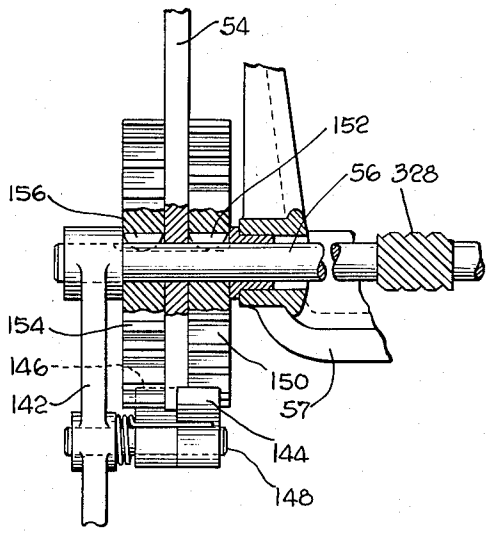


Fig. 6.

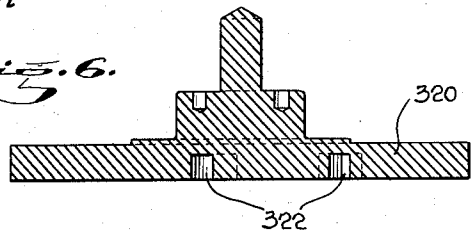
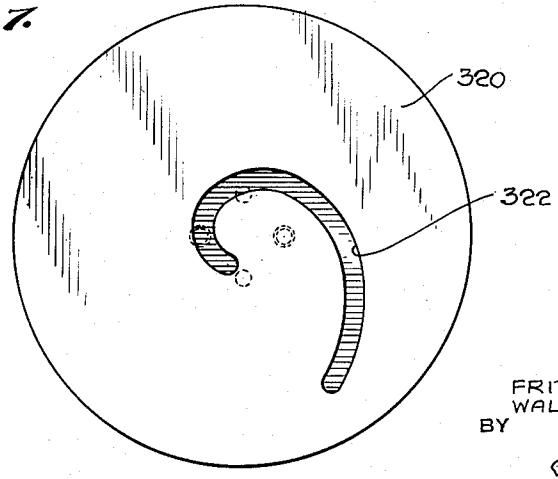


Fig. 7.



INVENTORS
FRITZ LAMBACH
WALTER SIEGEL
BY
ATTORNEY

Jan. 5, 1954 F. LAMBACH ET AL 2,664,724

WARP KNITTING MACHINE

Filed Dec. 28, 1951 5 Sheets-Sheet 4

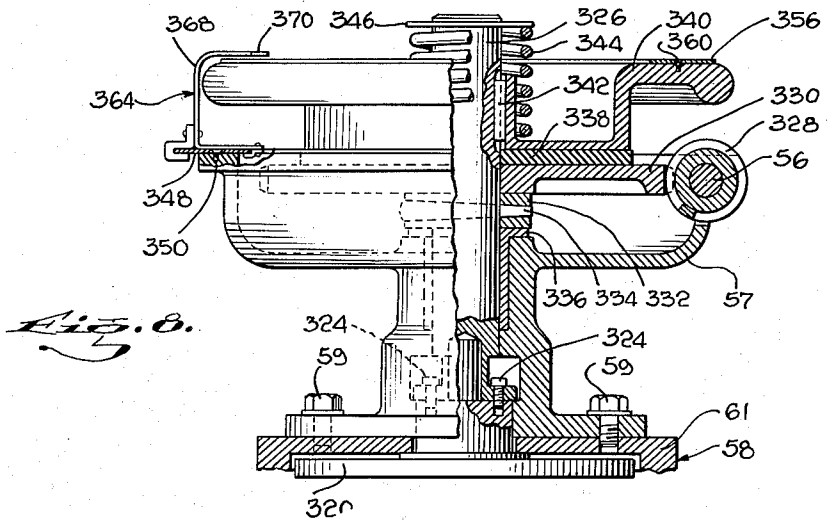


Fig. 8.

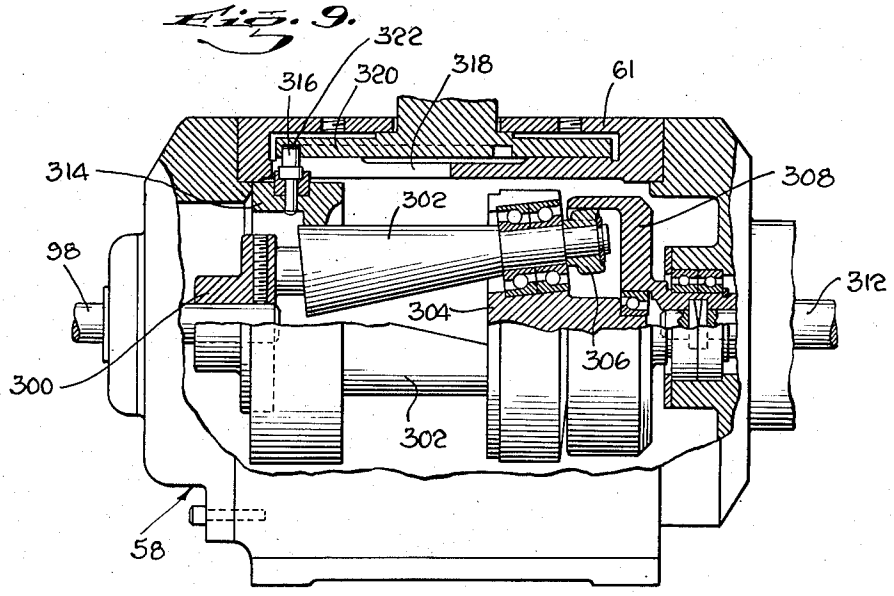


Fig. 9.

INVENTOR
FRITZ LAMBACH
WALTER SIEGEL
BY
ATTORNEY

Jan. 5, 1954 F. LAMBACH ET AL 2,664,724

WARP KNITTING MACHINE

Filed Dec. 28, 1951 5 Sheets-Sheet 5

Fig. 10.

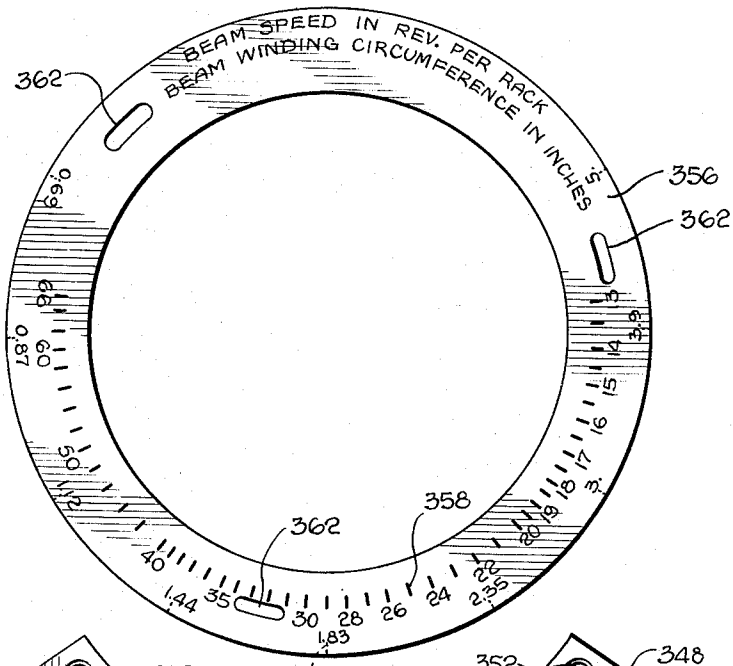


Fig. 11.

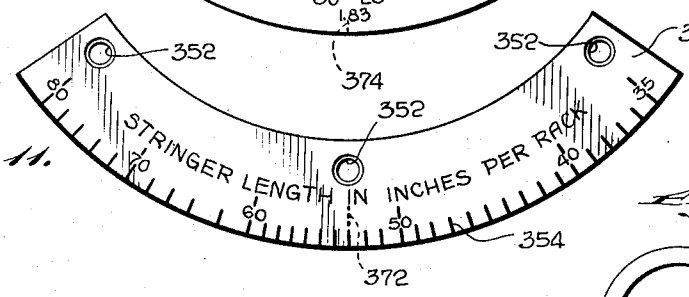


Fig. 12.

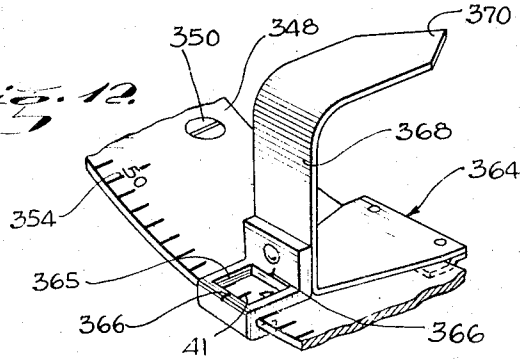
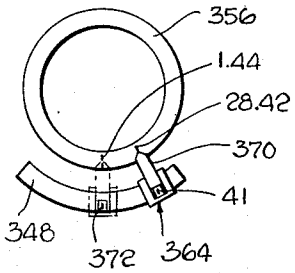


Fig. 13.



INVENTORS
FRITZ LAMBACH
WALTER SIEGEL
BY
ATTORNEY

Patented Jan. 5, 1954

2,664,724

UNITED STATES PATENT OFFICE

2,664,724

WARP KNITTING MACHINE

Fritz Lambach, Tenafly, and Walter Siegel, Union City, N. J., assignors to Robert Reiner, Inc., Weehawken, N. J.

Application December 28, 1951, Serial No. 263,888

7 Claims. (Cl. 66—86)

1

This application is a continuation-in-part of our copending application Serial No. 193,468, filed on November 1, 1950, for "A Warp Knitting Machine."

The present invention relates to knitting machines, and more particularly to warp knitting machines wherein the warp beam or beams are rotated by a drive and wherein automatic controlling means are arranged for controlling the speed of rotation of the warp beam or beams in dependence on a certain factor, for example tension in the warp yarns or decrease of the winding on the warp beam, so as to maintain a substantially uniform circumferential speed of the winding or windings on the warp beam or beams for a substantially constant travelling speed of the warp yarns fed to the knitting implements.

At the beginning of an operation of the warp knitting machine said controlling means must be set for a predetermined speed or number of rotations of the warp beam or beams per rack (1 rack=480 revolutions of the main cam shaft of the knitting machine) so that a fabric of a predetermined quality may be knitted with a warp yarn of a certain quality. During the operation of the warp knitting machine, while the diameter of the winding or windings on the warp beam or beams decreases, said controlling means increase automatically the speed of rotation of the warp beam or beams from the preset value at the start of the operation to a higher value at the end of the operation. Therefore, at the beginning of the next operation, said controlling means must be reset.

Heretofore, it has been necessary to compute mathematically the speed or numbers of rotations of the warp beam or beams for causing the feeding of a predetermined length of warp yarn or stringer in inches per rack as required for a warp yarn of a certain quality. In other words, the presetting of the controlling means of the warp knitting machine for causing a predetermined speed of the warp beam or beams involved time-consuming and tedious calculations, subject to costly errors.

An object of the present invention is to provide a warp knitting machine equipped with mechanical means completely eliminating the mathematical calculations, hitherto necessary for the presetting of the warp knitting machines so as to obtain the proper yarn feed by the warp beam or beams.

Another object of the present invention is to provide setting means for the presetting of the means controlling the speed of the warp beam or beams of a warp knitting machine, which setting means can be readily manipulated by hand.

2

A further object of the present invention is to improve on the art of warp knitting machines as now customarily made.

It is understood that the term "Warp Beam" used in the specification and claims indicates a single warp beam or an assembly of warp beams composed of a plurality of sectional warp beams.

Other objects and structural details of the invention will be apparent from the following description when read in conjunction with the accompanying drawings forming part of this specification, wherein:

Fig. 1 is a fragmentary side elevational view of a warp knitting machine according to the invention,

Fig. 2 is a sectional view taken on line 2—2 of Fig. 1,

Fig. 3 is a fragmentary rear elevational view of the warp knitting machine shown in Fig. 1,

Fig. 4 is an enlarged elevational view of an adjusting mechanism of the warp knitting machine shown in Fig. 1, some parts being broken away,

Fig. 5 is an elevational view of the detail shown in Fig. 4 as seen in the direction of the arrows 5—5 of Fig. 4, partly in section,

Fig. 6 is a vertical sectional view of an adjusting cam of a stepless change speed transmission of a machine shown in Fig. 1,

Fig. 7 is a bottom plan view of the adjusting cam shown in Fig. 6,

Fig. 8 is a side elevational view, in an enlarged scale, of the mechanism for setting the adjusting cam of the stepless change speed transmission in various positions,

Fig. 9 is a side elevational view, some parts being broken away and some parts being shown in section, of the stepless change speed transmission,

Fig. 10 is a top plan view of a first scale of the setting mechanism according to the invention,

Fig. 11 is a top plan view of a second scale of the setting mechanism according to the invention,

Fig. 12 is a perspective view of a slider slidably mounted on the member bearing the second scale, and

Fig. 13 illustrates diagrammatically the setting of the setting mechanism according to the invention for a desired length of the yarn to be fed to the knitting implements of the machine per rack.

The drawings illustrate only those parts of a warp knitting machine which are necessary for an understanding of the invention.

Referring now to Figs. 1 and 3, 20 generally indicates the frame of a warp knitting machine. A

main cam shaft 22 may be rotated by an electric motor 24 through the medium of a belt drive 26.

28 generally indicates an upper sectional warp beam rotatably arranged in the frame 20 of the machine. 30 generally indicates a lower sectional warp beam rotatably arranged in the frame 20 of the machine.

Warp yarns 32 fed by the upper warp beam to the knitting implements (not shown) of the warp knitting machine, are engaged with an upper tension rod 34 carried by arms 36 rigidly connected with a shaft 38 rotatably arranged in suitable bearings of the frame 20 of the machine. An arm 40 rigidly connected with said shaft 38 is under the action of a spring 42 wound around a rod 44 secured to the frame of the machine. Said spring 42 being interposed between said arm 40 and an abutting member 43 tends to urge the shaft 38 together with the tension rod 34 engaged with the warp yarns 32 in clockwise direction (as viewed in Fig. 1), so as to tension the warp yarns during the operation of the machine.

The free end of another arm 46 secured to the shaft 38 is pivotally connected at 48 to one end of a connecting rod 50, the other end of which is pivoted at 52 to a neutralizing member 54 (see Figs. 1 and 3–5) rockably mounted on a shaft 56 journalled in suitable bearings of a member 57 attached by screws 59 to the casing 61 of a stepless change speed transmission generally indicated by 58. Said stepless change speed transmission in turn is attached to the frame 20 by screws 63. The purpose of said neutralizing member 54, and its action will be described farther below in detail.

A gear 82 keyed to the main cam shaft 22 is in mesh with a gear 84 keyed to a vertical shaft 86 rotatably arranged in brackets 88 mounted on the frame 20 of the machine. Said vertical shaft 86 carries a gear 90 for meshing engagement with a gear 94 keyed to the input shaft 98 of the stepless change speed transmission 58.

As best shown in Fig. 9 the input shaft 98 carries a member 300 rigidly connected therewith. A series of tapered rollers 302 are rotatably carried by said member 300 and another rotatable member 304. Each of said tapered rollers 302 carries a planetary pinion 306 in meshing engagement with the interior gearing of a ring 308 rotatably arranged in a cover mounted on the casing 61 of the stepless change speed transmission 58. The ring gear 308 is rigidly connected with a shaft 312 which through a gearing (not shown) is operatively connected with the output shaft 102 (see Figs. 1 and 3) of the stepless change speed transmission 58.

The tapered rollers 302 are in frictional engagement with a non-rotatable traction ring or adjusting body 314, which carries a pin 316 slidably engaged with a longitudinal slot 318 of the casing 61. Thus, the traction ring 314 may be displaced in a straight line parallel to the longitudinal axis of the stepless change speed transmission 58. The pin 316 engaged with the slot 318 prevents the traction ring 314 from rotation. It will be readily understood that the speed of rotation of the tapered rollers 302 and thus of the shaft 312 coupled with the output shaft 102 of the stepless change speed transmission 58 depends on the position of the axially movable traction ring 314 engaged with said tapered rollers 302.

In order to obtain a change in the speed of rotation of the output shaft of the stepless change speed transmission, the traction ring 314 is displaced axially by means of a cam 320 having a groove 322 engaged with the projecting end of the pin 316; the cam 320 is rigidly connected by screws 324 (see Fig. 8) with a vertical shaft 326 rotatably arranged in the member 57 mounted on the casing 61 of the stepless change speed transmission 58. The cam 320 and its curved groove 322 are shown in detail in Figs. 6 and 7. The actuation of said cam 320 for obtaining a change in the speed of the output shaft 102 of the stepless change speed transmission 68 will be described hereinafter.

As best shown in Figs. 1 and 3, the output shaft 102 of the stepless change speed transmission 58 carries a sprocket wheel 104 connected by a chain 106 with a sprocket wheel 108 keyed to a shaft 110 rotatably arranged in the frame 20 of the machine.

A gear 112 keyed to said shaft 110 is in mesh with a gear 114 connected with the upper beam 28 for rotating the same.

As best shown in Figs. 1 and 2, a cam 130 rigidly connected with the vertical shaft 86 is provided with an eccentric groove 132 engaged with a stud 134 mounted on the lower surface of an actuating element 136 having a forked end 138 engaged with the vertical shaft 86. The other end of said actuating element 136 is pivotally connected at 140 with the lower end of a lever 142 swingably mounted on the shaft 56 carried by the member 57 mounted on the casing of the stepless change speed transmission 58.

As will be readily understood, upon rotation of the vertical shaft 86 by means of the main cam shaft 22 connected therewith through the train of gears 82, 84, the cam 130 engaged with the stud 134 of the actuating element 136 causes an oscillation of the lever 142 about the axis of the shaft 56 as indicated by a double arrow A in Fig. 4.

As shown in Figs. 1, 4 and 5, a first spring-loaded pawl 144 and a second spring-loaded pawl 146 are swingably arranged on a stud 148 carried by said lever 142 intermediate its ends. The first pawl 144 is arranged for cooperation with the teeth of a first ratchet wheel 150 rigidly connected with the shaft 56 by a key 152.

The second pawl 146 is arranged for cooperation with the teeth of a second ratchet wheel 154 secured to the shaft 56 by a key 156.

As best shown in Figs. 5 and 8, a worm 328 is integral with or rigidly connected with the shaft 56 journalled in the member 57. Said worm 328 is in mesh with a worm gear 330 loosely arranged on the vertical shaft 326 carrying the cam 320. The worm gear 330 rests on a collar 332 secured to the shaft 326 by a key 334. The lower surface of said collar 332 rests on the end surface of a bushing 336 arranged in the member 57, thus holding the vertical shaft 326 and the cam 320 connected therewith in its position.

A disk 338 of frictional material resting on the upper surface of the worm gear 330 is interposed between said worm gear 330 and a hand wheel or setting means 340 connected with the vertical shaft 326 through a spline 342. A spring 344 arranged between said hand wheel 340 and a collar 346 mounted on the shaft 326 tends to hold the hand wheel 340 in frictional engagement with the worm gear 330 through the medium of said disk 338 of frictional material.

When the worm gear 330 is rotated by a rotation of the worm 328 arranged on the shaft 56, the shaft 326 carrying the adjusting cam 320

of the stepless change speed transmission is rotated through the medium of the hand wheel 340 frictionally engaged with the worm gear 330 and connected with said shaft 326 through the spline 342.

On the other hand, if, for the purposes of setting the mechanism in a manner to be described hereinafter, the hand wheel 340 is rotated, it causes through the medium of the spline 342 a rotation of the shaft 326 carrying the adjusting cam 320 while, at the same time, it may be rotated relative to the worm gear 330 held in its position by the worm 328; the spring 344 being strong enough to assure a sufficient frictional engagement between the worm gear 330 and hand wheel 340 when the worm gear 330 is actuated, permits on the other hand an overcoming of the frictional forces when the hand wheel 340 is actuated.

When the tension rod 34 is in a mean position, as shown in Fig. 1, during the operation of the machine, the neutralizing member 54 connected with the tension rod 34 through the medium of the connecting rod 50, arm 46, shaft 38 and arm 36, is in the position shown in full lines in Figs. 1, 4 and 5.

As best shown in Fig. 4, the curved position 158 of said neutralizing member 54 then is in a position to hold both pawls 144 and 146 out of engagement with the associated ratchet wheels 150 and 154, respectively, so that an oscillation of the lever 142 caused by the cam 130 will merely result in a sliding of the pawls 144 and 146 on the surface of the curved portion 158.

If, however, due to a change in the tension of the warp yarns, the neutralizing member 54 is swung by the tension rod 34 and connecting rod 50 either in clockwise direction or in counterclockwise direction, the end 160 or the end 162 of the curved surface 158 is displaced to such an extent that during the oscillation of the lever 142 either the pawl 144 or the pawl 146 becomes disengaged from the curved surface 158 and drops into a space between teeth of the ratchet wheel 150, or the ratchet wheel 154, respectively, whereby either the ratchet wheel 150 or the ratchet wheel 154 is advanced by the associated pawl in counterclockwise or in clockwise direction. Such an advance of the ratchet wheel 150 or 154 results in a corresponding rotation of the shaft 56 and through the worm 328, worm gear 330, friction disk 338, hand wheel 340 and shaft 326 of the adjusting cam 320 of the stepless change speed transmission 58, whereby the traction ring 314 of the latter is axially displaced for a change in the speed of the output shaft 102 of said transmission resulting in a change of speed of rotation of the beam 28.

Such a change in the tension of the warp yarns occurs during the operation of the machine. When warp yarn is fed by the warp beam 28 to the knitting implements (not shown) the diameter of the winding on the beam decreases. This results in an increase of the tension in the warp yarns. Now, a correction of the speed of the output shaft 102 of the stepless change speed transmission 58 by means of above described automatic controlling means (tension rod 34, connecting rod 50, lever 142, one of the pawls 144, 146, shaft 56, worm 328, worm gear 330, shaft 326) takes place for an increase of the speed of the beam 28 so as to reduce the tension in the warp yarns. If during this controlling action the tension in the warp yarns is reduced slightly beyond the required tension in the warp yarns, above described automatic controlling means counter-act in reversed sense. Then, there will be again an increase of the tension in the warp yarns calling again for an action of the automatic controlling means for a reduction of the tension in the warp yarns, etc. In any case, the play back and forth of said automatic controlling means will cause substantially a constant tension in the warp yarns during the operation of the machine. This means, on the other hand, that the warp yarns have a substantially constant travelling speed, which, in view of the progressively decreasing diameter of the winding on the beam, requires an increase of the speed of rotation of the warp beam 28 speed of rotation of the output shaft 102 of the stepless change speed transmission during the operation of the machine. Thus, if at the beginning of the operation of the machine, the adjusting element or cam 320 of the stepless change speed transmission 58 was set by the hand wheel 340 for obtaining a predetermined number of revolutions of the warp beam per rack (one rack=480 revolutions of the main cam shaft of the machine), owing to the automatic control by the above described controlling means, the speed of the output shaft 102 of the stepless change speed transmission 58 will be increased for a higher number of revolutions per rack of the warp beam 28 at the end of the operation of the machine. Consequently, it becomes necessary to reset the adjusting means 320 of the stepless change speed transmission 58 prior to the restarting of the machine, so as to obtain again the same lower number of revolutions per rack of the warp beam, if the same quality of warp yarns is used and the same quality of fabric shall be obtained.

Furthermore, the problem of properly setting the adjusting cam 320 of the stepless change speed transmission 58 occurs each time when warp yarn of different quality is used and/or a fabric of different quality should be obtained. As a matter of fact, the length of warp yarn, the so called "stringer length," to be fed by a warp beam to the knitting implements and measured in inches per rack depends on the quality of yarn used, for example 55 denier or 75 denier, on a tight or loose knitting of the fabric and on the type of pattern of the fabric. Therefore, a chart is given to the operator of the machine indicating to him the length of the stringer in inches per rack for a certain fabric to be knitted with a certain yarn. Now the operator is confronted with the problem to determine the proper speed of revolutions per rack of the warp beam so as to obtain the desired stringer length. This speed of the warp beam in turn depends on the diameter of the winding on the beam.

Hitherto it was necessary to determine the speed of the warp beam by mathematical calculations which require some skill and quite often it could not be carried out by an operator of a warp knitting machine without errors. Such an error might prove to be quite costly, if for example owing to an erroneous calculation the length of warp yarn fed to the knitting implements is more than desired or else, if, owing to an insufficient length of warp yarn fed to the knitting implements an inferior quality of the fabric is obtained. The number of revolutions of

the warp beam per rack may be calculated by the following formula:

$$r=\frac{s}{c}$$

wherein

r=number of revolutions of the beam per rack,

s=stringer length in inches per rack, and

c=circumference of the winding on the beam in inches.

Let us assume:

A stringer length of 41 inches per rack is required and the circumference of the winding on the beam as measured is 28.42 inches. Then

$$r=\frac{41}{28.42}=1.44$$

revolutions per rack.

These calculations are entirely eliminated by the following setting mechanism:

Referring now to Figs. 8 and 10–13, **348** indicates a member in the shape of a sector of an annulus, which is fixedly mounted on the member **57** by means of screws **350** passing through bores **352** of said member. The member **348** bears a first scale **354** having a logarithmic calibration of the stringer length in inches per rack.

Furthermore, a ring **356** bearing a second scale **358** having a logarithmic calibration of the circumference of the winding on the beam in inches is rigidly secured to the upper surface of the hand wheel **340** by means of screws **360** passing through slots **362** of said ring.

Moreover, a slider generally indicated by **364** is slidably mounted on the fixed member **348** bearing the first scale **354**. Said slider **364** has a window **365** with a mark **366** for cooperation with the first scale **354**. An upwardly extending portion **368** of said slider being bent extends over the ring **356** on the hand wheel **340** and carries at its end a pointer **370** or a suitable mark for cooperation with the second scale **358** of the circumference of the winding on the beam.

If desired, but not necessarily, the sector member **348** may be provided with a center mark **372**, shown in dash lines, and the ring **356** may be provided with a third scale **374**, shown in dash lines, indicating the speed of the beam in revolutions per rack.

Above described setting mechanism may be used as follows:

The slider **364** is moved along the sector member **348** until the mark **366** is opposite the calibration for the length of stringer in inches to be fed in inches per rack to the knitting implements, for example the slider **364** is set in the position for "41 inches per rack" as shown in Figs. 12 and 13.

Then the hand wheel **340** carrying the ring **356** with the scale **358** is rotated until the calibration for the value, for example 28.42, of the circumference of the winding on the beam is opposite the pointer **370**, as shown in Fig. 13. As the scales **354** and **358** have logarithmic calibrations, the ring **356** and the hand wheel **340** connected with the vertical shaft **326** carrying the adjusting cam **320** of the stepless change speed transmission **58**, have been immediately set for the proper speed of the warp beam, the setting of said two logarithmic scales answering the problem of the formula

$$r=\frac{s}{c}=\frac{41}{28.42}=1.44$$

If the ring **356** is provided with the third scale **374** the value 1.44 of the number of revolutions of the beam per rack can be determined by shifting the slider **364** into the dash line position shown in Fig. 13, wherein the mark **366** of its window **365** is in alignment with the center mark **372** and its pointer **370** is in alignment with the calibration 1.44 of the beam speed scale **374**.

As said before, upon the setting of the hand wheel **340** in the manner described above, the adjusting cam **320** of the stepless change speed transmission **58** is in the proper position for obtaining the desired speed of the warp beam. The shape of the curved groove **322** (see Figs. 6, 7, and 9) of said adjusting cam **320** cooperating with the pin **316** of the traction ring **314** is determined by the logarithmic calibration of the scale **358** on the ring **356** in conjunction with the characteristics of the stepless change speed transmission **58**, so that for a given position of the adjusting cam **320** obtained by above described setting of the hand wheel **340** the traction ring **314** is in such a position that the output shaft **102** of the stepless change speed transmission **58** rotates at such a speed that the warp beam driven by said output shaft makes the correct number of revolutions per rack, for example 1.44 revolutions per rack in the example given above.

It will be readily understood from above, that the presetting of the beam speed by means of the setting mechanism according to the invention may be readily carried out without any difficulties, irrespective of the position of the adjusting cam **320** and the hand wheel **340** at the end of a knitting operation, owing to the action of the automatic controlling means during the operation of the machine.

If, for example, a different presetting of the beam speed is desired, for example for feeding a stringer length of 54.7 inches per rack when the circumference of the winding on the beam amounts to 31.3 inches, it is simply necessary to set the slider **364** in position for alignment of the mark **366** with the calibration 54.7 and rotate the hand wheel **340** until the pointer **370** is in register with the calibration 31.3 of the scale **358**. No calculation is necessary.

The speed of the lower warp beam **30** (see Fig. 1) feeding the warp yarns **60** to the knitting implements of the machine may be set in the same manner as described above by a hand wheel **376** connected with the adjusting cam of a stepless change speed transmission **80** driving the warp beam **30**. As the driving means, controlling means and setting means associated with the lower warp beam **30** are identical with the corresponding means associated with the upper warp beam **28**, a detailed description thereof is unnecessary.

We have described preferred embodiments of our invention, but it is understood that this disclosure is for the purpose of illustration, and that various omissions or changes in shape, proportion and arrangements of parts, as well as the substitution of equivalent elements for those herein shown and described, may be made without departing from the spirit and scope of the invention as set forth in the appended claims.

For example, the setting device according to the invention could be applied to a stepless change speed transmission wherein the automatic controlling means moving the adjusting means of the transmission from a preset position at the beginning of the operation to another position at the end of the operation are responsive

to the reduction of the diameter of the winding on the beam rather than to a change of the tension in the warp yarns.

Moreover, the setting mechanism according to the invention could be applied to a stepless change speed transmission with adjusting means of a different construction.

What we claim is:

1. In a warp knitting machine, the combination of: a rotatable warp beam arranged for feeding warp yarns to knitting implements of the machine, a variable speed drive including a rotatable output element arranged for rotating said warp beam, said variable speed drive including further a movable adjusting element associated with said output element for adjusting the speed of the latter, said adjusting element being settable in various positions, movable setting means associated with said adjusting element for setting same in a predetermined position, automatic controlling means associated with said adjusting element for moving same during the operation of the machine from said predetermined set position into another position so as to maintain a substantially constant circumferential speed of the progressively decreasing winding of yarn on said warp beam, a fixed member bearing a first scale having a logarithmic calibration of the length of warp yarn to be fed in inches per rack, and a movable slider having a first mark for cooperation with said first scale whereby said slider may be set in a predetermined position, said movable setting means bearing a second scale having a logarithmic calibration of the circumference of the winding in inches, and said slider having a second mark for cooperation with said second scale whereby said setting means may be brought into a predetermined position relative to a set position of said slider so as to set said adjusting element in a predetermined position for adjusting a predetermined number of revolutions per rack of said warp beam.

2. In a warp knitting machine, the combination of: a rotatable warp beam arranged for feeding warp yarns to knitting implements of the machine, a variable speed drive including a rotatable adjusting cam, a speed adjusting body displaceable in a straight line direction, rotatable transmission means operatively engaged with said speed adjusting body, and a rotatable output element connected with said transmission means and arranged for rotating said warp beam, an engaging element on said adjusting body, said adjusting cam having a curved camming surface operatively engaged with said adjusting body whereby the latter may be displaced for adjusting the speed of said output element, said adjusting cam being settable in various positions, movable setting means associated with said adjusting cam for setting same in a predetermined position, automatic controlling means associated with said adjusting cam for moving same during the operation of the machine from said predetermined set position into another position so as to maintain a substantially constant circumferential speed of the progressively decreasing winding of yarn on said warp beam, a fixed member bearing a first scale having a logarithmic calibration of the length of warp yarn to be fed in inches per rack, and a movable slider having a first mark for cooperation with said first scale whereby said slider may be set in a predetermined position, said movable setting means bearing a second scale having a logarithmic calibration of the circumference of the winding in inches, said slider having a second mark for cooperation with said second scale whereby said setting means may be brought into a predetermined position relative to a set position of said slider so as to set said adjusting cam in a predetermined position for adjusting a predetermined number of revolutions per rack of said warp beam, and the curve of said camming surface being determined by the logarithmic calibration of said second scale in conjunction with the characteristics of said variable speed drive for obtaining a predetermined speed of the output element at a predetermined position of said adjusting body.

3. In a warp knitting machine as claimed in claim 1, said setting means being in rigid connection with said adjusting element, and said automatic controlling means being in frictional engagement with said setting means.

4. In a warp knitting machine as claimed in claim 1, a rotatable shaft carrying said adjusting element, a setting element rigidly connected with said shaft, said automatic controlling means including a controlling member loosely engaged with said shaft, friction means interposed between said controlling member and said setting element, and resilient means arranged for holding said controlling member frictionally engaged with said setting element.

5. In a warp knitting machine as claimed in claim 1, said slider being slidably mounted on said fixed member bearing said first scale.

6. A device for use in conjunction with a warp knitting machine having a warp beam driven by a variable speed drive including a movable adjusting element for adjusting the speed of said warp beam, said device comprising in combination: a fixed member bearing a first scale having a logarithmic calibration of the length of warp yarn to be fed in inches per rack by the warp beam, a movable setting element, said setting element being movable relative to said fixed member and being arranged for connection with said adjusting element for setting same in a predetermined position, said setting element bearing a second scale having a logarithmic calibration of the circumference of the winding on the beam in inches, and a slider movable relative to said fixed member, said slider having a first mark for cooperation with said first scale whereby said slider may be set in a predetermined position, and said slider having a second mark for cooperation with said second scale whereby said setting element may be brought into a predetermined position relative to a set position of said slider for obtaining a predetermined position of the adjusting element of the variable speed drive corresponding to a predetermined number of revolutions per rack of the warp beam.

7. In a device as claimed in claim 6, said slider being slidably mounted on said fixed member bearing the first scale.

FRITZ LAMBACH.
WALTER SIEGEL.

References Cited in the file of this patent

UNITED STATES PATENTS

Number	Name	Date
2,361,526	Bassist	Oct. 31, 1944
2,383,562	Plunkett et al.	Aug. 28, 1945
2,541,192	Blake	Feb. 13, 1951
2,600,256	Morrison	June 10, 1952