United States Patent

Umeda et al.

[15] **3,703,818**

[45] **Nov. 28, 1972**

[54] **APPARATUS FOR FEEDING WARPS OR FILLING THREADS TO KNITTING MACHINE**

[72] Inventors: **Shinobu Umeda; Yoshiaki Miyagawa; Yutaka Tanaka; Yukio Tanaka; Ryoji Nakamura,** all of Takatsuki, Japan

[73] Assignee: **Toyo Boseki Kabushiki Kaisha,** Kita-ku, Osaka, Japan

[22] Filed: **Dec. 21, 1970**

[21] Appl. No.: **99,972**

[30] **Foreign Application Priority Data**

Dec. 29, 1969 Japan 45/1645
May 22, 1970 Japan 45/43782

[52] **U.S. Cl.** .....**66/84 R,** 66/125 R
[51] **Int. Cl.** ...**D04b 23/06,** D04b 23/08, D04b 23/10
[58] **Field of Search** 66/84, 85, 125; 28/1

[56] **References Cited**

UNITED STATES PATENTS

2,743,596	5/1956	Noe	66/84
3,364,701	1/1968	Carman	66/84
3,446,038	5/1969	Inui	66/84
3,523,432	8/1970	Vajda et al.	6/125
3,564,872	2/1971	Klaeui	66/85

FOREIGN PATENTS OR APPLICATIONS

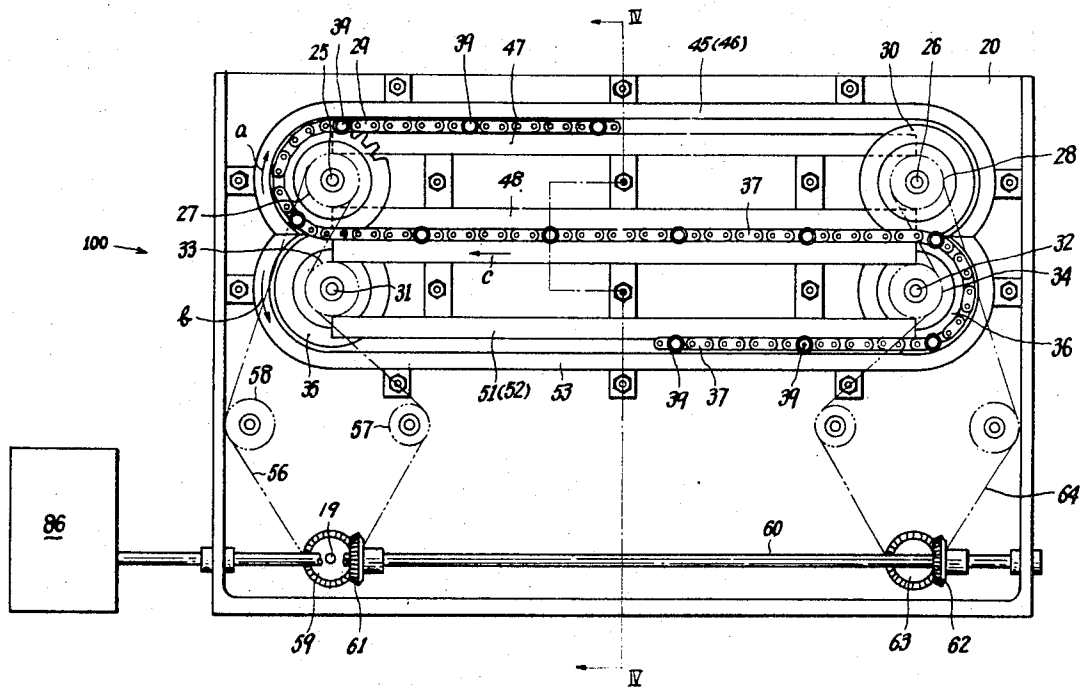
1,919,988	11/1969	Germany	66/84

Primary Examiner—Ronald Feldbaum
Attorney—Wenderoth, Lind & Ponack

[57] **ABSTRACT**

A supply thread guiding apparatus has upper and lower tracks of equal length and each having a middle straight region common to the other one, a single flexible band means is provided which is not longer than the circumference of either of the tracks and which moves along the tracks. The band means has thread guides disposed therealong at fixed intervals. Means is also provided for guiding the flexible band means alternately onto the upper and lower tracks when the leading end of the flexible band means reaches the junction of the upper and lower tracks at the end of the middle straight region. The beginning of the middle straight region is opposed to a first conveyor for carrying one of the respective ends of filling threads to one end of the knitting station of a knitting machine, and the end is opposed to a second conveyor for carrying the other ends of the filling threads to the other end of the knitting station. The arrangement is such that thread ends passed through the thread guides are delivered to thread clamps on the first conveyor at the beginning of the middle straight region and at the end thereof intermediate portions of the threads extending from the thread clamps on the first conveyor to the thread guides are delivered to thread clamps on the second conveyor.

7 Claims, 10 Drawing Figures

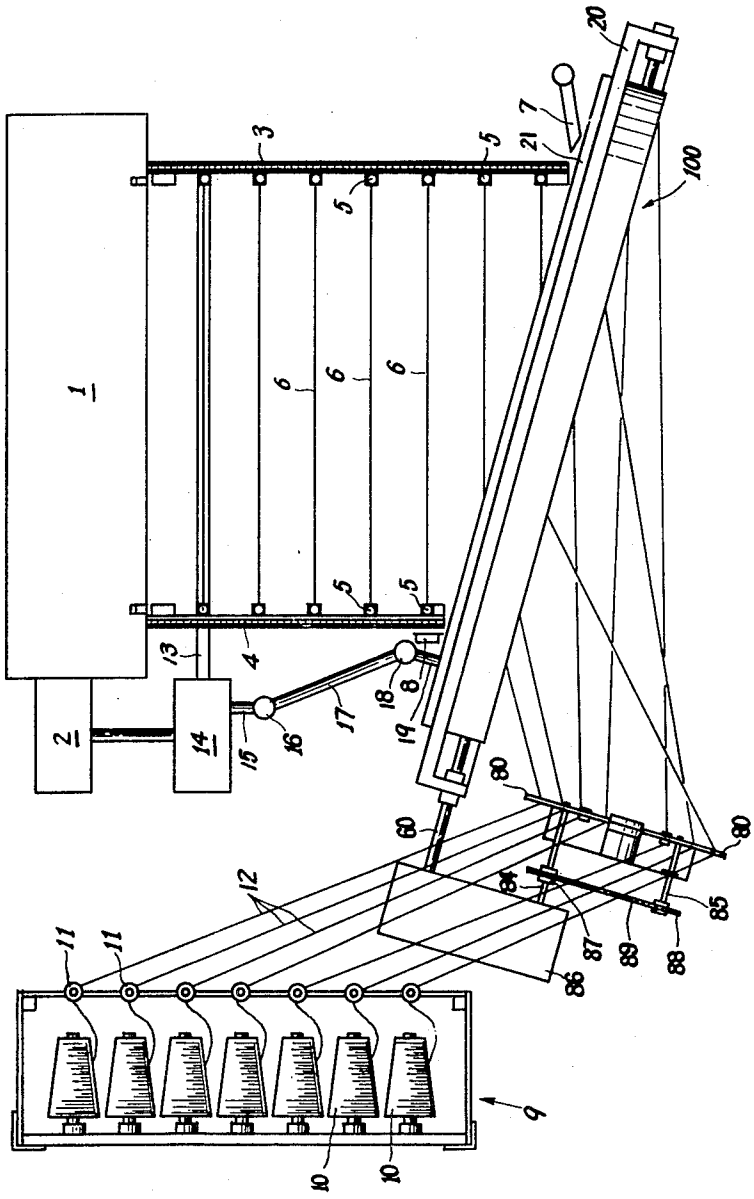


PATENTED NOV 28 1972

3,703,818

SHEET 1 OF 6

Fig. 1

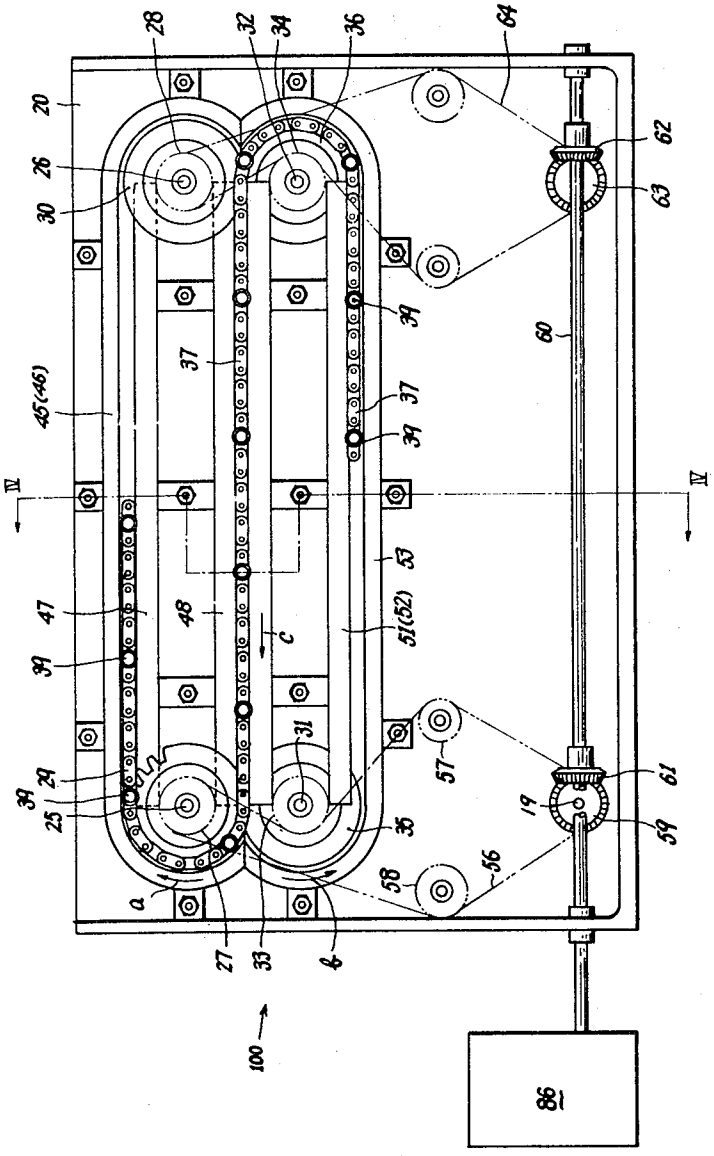


SHINOBU UMEDA,
YOSHIAKI MIYAGAWA,
YUTAKA TANAKA,
YUKIO TANAKA, and
RYOHI NAKAMURA,

Inventors

By Wenderoth, Lind & Ponack *Attorneys*

Fig. 2



SHINOBU UMEDA,
YOSHIAKI MIYAGAWA,
YUTAKA TANAKA
YUKIO TAKANA and
RYOJI NAKAMURA,

Inventors

By Wenderoth, Lind & Ponack *Attorneys*

Fig. 4

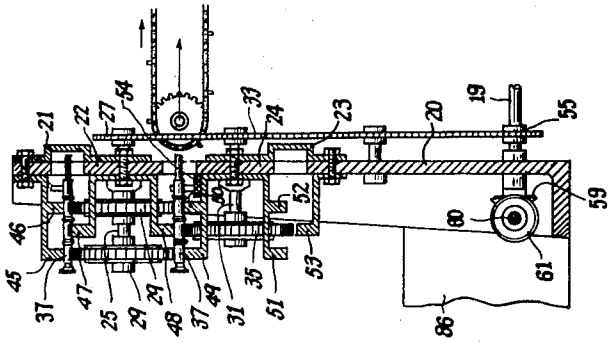
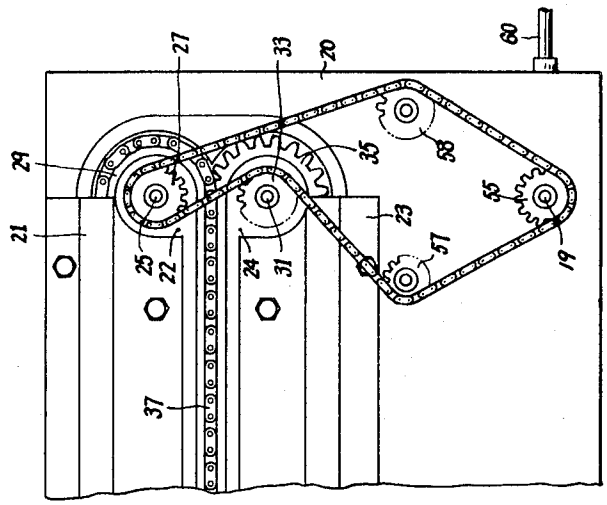


Fig. 3

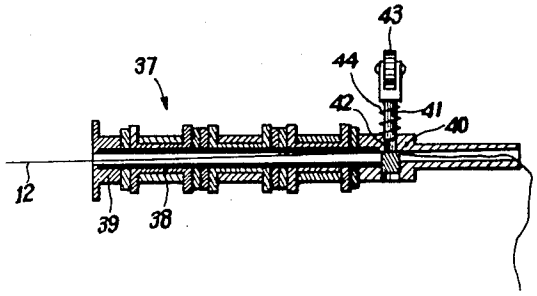


SHINOBU UMEDA,
YOSHIAKI MIYAGAWA,
YUTAKA TANAKA,
YUKIO TANAKA and
RYOJI NAKAMURA,

Inventors

By Wenderoth, Lind & Ponack *Attorneys*

Fig. 5



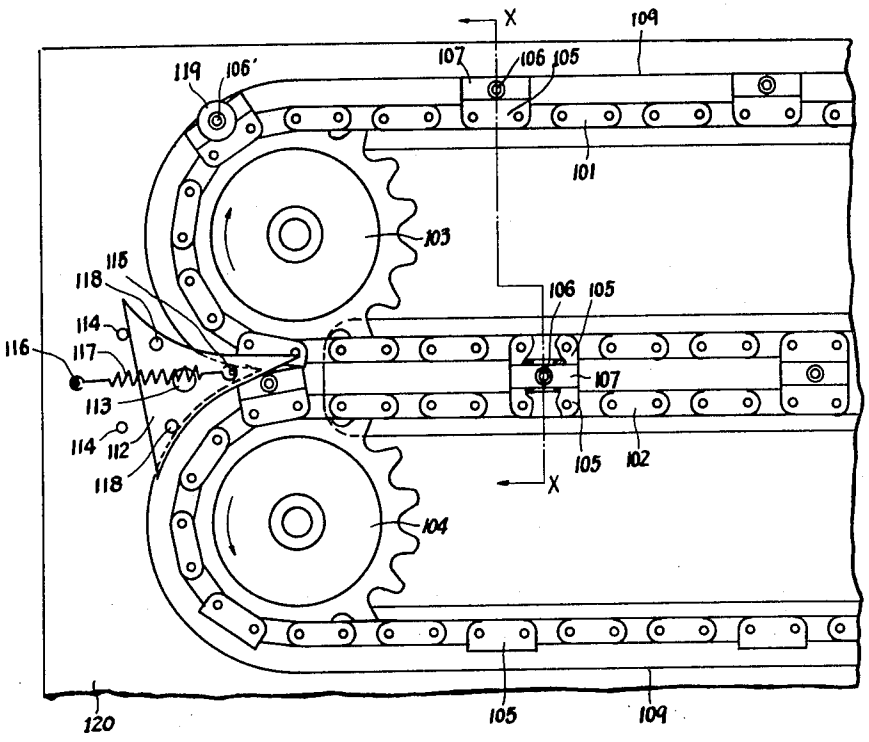


Fig. 8

SHINOBU UMEDA,
YOSHIAKI MIYAGAWA,
YUTAKA TANAKA,
YUKIO TANAKA, and
RYOJI NAKAMURA,

Inventors

By Wenderoth, Lind
and Ponack Attorneys

Fig. 6

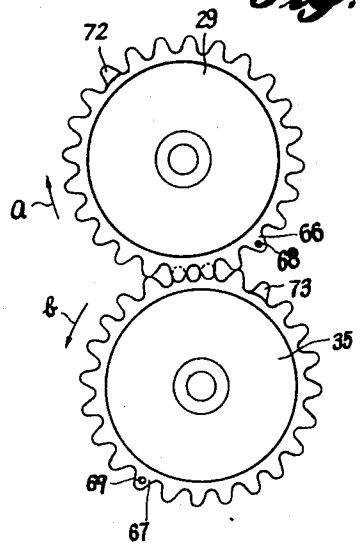
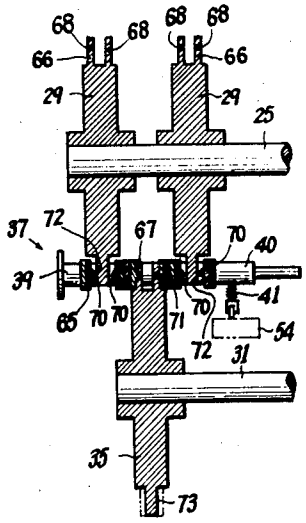


Fig. 7



SHINOBU UMEDA,
YOSHIAKI MIYAGAWA,
YUTAKA TANAKA,
YUKIO TANAKA and
RYOJI NAKAMURA,

Inventors

By Wenderoth, Lind & Ponack *Attorneys*

Fig. 10

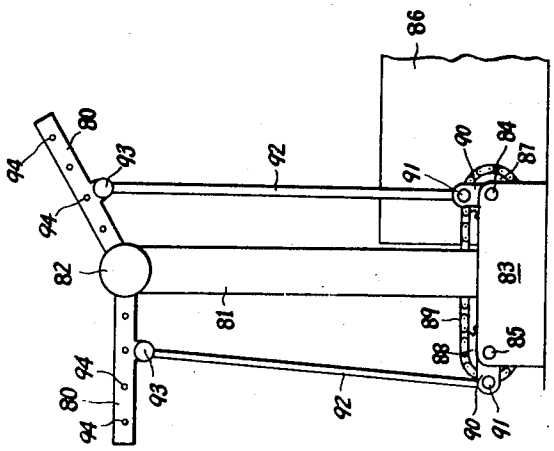
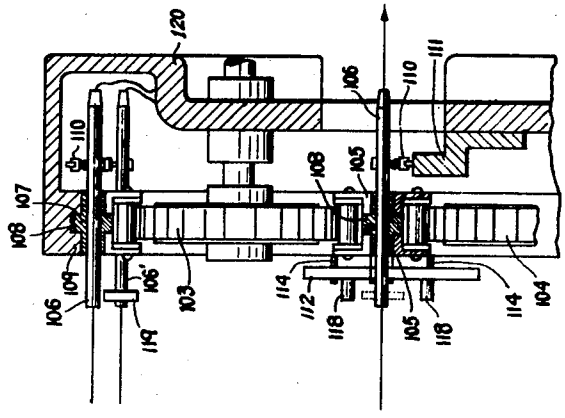


Fig. 9



SHINOBU UMEDA,
YOSHIAKI MIYAGAWA,
YUTAKA TANAKA,
YUKIO TANAKA, and
RYOHI NAKAMURA,

Inventors

By Wenderoth, Lind & Ponack Attorneys

APPARATUS FOR FEEDING WARPS OR FILLING THREADS TO KNITTING MACHINE

The present invention relates to an apparatus for feeding filling threads efficiently when it is desired to incorporate fixed lengths of filling thread across the width of a fabric being knitted on a tricot machine or other knitting machine.

U.S. Pat. No. 3,364,701 discloses this type of apparatus, which comprises a first conveyor for feeding one of the respective ends of filling threads to one end of the knitting station of a warp knitting machine, a second conveyor for feeding the other ends of said filling threads to the other end of said knitting station, and a third conveyor for carrying filling thread packages from said first conveyor to said second conveyor, the operation of the apparatus consisting of causing the free ends of the filling threads from the packages to be clamped by thread clamps on the first conveyor, drawing out the threads as the third conveyor is driven, causing thread clamps on the second conveyor to clamp the threads upon drawing out of lengths of filling thread corresponding to the width of the knitting station, cutting each thread at a point between the thread clamp on the second conveyor and the package on the third conveyor, and transferring the fixed lengths of thread thus cut to the knitting station of the knitting machine by the driving of the first and second conveyors.

The known apparatus for feeding filling threads described above is arranged to carry a number of filling thread packages on the third conveyor. Since these packages are constantly moving with the third conveyor, it is impossible to exchange packages or supply a fresh package unless the machine is stopped each time one package is consumed. Further, since threads are being drawn out from packages while the latter are moving, it is difficult to adjust tension and it is almost impossible to equalize the tensions of threads being drawn out from packages. A further disadvantage is that the driving of the third conveyor carrying a number of packages results in higher consumption of power.

Accordingly, an object of the invention is to provide an apparatus which is capable of exchanging filling thread packages without stopping the machine. A second object is to draw out threads from a number of filling thread packages positioned stationary and transfer the threads successively to said first and second conveyors without imparting twist to the threads being drawn out.

According to the present invention, these objects are achieved by positioning a number of thread packages stationary, inserting the threads drawn out from said packages into as many thread guides as the threads connected in a row through flexible band means, and moving these thread guides alternately up and down so as to describe the FIG. **8**.

Other objects, advantages and features of the present invention will appear as the description proceeds, when taken in conjunction with the accompanying drawings, in which:

FIG. **1** is a plan view of an embodiment of the invention, shown in its entirety;

FIG. **2** is a front view of the principal portion;

FIG. **3** is a rear view of part of FIG. **2**;

FIG. **4** is a sectional view taken along the line IV—IV of FIG. **2**;

FIG. **5** is a sectional view of a thread guide;

FIG. **6** is a front view of sprockets;

FIG. **7** is a sectional view showing the relationship between the sprockets and a triple chain;

FIG. **8** is a front view of the principal portion of another embodiment;

FIG. **9** is a sectional view taken along the line X—X of FIG. **8**; and

FIG. **10** is a front view of swing means for decreasing frictional contact between threads.

Referring to the drawings, FIG. **1** is a schematic plan view showing the relationship between a warp knitting machine **1** and the present apparatus. The warp knitting machine has a driving motor **2** disposed laterally thereof and it also has a first and a second conveyor **3** and **4**, respectively, disposed rearwardly thereof and extending rearwardly from the opposite ends of the knitting station, each conveyor being composed of an endless chain having thread clamps **5** disposed therealong at suitable intervals to carrying filling threads **6** cut to a fixed length toward the knitting machine **1**. Upon arrival of the filling threads at the knitting station, they are released for delivery to the knitting station by simultaneously opening clamps **5** at each end of a filling thread **6**. The above-mentioned mechanism is described in detail in U.S. Pat. No. 3,364,701. According to the apparatus disclosed in said patent, a third conveyor for carrying a number of filling thread packages is installed at a position where supply thread guiding means **100** according to the present invention is installed. The thread end drawn out from each package is temporarily held by an air suction pipe **7** adjacent the first conveyor **3** and clamped by a thread clamp **5** on the first conveyor **1**, and the thread is drawn out by the driving of the first and third conveyors. When the package on the third conveyor passes by the second conveyor **4**, the thread is clamped by a thread clamp **5** on the second conveyor **4** and cut by a cutter **8** between the clamp **5** and the package.

According to the present invention, a number of filling thread packages **10** are mounted on a creel **9** positioned stationary laterally of the knitting machine **1** and a number of threads **12** drawn out therefrom through tension devices **11** are inserted into guide eyes arranged in a row on eye boards **80** so that the threads are arranged side by side in a sheet. These threads are then guided into a number of thread guides moving from the first conveyor **3** to the second conveyor **4**. During the movement of the thread guides, the thread ends are caused to be clamped by the clamps **5** on the first conveyor. When the thread guides included in the means **100** pass by the second conveyor **4**, the threads are further clamped by the clamps **5** on the second conveyor **4** and cut by the cutter **8**. In addition, the numeral **13** designates a driving shaft for the two conveyors **3** and **4**. The driving shaft **13** receives rotation from the motor **2** through a reduction gear box **14**, from which the rotation is also imparted to a driving shaft **19** through a shaft **15**, universal joint **16**, intermediate shaft **17** and a universal joint **18**.

Referring to FIGS. **1** – **4** (particularly FIG. **4**), an upper panel **22** is fixed to the frame **20** of the supply thread guiding means **100** by a support plate **21** and a lower panel **24** is likewise fixed to said frame **20** by a support plate **23** so that a long transverse clearance is formed between the upper and lower panels.

At the opposite ends of the upper panel **22** there are bearing portions to support shafts **25** and **26** having secured thereto driving sprockets **27, 28** and sprockets **29, 30** for moving the thread guides, it being noted that there are two identical sprockets **29** fixed on the common shaft **25** and that there are two identical sprockets **30** fixed on the common shaft **26**.

Bearing portions are also formed at the opposite ends of the lower panel **24** to support shafts **31** and **32**. Sprockets **33** and **35** are fixed on the shaft **31** and sprockets **34** and **36** are fixed on the shaft **32**. As is apparent from FIG. **4**, the sprocket **35** is positioned intermediate between the two sprockets **29**, thus providing a set of sprockets **29, 35, 29** at the left-hand side as seen in FIG. **2**. Similarly, the sprocket **36** is positioned intermediate between the sprockets **30**, thus providing a set of sprockets **30, 36, 30**. These two sets of sprockets drive a triple chain **37** which is not endless. To this end, the vertical distance between the upper sprockets **29** or **30** and the lower sprocket **35** or **36** is such that their pitch circles contact each other with their addendum circles crossing each other.

The triple chain **37** has a length not greater than the circumference of an upper or lower track defined by the upper or lower right and left sprockets and has hollow pins **38** extending therethrough at fixed intervals. A flanged bushing **39** is fixed to one end of each hollow pin **38** forming an entrance for thread and a pipe **40** forming a thread exit is fixed to the other end (see FIG. **5**). A pin **41** is inserted in the pipe **40** across the pipe passageway. Pin **41** has an opening **42** at a right angle to the axis thereof and has a roller **43** pivotally supported at the projecting end thereof and is outwardly urged by a spring **44**. Therefore, when the roller **43** contacts a cam and thereby is pressed as described hereinafter, the opening **42** in the pin **41** communicates with the pipe passageway in the hollow pin **38** and pipe **40**, thereby permitting the passage of a thread **12**, but when the roller **43** is disengaged from the cam, said pipe passageway is closed and the thread **12** is clamped between the inner wall of said pipe passageway and the step portion of the pin **41**.

The middle chain section of the triple chain **37** meshes with the lower sprocket **35** and the chain sections on both sides mesh with the two upper sprockets while the triple chain is being moved alternately along the upper and lower tracks defined by the upper and lower sprockets by means described hereinafter. At this time, in order to guide the chain where no sprocket exists, rails **45 – 53** are fixed to the frame **20** and panels **22** or **24**. These rails are so arranged as to contact the rollers between links of the triple chain in such a manner that while the triple chain is being moved along the upper straight region of the upper track, the two side chain sections of the triple chain are supported from above by the rails **45** and **46** and the middle chain section is supported from below by the rail **47**. Further, in the middle straight region where the upper and lower tracks are in contact with each other, the middle chain section of the triple chain is supported from above by the rail **48** and the two side chain sections are supported from below by the rails **49** and **50**. Further, in the lower straight region of the lower track, the two side chain sections of the triple chain are supported from above by the rails **51** and **52** and the middle chain section is supported from below by the rail **53**. A cam **54** is fixed along the supported portion of the rail **50** so that while the triple chain is being moved along the middle straight run, the rollers **43** on the thread clamping pins **41** are pressed by the cam **54** to maintain the respective thread passageways in their opened state.

The driving shaft **19** has a sprocket **55** fixed thereon to rotate sprockets **27** and **33** on shafts **25** and **31** in the directions of arrows *a* and *b* through an endless chain **56**. The numerals **57** and **58** designate guide sprockets for the chain **56**.

The shaft **19** has also a bevel gear **59** fixed thereon, said gear meshing with a bevel gear **61** fixed on a long shaft **60** extending along the lower portion of the frame **20**.

Shafts **26** and **32** on the opposite side for driving the triple chain have sprockets **28** and **34**, respectively, fixed thereon, said sprockets being driven by an endless chain **64** through a bevel gear **62** fixed on the long shaft **60**, a bevel gear **63** meshing with said bevel gear **62**, and a sprocket fixed on a shaft on which said bevel gear **63** is also fixed. It is to be noted that except the bevel gear **62** they are arranged to be substantially symmetrical with respect to the driving mechanism for the sprockets **29** and **35**.

On the middle straight region common to the two upper and lower tracks, the triple chain is driven by the mechanisms described above toward the second conveyor **4** in the direction of arrow c in FIG. **2**, but it is necessary that when the leading links **65** reach the left-hand end of the middle straight region (FIG. **2**), they be directed alternately upwards and downwards.

In FIGS. **6** and **7**, a single tooth **66** and **67** of each sprocket **29** and **35** has its intermediate thickness portion cut away to provide two thin parallel teeth which are then externally provided with recesses **68** and **69**, respectively. On the other hand, the leading link plates **65** of the triple chain are internally provided with complementary projections **70** and **71** to mesh with said recesses **68** and **69**. The teeth **72** and **73** which are symmetrical with respect to the teeth **66** and **67**, respectively, are made thinner than the other teeth, the phase relationship between the teeth being such that when the shaft **25** is rotated until the teeth **72** are at the bottom, the tooth **67** of the sprocket **35** on the shaft **31** is at the top. Therefore, in the position shown in FIG. **7**, the middle chain section of the triple chain is joined to the lower sprocket **35** but the two side chain sections engaged with the upper sprockets **29** do not become joined to said sprockets **29** since their teeth **72** are thinner. As a result, the triple chain takes a downward course along with the lower sprocket **35**. By suitably selecting the length of the triple chain and the number of teeth of the sprockets, it can be so arranged that when the triple chain has made a round of the lower track, the leading end of the triple chain is joined to the teeth **68** of the upper sprockets, so that this time the triple chain is caused to take an upward course. For example, if the number of teeth of each sprocket is **24** and the circumference of each track corresponds to the length of 300 chain links, such sprockets has to make 12.5 revolutions while the triple chain makes a round of the upper or lower track, so that the phase shifts through 180°. Thus the upper and lower sprockets can be joined to the triple chain in turns. Further, every

sixth tooth of each of the sprockets **30** and **36** on the first conveyor side is made thinner in order to avoid interference with the triple chain.

With the arrangement thus made, when the machine is driven, the triple chain will be moved alternately along the two upper and lower tracks to describe the FIG. **8** in such a manner that in the middle straight region which is the junction between the upper and lower tracks the triple chain is moved from the first to the second conveyor.

Thus, when threads inserted in the hollow pins **38** of the triple chain constituting thread guides are moved along the middle straight region, they are successively caught at their ends by the air suction pile **7** as in U.S. Pat. No. 3,364,701 and when so tensioned they are clamped by clamps **5** on the first conveyor **3**. As the triple chain is further moved, the threads having their free ends thus clamped extend toward the second conveyor and as soon they pass by the second conveyor they are clamped by clamps on the second conveyor and cut by the cutter **8** between the thread guides and clamps **5**. During this time, the hollow pins **38** are opened to permit threads to be freely drawn out, but simultaneously with the cutting of threads, the cam **54** which up to now has been pushing the rollers **43** releases them, so that the threads are clamped in the manner shown in FIG. **5** with the thread ends projecting outwardly through the exit pipe **40**.

Thus, since the triple chain interconnecting a number of thread guides is moved alternately along the upper and lower tracks as described above, the threads tensioned between the eye plates **80** and the triple chain can be smoothly fed without being twisted more than once.

Further, in order to prevent the threads from sagging due to changes in the distance between the eye boards **80** and the thread guides included in the triple chain, light hairpin-like weights may be provided between the eye boards **80** and the tension devices **11**.

FIGS. **8** and **9** shows another example of the means for changing the direction of a series of thread guides each time they have made a round of the upper or lower track.

Two endless chains **101** and **102** are driven by sprockets **103** and **104** to form an upper and a lower track, respectively. The sprockets on the first conveyor side, though not shown, are arranged to be symmetrical with respect to the illustrated sprockets **103** and **104**, i.e., the sprockets on the second conveyor. Thread guides are held between the chains **101** and **102** and thereby moved along the middle straight region, but except therealong they are moved either by the chain **101** or by the chain **102** while being guided by a rail. Each of the chains **101** and **102** has some of its link plates replaced at suitable intervals by U-shaped plates **105** so that in the middle straight region where the upper and lower tracks contact each other, the U-shaped plates **105** on one chain are opposed to those on the other chain with thread guides held therebetween. Each thread guide consists of a hollow pipe **106** in which a thread is inserted and a rectangular parallelepiped member **107** holding said hollow pipe therein, said pipe **106** extending through the member **107**. Projections **108** on the upper and lower surfaces of each member **107** are adapted to be fitted in openings formed in the respective middle bridging portions of the U-shaped plates **105** to prevent slip between the members **107** and plates **105**. The rail **109** is formed integral with a frame **120** to surround the upper and lower tracks and the surface of the rail **109** on which the members **107** slide is formed with a groove adapted to receive the projections **108** on the members **107** while the members are being moved along the rail.

In order that threads may be freely passed through the hollow pipes **106** during travel along the middle straight region and that the threads may not be passed therethrough any more when they reach the terminal end of said region, each pipe **106** is provided with clamp means **110** and the frame **120** is provided with a cam **111** associated with said clamp means.

At a position where the thread guides are to change their direction of travel, a substantially triangular plate **112** is pivotally mounted on a stud **113**. The extent of pivotal movement of the triangular plate **112** is limited by two stop pins **114** fixed to the frame **120**. The base side of the triangular plate **112** is caused to abut against either of the two stop pins **114** by a spring **117** tensioned between a pin **115** on the triangular plate and a pin **116** on the frame **120** so that either of the other two sides of the triangular plate is brought into successive contact with the pipes **106** inserted in the members **107**, thereby guiding the thread guides. The triangular plate **112** is shaped symmetrical about a straight line perpendicular to the base side and passing through the center of the plate. The said stud **113** lies on said straight line and between the pins **115** and **116** which are also on said straight line, so that when the base side of the triangular plate is contacted with either of the stop pins **114**, the straight line connecting the pins **115** and **116** is deviated from the center of the stud **113**. Therefore, the triangular plate is urged by the spring **117** in such a manner that its base side is always in contact with either of the stop pins **114**. The triangular plate is provided with pins **118** positioned adjacent the guiding sides thereof along which the pipes **106** are guided, said pins **118** being adapted to be contacted by a disc **119** provided on a particular thread guide **106'**. Upon contact with either of the pins **118**, the disc **119** turns the triangular plate around the axis of the stud **113** to the extent that the pin **115** goes beyond the horizontal line. Thereupon, the triangular plate begins to turn by itself under the action of the spring **117** until the base side comes into contact with a pin **114** opposite to the one with which it has been in contact till now, thereby switching the course of travel of thread guides. Therefore, the thread guides that follow said particular thread guide **106'** are guided by the triangular plate to take a course toward a track opposite to the one along which they have been travelling till now. When said particular thread guide **106'** again reaches the triangular plate, it turns the latter as the disc **119** passes by the other of the pins **118**, thereby changing the course of travel of thread guides that follow said particular thread guide **106'**, in the same manner as described above.

If a number of threads arranged side by side are inserted individually in a series of thread guides and guided thereby while causing the thread guides to travel along the upper and lower tracks so as to describe the FIG. **8** in the manner as described above,

each thread will not be twisted even if the threads cross each other. However, the threads can rub each other due to crossing. In order to reduce this problem, the path of travel of threads may be somewhat modified. In FIG. **10** the two eye boards **80** have one of their respective ends pivotally mounted at the upper end **82** of a column **83**. A base block **81** supports two parallel shafts **84** and **85**. The shaft **84** is connected to the output side of a reduction gear **86** having the long shaft **60** as its input shaft. An endless chain **89** is entrained around a sprocket **87** fixed on the shaft **84** and a sprocket **88** fixed on the shaft **85**. Each of the shafts **84** and **85** has a crank arm **90** fixed thereon and connected to its associated eye board **80** through a pin **91**, rod **92** and pin **93**. The shafts **84** and **85** are so controlled that while the thread guides in the means **100** make a round of the upper track and of the lower track (two rounds in all), each shaft makes one revolution, moving the eye boards up and down to change the level at which the threads are passed through guide eyes **94**, thereby reducing frictional contact between the threads.

The present apparatus is arranged in the manner described above. Therefore, exchange of packages can be effected without stopping knitting operation, so that the efficiency can be increased. Further, since guiding of threads from the first to the second conveyor makes it only necessary to move threads guides alone, the consumption of power is very small and high-speed operation is possible.

What is claimed is:

1. In an apparatus for supplying a plurality of filling threads to a knitting machine of the type wherein first ends of said threads are clamped by a first conveyor and moved thereby toward said knitting machine, said threads are guided by a thread guiding means toward a second conveyor, and second ends of said threads are clamped by said second conveyor and moved thereby toward said knitting machine: the improvement wherein said thread guiding means comprises an upper endless thread guide track; a lower endless thread guide track positioned immediately below said upper track; the total length of said lower track being equal to the total length of said upper track; said upper and lower tracks having a common straight region; a first end of said straight region terminating adjacent said first conveyor, and a second end of said straight region terminating adjacent said second conveyor; a flexible band means movable along said tracks, the length of said band means being less than said total length of either of said tracks; a plurality thread guides extending through said band means at fixed intervals along said length thereof; means for moving said band means through said common straight region from said first end thereof toward said second end thereof; and means for guiding the leading end of said band means alternately to said upper and lower tracks after it passes said second end of said common straight region; whereby threads extending through said thread guides are clamped by said first conveyor as said band means passes said first end of said common straight region, said clamped threads are then guided toward said second conveyor as said band means moves through said common straight region, and said threads are then clamped by said second conveyor as said band means passes said second end of said common straight region.

2. The improvement claimed in claim **1**, wherein said flexible band means comprises a triple chain, and said thread guides comprise hollow link pins of said triple chain.

3. The improvement claimed in claim **1** further comprising a plurality of guide eyes arranged in a row, and wherein said plurality of threads are supplied to said thread guides from a plurality of stationary thread packages via said plurality of guide eyes.

4. The improvement claimed in claim **3**, further comprising a pair of eye boards having therein said guide eyes, one end of each of said eye boards being pivotally mounted so that said eye boards may be individually moved thereabout.

5. In an apparatus for supplying a plurality of filling threads to a knitting machine of the type wherein first ends of said threads are clamped by a first conveyor and moved thereby toward said knitting machine, said threads are guided by a thread guiding means toward a second conveyor, and second ends of said threads are clamped by said second conveyor and moved thereby toward said knitting machine: the improvement wherein said thread guiding means comprises an upper endless thread guide chain; a lower endless thread guide chain positioned immediately below said upper chain; the total length of said lower chain being equal to the total length of said upper chain; said upper and lower chains providing therebetween a straight track region; a first end of said straight track region terminating adjacent said first conveyer, and a second end of said straight track region terminating adjacent said second conveyor; a plurality of thread guides engageable by both of said chains and movable thereby through said straight track region; means for moving said thread guides through said straight track region from said first end thereof toward said second end thereof; and means for guiding said thread guides alternately to said upper and lower chains after said thread guides pass said second end of said straight track region; whereby threads extending through said thread guides are clamped by said first conveyor as said thread guides pass said first end of said straight track region, said clamped threads are then guided toward said second conveyor as said thread guides move through said straight track region, and said threads are then clamped by said second conveyor as said thread guides pass said second end of said straight track region.

6. The improvement claimed in claim **5**, further comprising plurality of guide eyes arranged in a row, and wherein said plurality of threads are supplied to said thread guides from a plurality of stationary thread packages via said plurality of guide eyes.

7. The improvement claimed in claim **6**, further comprising a pair of eye boards having therein said guide eyes, one end of each of said eye boards being pivotally mounted so that said eye boards may be individually moved thereabout.

* * * * *