United States Patent [19]

Mishcon

[11] **3,922,887**

[45] **Dec. 2, 1975**

[54] **POSITIVE YARN FEEDING SYSTEM FOR CIRCULAR KNITTING MACHINE**

[75] Inventor: **Lester Mishcon,** Miami Beach, Fla.

[73] Assignee: **The Singer Company,** New York, N.Y.

[22] Filed: **Sept. 13, 1974**

[21] Appl. No.: **505,828**

[52] **U.S. Cl.** ..... **66/132 T;** 226/171; 242/47.01

[51] **Int. Cl.**[2] **D04B 15/48**

[58] **Field of Search** ..... 66/132 R, 132 T; 226/172, 226/171, 181, 183; 242/47.01

[56] **References Cited**

UNITED STATES PATENTS

2,432,685	12/1947	Sawyer	66/132 R
3,090,215	5/1963	Rosen	66/132 T
3,194,276	7/1965	Krukonis et al.	66/132 R
3,264,845	8/1966	Rosen	66/132 T
3,363,815	1/1968	Vostal	66/132 T X
3,418,831	12/1968	Nance	66/132 T
3,675,446	7/1972	Cooke	66/132 T
3,802,228	4/1974	Deniega	66/132 T

FOREIGN PATENTS OR APPLICATIONS

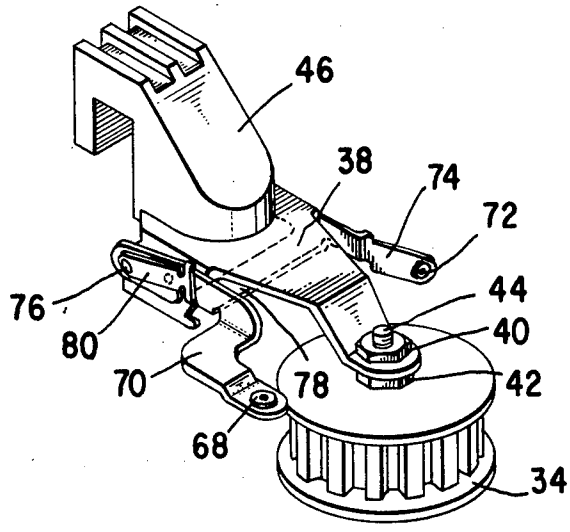
72,097	4/1970	Germany	66/132 R

Primary Examiner—Mervin Stein
Assistant Examiner—Andrew M. Falik
Attorney, Agent, or Firm—Edward L. Bell; Marshall J. Breen; William V. Ebs

[57] **ABSTRACT**

A circular knitting machine is provided with a positive yarn feeding system which includes a driven toothed belt and gear-like wheels that mesh with the belt. Yarn supplied from cones is received between the belt and wheels where it is gripped between mating parts of the belt and wheel and fed without slippage to the needles of the machine.

1 Claim, 6 Drawing Figures



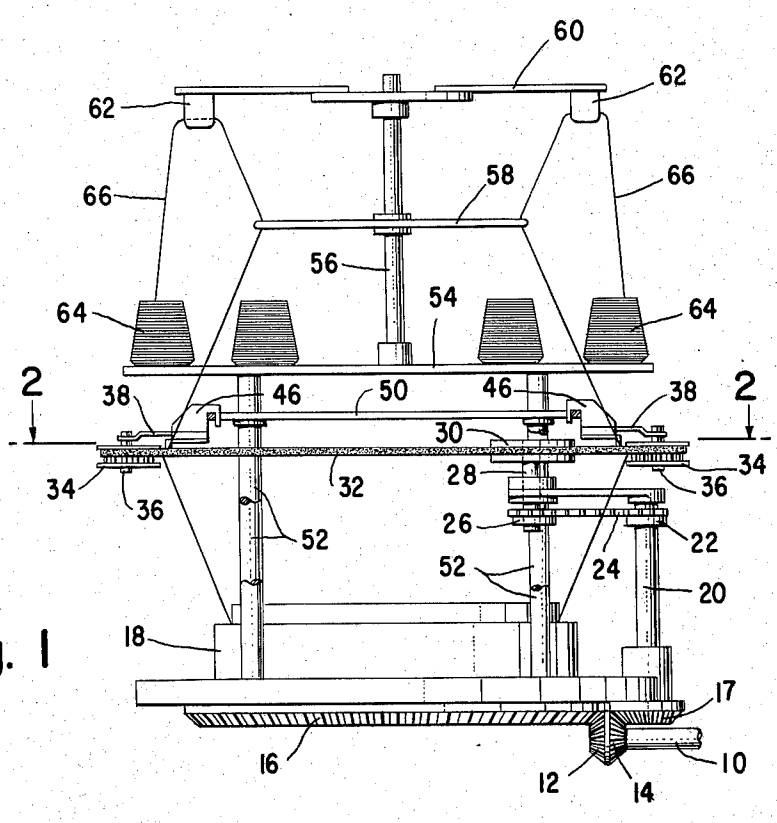

60
62
62
66
58
66
56
54
64
64
2
38
46
50
46
38
2
30
34
34
32
28
36
36
52
26
22
52
24
20
18
17
16
12
14
10

Fig. 1

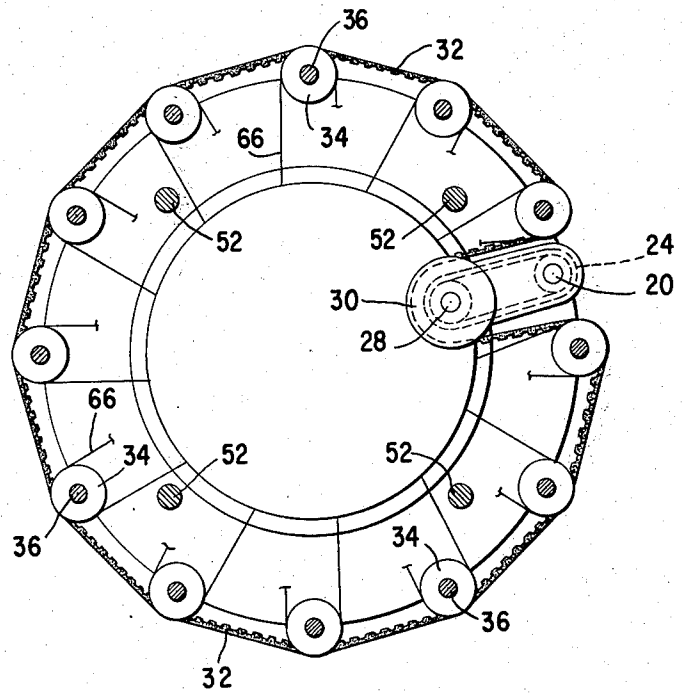

36
32
66
34
52
52
24
20
30
28
66
34
52
52
36
34
36
32

Fig. 2

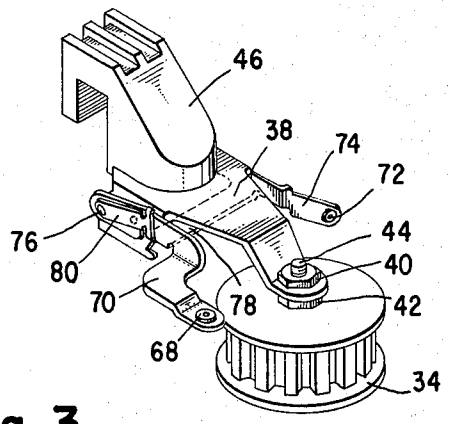


Fig. 3

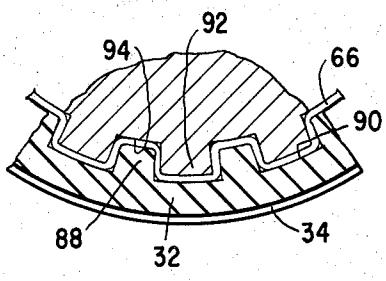


Fig. 6

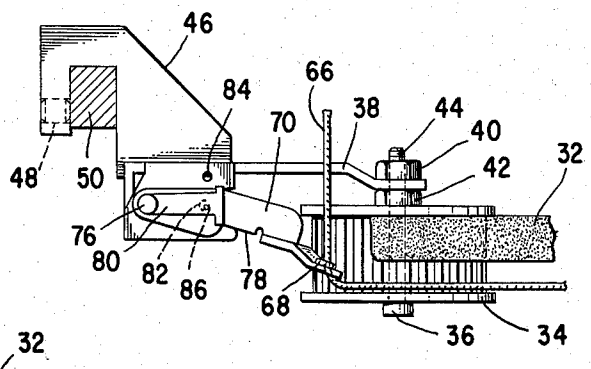


Fig. 5

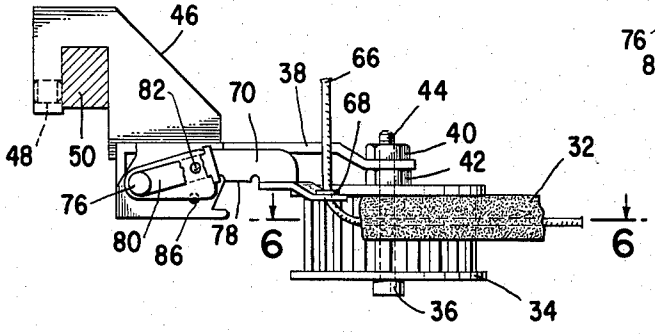


Fig. 4

POSITIVE YARN FEEDING SYSTEM FOR CIRCULAR KNITTING MACHINE

BACKGROUND OF THE INVENTION

1. Field Of The Invention

The invention relates to yarn feeding systems for circular knitting machines. More particularly, the invention is concerned with such systems which feed yarn positively between a driving belt and wheel to knitting instrumentalities.

2. Description Of The Prior Art

There are various types of yarn feeding systems for circular knitting machines. Such yarn feeding systems are, however, principally of two types. In one, yarn is pulled from the yarn cones by the knitting needles of a machine as they draw stitches, whereas in the other, the yarn is positively fed so as to provide the feeding stations with a defined length of yarn per stitch on each revolution of the machine. The most commonly used positive feeding system utilizes a smooth, endless tape to drive a plurality of wheels and feeds yarn to knitting needles from between the tape and wheels. Such a positive feeding system is shown in U.S. Pat. No. **3,090,215** issued May **21, 1963**, to Karl Isac Joel Rosen.

Although advantages may be realized with a positive feeding system of the type shown in the said Rosen patent, the performance of such a system is less than ideal because of slippage which occurs between the tape and yarn. Also the tape-driven wheels must be located at distances from the cylinder axis of a machine such as to substantially increase the diameter of the envelope of the machine.

SUMMARY OF THE INVENTION

In accordance with the invention, yarn is fed to a circular knitting machine by means of a driven, toothed belt and meshing gear-like wheels. The yarn passes between the belt and each wheel where it is gripped in a number of cogs of the wheel by teeth on the belt and caused to be fed to the knitting needles of the machine. Because of the manner in which the belt grips the yarn in the wheel, the yarn is fed equally at all feed stations without slippage and without stretch. Due to the absence of slippage between the belt and yarn, the life of the belt and wheels is increased, and horsepower requirements for operating a machine are reduced. Also because of the multiplicity of bends in the yarn where locked in the depressions in the wheels, the system of the invention may be run slower than the aforementioned Rosen tape feed system and still deliver the same amount of yarn. In addition, with the system of the invention only a small arc of contact between the belt and each wheel is required because of the positive gripping action between the belt and wheels, and as a consequence, the feeding system can be kept within the perimeter of the knitting machine proper thereby minimizing space requirements.

DESCRIPTION OF THE DRAWINGS

FIG. 1 is a front elevational view of a circular knitting machine including the positive yarn feeding system of the invention;

FIG. 2 is a cross-sectional view taken on the plane of the line 2—2 of FIG. 1;

FIG. 3 is a perspective view showing a feeding wheel according to the invention;

FIG. 4 is a side elevational view showing the wheel of FIG. 3 and an engaging yarn feeding belt with yarn under the belt;

FIG. 5 is a view similar to FIG. 4 showing the yarn displaced from under the belt;

FIG. 6 is a cross-sectional view taken on the plane of the line 6—6 of FIG. 4.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring to the drawings, reference character **10** designates a drive shaft to which bevel gears **12** and **14** are affixed. Bevel gear **12** engages and drives a ring gear **16** to rotate a needle cylinder within a cam ring **18.** Bevel gear **14** engages a gear **17** to drive a shaft **20** having a chain sprocket **22** affixed thereon at its upper end. An endless chain **24** extends above sprocket **22** and also about a chain sprocket **26** fixed to the lower end of a vertical shaft **28** to thereby drive the shaft **28** and an adjustable pulley **30** which is secured to the shaft **28.** The pulley **30,** which may be of the type disclosed in U.S. Pat. No. **3,243,091** of K. I. J. Rosen issued Mar. **29, 1966,** is used to drive a belt **32** at regulated speeds. The belt, which is trained about the pulley **30** and over a plurality of wheels **34** equally spaced circumferentially about the machine, drives the wheels. As shown, the wheels **34** are each rotatably mounted on a shaft **36** which is secured to an arm **38** as by nuts **40** and **42** that engage a threaded end **44** of the shaft, and the arms are each affixed to a bracket **46.** The brackets are secured as by set screws **48** to a ring **50** which is affixed to spaced upright members **52.**

The upright members **52** set in the base of the machine and at their upper ends support a yoke **54** which in turn supports a central upright member **56.** An intermediate yarn guide ring **58** and upper ring **60** are affixed to member **56.** Secured to the upper ring **60** are a plurality of stop-motion devices **62** of conventional construction which may be actuated to stop the machine in the event that a yarn end runs out or in the event that an undue amount of excess tension develops in yarn passing therethrough causing the yarn to be pulled from such device. The yoke **54** supports a plurality of similar yarn cones **64.**

Yarn **66** from each cone **64** extends upwardly to pass through an associated stop-motion device **62** and then downwardly through guide ring **58** to a wheel **34** where it extends under the belt **32.** Before passing under the belt, the yarn passes through an eyelet **68** in a yarn guide member **70** mounted on the arm **38** supporting the wheel. The yarn is gripped between the belt **32** and wheel **34** and fed by the moving belt and rotating wheel to an eyelet **72** in a yarn guide member **74.** The yarn passes through the eyelet **72** and then to the needles of the machine. The yarn guide member **70** is pivotally mounted at **76** on arm **38** and the yarn guide member **74** is similarly mounted on the arm **38.** The members **70** and **74** are joined by a crosspiece **78** and can be moved together from a position permitting yarn to pass under the belt **32,** as described and as shown in FIG. **4,** to the position of FIG. **5** to cause the yarn to be moved out from under the belt. Each of the members **70** and **74** has a spring **80** affixed to it which spring contacts a ball **82** that extends through an opening in the member and is movable with the ball. The ball is registrable in one of two detents **84** or **86,** to thereby define the two positions mentioned for the eyelets **68** and **72.**

In accordance with the invention the belt **32** is provided with evenly spaced teeth **88** separated by grooves **90,** and the wheel is provided with cogs **92** separated by grooves **94.** The teeth **88** and grooves **90** of the belt mesh with the cogs **92** and grooves **94,** respectively, of the wheel such that yarn passing under the belt is caught in the grooves **94** of the wheel by the teeth **88** of the belt and is caught in the grooves **90** of the belt by the cogs **92** of the wheel. The yarn is caught in this manner in a plurality of mating teeth and grooves of the belt and wheel to provide a non-slip, high-traction grip. The wheels **34** are preferably formed with hardened, wear resistant surfaces to engage the belt **32,** and the belt is preferably of a non-metallic material which has a high coefficient of friction and is deformable to a degree such as to prevent damage to the yarn **66.** The teeth **88** and cogs **92** are preferably trapezoidal in form as shown.

Numerous alterations of the structure herein disclosed will suggest themselves to those skilled in the art. However, it is to be understood that the present disclosure relates to a preferred embodiment of the invention which is for purposes of illustration only and not to be construed as a limitation of the invention. All such modifications which do not depart from the spirit of the invention are intended to be included within the scope of the appended claims.

Having thus set forth the nature of the invention, what is claimed herein is:

1. In a yarn feeding system for a knitting machine, the combination comprising an endless belt to be driven by the knitting machine, the belt having trapezoidly shaped teeth, a plurality of gear-like wheels over which the belt extends and which are driven by the belt, the wheels having spaced cogs which mesh with teeth on the belt, and means at each wheel for guiding a yarn between the belt and the wheel where the yarn is gripped between the meshing parts of the belt and the wheel and moved at a speed determined by the speed of the belt.

* * * * *