Aug. 24, 1965 D. E. ANDREWS ETAL 3,202,387

WOVEN WIRE CONVEYOR BELT

Filed Dec. 6, 1963 2 Sheets-Sheet 1

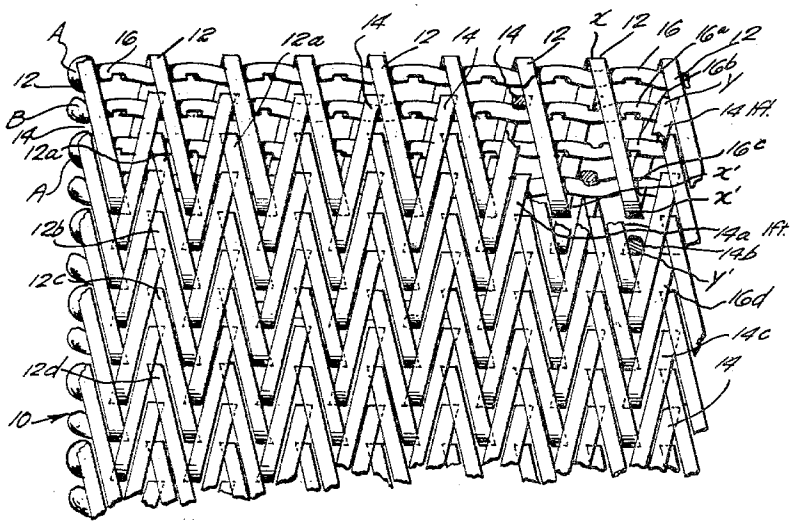

Fig. 1.

Fig. 3.

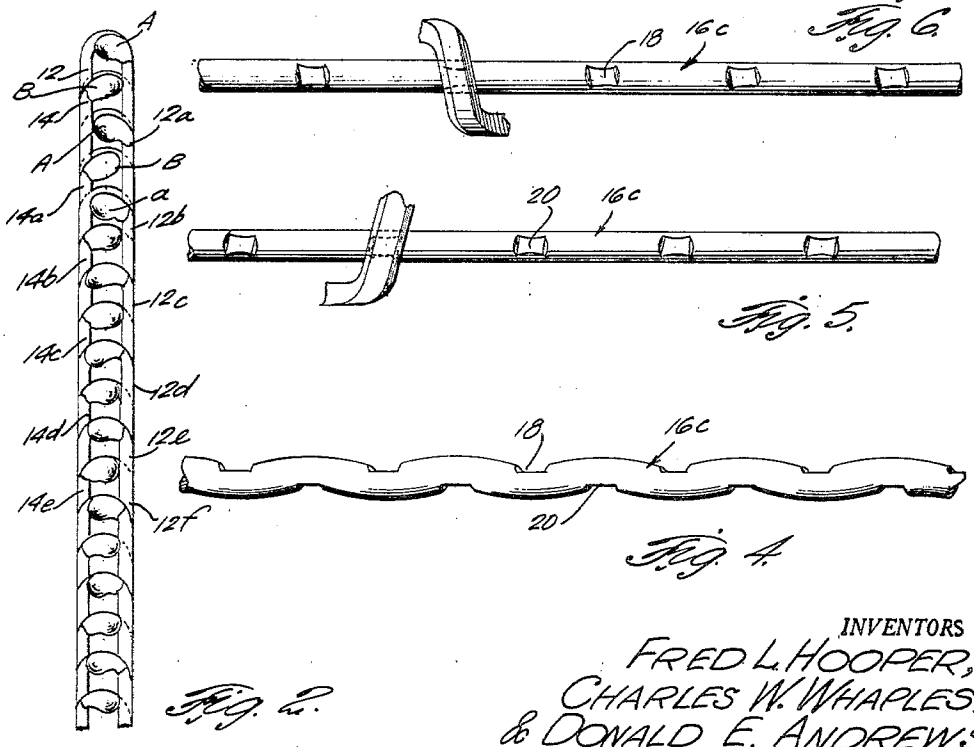

Fig. 6.

Fig. 5.

Fig. 4.

Fig. 2.

INVENTORS
FRED L. HOOPER,
CHARLES W. WHAPLES,
& DONALD E. ANDREWS.
BY Victor J. Evans & Co.
Attorneys

Aug. 24, 1965 D. E. ANDREWS ETAL 3,202,387

WOVEN WIRE CONVEYOR BELT

Filed Dec. 6, 1963 2 Sheets-Sheet 2

Fig. 7.

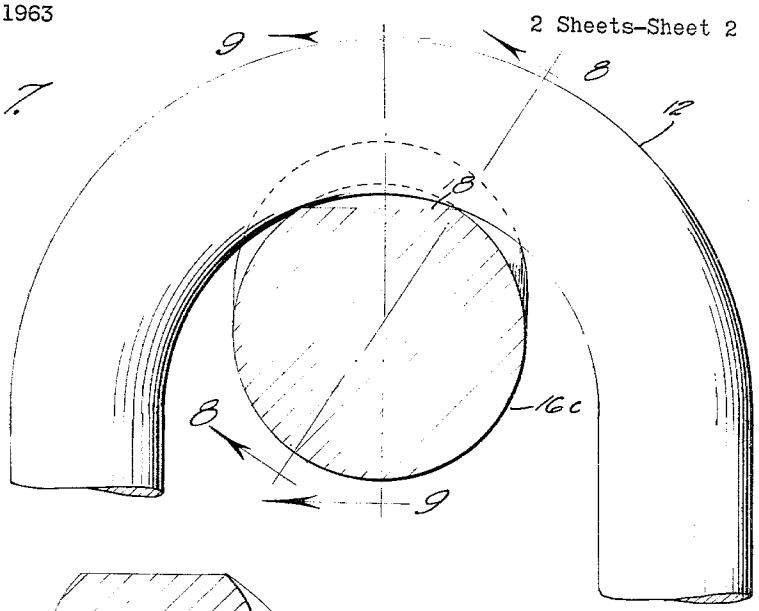

Fig. 8.

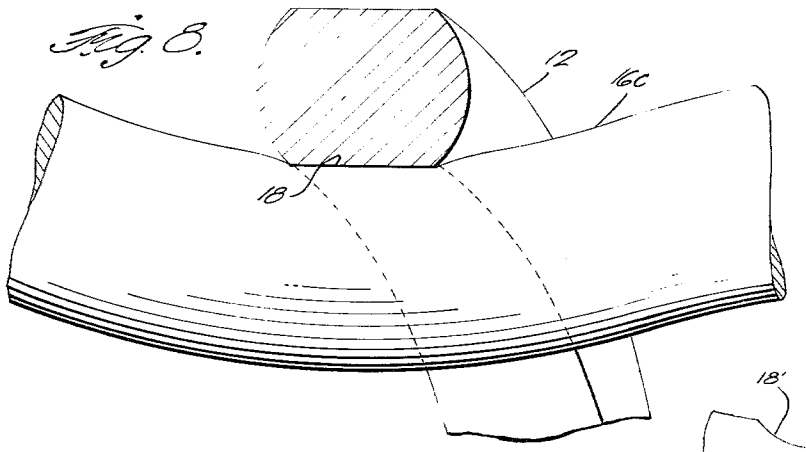

Fig. 11.

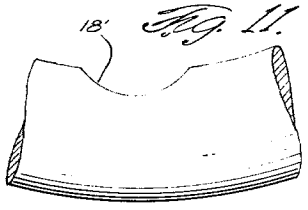

Fig. 9.

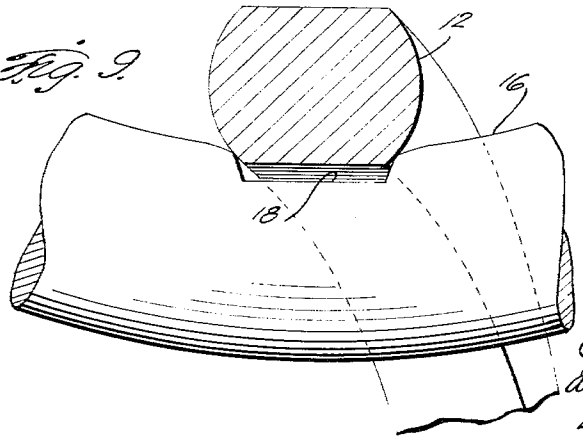

Fig. 10

INVENTORS
FRED L. HOOPER,
CHARLES W. WHAPLES,
& DONALD E. ANDREWS
BY Victor J. Evans & Co.
ATTORNEYS

United States Patent Office 3,202,387 Patented Aug. 24, 1965

3,202,387

WOVEN WIRE CONVEYOR BELT

Donald E. Andrews, Fred L. Hooper, and Charles W. Whaples, Cambridge, Md., assignors to Cambridge Wire Cloth Company, Cambridge, Md., a corporation of Maryland

Filed Dec. 6, 1963, Ser. No. 328,712
6 Claims. (Cl. 245—6)

The present invention relates to a woven wire conveyor belt, and more particularly to such a belt having a corduroy or herringbone weave.

Such belts are commonly used in the baking industry and are sometimes known as wafer weave belts. The standard or conventional corduroy belt used presently has contained serious defects in regard to its tracking properties. A close analysis of these standard wafer weave belts disclosed factors in their basic design which cause them to be inherently poor tracking bands. One such factor is that the conventional wafer weave uses a straight connecting rod or transverse rod to join the wire spirals or loops or flat coils forming the weave of the belt. The straight rod will not prevent the spirals from shifting laterally and producing what is known as a dog leg or crooked belt. For example, in the improbable event that it were possible to make the weave so tight that every other spiral could shift laterally .001 inch, this could produce a four inch dog leg in 100 feet of belting. For this reason, a standard corduroy weave belt or band may be perfectly straight in the manufacturer's plant and yet it may be impossible to control when installed in a baking oven. A second factor contributing strongly to dog legs in a conventional wafer weave belt is that the band or belt contains two types of spirals, namely a right hand spiral which corkscrews clockwise and a left hand spiral which corkscrews counterclockwise. The right hand spirals in the weave tend to track the band to one side and the left hand spirals tend to track the band to the opposite side. The conventional wafer weave shows that any given connecting rod in the belt has spirals of only one hand hinging on it. In other words, if a given rod has right hand spirals hinging on it, then the adjoining rod will have only left hand spirals hinging on it, so that the conventional wafer weave belt contains two basic types of belt elements, one meshed within another. Unless the right hand spiral is perfectly matched to the left hand spiral throughout the band, or in other words if they are not absolutely identical in pitch, then one spiral will control tracking of the belt, or band.

It is an object of the present invention to provide a corduroy woven wire conveyor belt provided with diagonally notched connecting rods with the angle of the notch matching the helix angle of the spiral hinged thereon so that the spirals are locked in place on the rod and are prevented from laterally moving or shifting thereon, and a corduroy belt provided with right hand spirals and left hand spirals hinged on the same connecting rod so that tracking is controlled equally by both spirals.

It is another object of the present invention to provide an improved corduroy weave belt of woven wire provided with diagonally notched rods, with a right hand spiral and a left hand spiral hinged on the same rod and seated in the notches so as to eliminate vibrations encountered in conventional wafer weave belts used heretofore.

It is another object of the present invention to provide a corduroy weave belt made of woven wire wherein the spirals are fully seated in diagonal notches provided in the connecting rods so that the spirals hinge smoothly therein and eliminate vibrations or jumping as the belt passes on or off an end drum.

It is another object of the present invention to provide a corduroy weave belt made from woven wire provided with diagonally notched rods in which right hand and left hand spirals are disposed and fit naturally so that they do not have to wear themselves into place.

It is another object of the present invention to provide a corduroy weave belt having a plurality of diagonal notches to the connecting rods thereof and in which right hand and left hand spirals are seated and hingedly connected thereto over a relatively large area, as compared with belts used heretofore, as to decrease initial elongation and operational elongation of the belts.

It is another object of the present invention to provide a corduroy weave belt made of woven wire provided with a plurality of diagonally notched connecting rods to which fit right hand and left hand spirals connected to the same rod to provide an independently straight tracking balanced belt wherein tracking is controlled equally by both spirals and any minute pitch variations in the spirals are not additive and do not accumulate to produce dog legs in the belt.

It is another object of the present invention to provide a corduroy weave belt made of woven wire with diagonally notched rods for receiving spirals, which notches are disposed at an angle which corresponds to the helix angle of the spiral so that there is precise mating of the rod and the spirals hinged thereto, and so that the spirals are locked in place to prevent lateral shifting thereof.

It is another object of the present invention to provide a corduroy weave belt made of woven wire provided with diagonally notched connecting rods, which notches receive right and left hand spirals, and which notches may be of any configuration which serves to restrain the spirals from lateral movement along the rods.

It is another object of the present invention to provide a corduroy weave belt made of woven wire, which wire may be of any configuration such as round wire, flat wire, half-round wire, and the like, provided with diagonal notches in the connecting rods thereof upon which the spirals are hinged.

It is another object of the present invention to provide a corduroy weave made of woven wire for use as a conveyor belt, which belt is provided with diagonally notched connecting rods with right hand spirals and left hand spirals being hinged to the same rod and within the notches provided in said rod, and with an individual spiral containing at least four rods, and wherein the individual spiral can contain a larger number of rods, so long as the contained rods are in even multiple numbers such as six rods or eight rods and the like.

It is another object of the present invention to provide a corduroy weave fabric belt with diagonally notched connecting rods with left hand and right hand spirals hinging on the same rod, and with the diagonal notches matching the helices of the left and right hand spirals hingedly thereon, and with individual spirals enclosing and enveloping more than two rods, with the number of rods being an even number, such as four, six and so on.

It is another object of the present invention to provide a corduroy weave fabric belt with left hand and right hand spirals hinged on a given connecting rod, with the connecting rod being notched, and with an even number of rods, with at least four rods being contained in each spiral.

Various other objects and advantages of the present invention will be readily apparent from the following detailed description when considered in connection with the accompanying drawings forming a part thereof, and in which

FIGURE 1 is a fragmentary plan view, partly broken away for purposes of illustration, showing one form of weave belt of the present invention;

FIGURE 2 is a view looking at the left marginal edge of the belt shown in FIGURE 1;

FIGURE 3 is a side elevational view of a right hand spiral of the belt;

FIGURE 4 is an enlarged fragmentary top plan view of a connecting rod in the belt;

FIGURE 5 is a view of one side of the rod shown in FIGURE 4;

FIGURE 6 is a view of the opposite side of the rod shown in FIGURE 5;

FIGURE 7 is an enlarged fragmentary side view of a spiral and diagonally notched rod;

FIGURE 8 is a section taken along line 8—8 of FIGURE 7, illustrating a spiral seating fully into the base of a notch;

FIGURE 9 is a section taken along line 9—9 of FIGURE 7 illustrating where the spiral falls below the top of the shoulder on the notch;

FIGURE 10 illustrates the connecting rod shown in FIGURE 9 without the spiral disposed therein, and an arcuate bottom notch; and

FIGURE 11 is a modification of the connecting rod shown in FIGURE 10.

Referring to FIGURE 1, the reference numeral **10** generally designates a corduroy weave fabric of the present invention made of a plurality of helically coiled wires or spirals. The spirals **12**, **12***a*, **12***b*, **12***c*, **12***d*, and so on, are right hand spirals while the coiled wires or spirals **14**, **14***a*, **14***b*, **14***c*, **14***d*, and so on, are left hand spirals, or spirals of opposite twist. Cross wires or connecting rods **16**, **16***a*, **16***b*, **16***c*, and so on, lie in the helices of the spirals **12**, **12***a*, **12***b*, etc., and **14**, **14***a*, **14***b*, etc., and connect them in operative relationship. The helically coiled spirals are disposed in close relationship, and this is affected by developing their width to such a dimension that a plurality of connecting rods, in the present instance at least four connecting rods, may lie in properly spaced relation within the helices of each spiral, between and in properly spaced relationship with respect to those connecting rods which are engaged by the bights of any one of the helically coiled spirals.

Referring to FIGURE 1, which shows a portion of the helical spirals broken away in the upper right hand portion, it will be noted that the bights of the spiral **12**, for example, engage the connecting rods **16**, and the connecting rod **16**c, such bights being indicated at X and X', respectively. The connecting rods **16***a* and **16***b* are enclosed within the spiral **12** so that a single spiral has at least four connecting rods enveloped or contained therein. The spiral **12** is continuous across the width of the fabric belt, and has the end connected as shown at A to the end of the connecting rod **16** by welding.

The left hand spirals, for example **14***a*, are of the same dimension as the right hand spirals, and contain four connecting rods with a connecting rod, for example **16***a*, engaged in the upper bight of the spiral **14**, as indicated at Y. The lower bight indicated as Y' of the left hand spiral **14** also engages a connecting rod **16***d* so that connecting rods **16***a*, **16***b*, **16***c*, and **16***d* are enveloped or contained within the spiral **14**. The spirals **14** are also continuous and have their ends welded to a connecting rod, for example **16***a*, as indicated at B.

All of the spirals are in nested relationship offset with respect to each other, and in order that they may be maintained in a connected condition by the connecting rods. In the present invention, all of the connecting rods have a right hand spiral and a left hand spiral hinging on it so as to provide a cord weave which is a balanced belt and has an inherently straight tracking characteristic. For example, taking a given connecting rod **16***c*, it will be noted that the right hand spiral **12** and the left hand spiral **14***a* engage rod **16***c* an hinge on it. Each and every one of the connecting rods, for example **16***a* and **16***b* and so on, have a left and a right hand spiral hinging on the individual connecting rod.

Referring to FIGURE 3, it will be noted that the spirals, for example, the right hand spiral **12**, are made of flat-

wire. If desired, the spiral can be made of round wire, half-round wire, or any desired configuration. As shown in FIGURE 4, which is a top plan view of a connecting rod such as the rod **16***c*, for example, it will be noted that it is crimped and is provided with diagonal notches **18** and **20** disposed in opposite sides thereof and in alternate relationship. The notches **18** and **20** are flat bottom notches and are disposed in the valleys of the crimped wire so as to receive the bights of the spirals therein and restrain the spirals from lateral movement. The diagonal notches **18** are disposed as shown in FIGURE 6 to receive the right hand spirals of the fabric therein while the notches **20**, as shown in FIGURE 5, are disposed to receive the left hand spirals therein. If desired, the notches may be of any desired configuration and may have a radius bottom notch **18'** as shown in FIGURE 11, or the arcuate bottom notch **18''** of FIGURE 10. The notches are formed on the diagonal to match the helix angle of the spiral to be hinged thereto. Thus, the diagonally notched rod allows a precise fit between the hinging surfaces of the connecting rod and the spiral.

The configuration of the bottom of the notch, i.e., flat, arcuate, or radiused, as shown in FIGURES 9 through 11, is described along the transverse axis of the notch which, in non-diagonal transverse notches, lies parallel to the major axis of the rod and which, in diagonal transverse notches, is the same dimension but rotated from a parallel relation to the longitudinal axis in accordance with the angular deviation of the diagonal notch from the minor axis of the rod.

The precise fit between a spiral, for example, spiral **12**, and a connecting rod **16***c*, for example, is shown in FIGURE 7. It will be noted in FIGURE 8 wherein the crimp has little or no shoulder, the spiral seats fully into the base of the notch. As this point, it can be clearly seen that the notch is flat-bottomed and the width of the notch is precisely equal to the width of the flat on the spiral. Thus, complete seating occurs for the full width of the bearing surface. Referring to FIGURE 9, it can be seen that the spiral falls approximately a slight distance below the top of the shoulder on the notch. It can also be seen from this view that the angle of the shoulder is designed to contact the spiral and provide lateral restraint. Hence, by fully seating the spiral and securely locking it against motion in a lateral direction, the advantages of a diagonally notched connecting rod are fully and precisely realized.

Thus, from the foregoing description it is realized that the corduroy weave fabric or belt of the present invention has notched connecting rods in which individual spirals envelop or contain an even number of rods, which number of connecting rods is at least four, and each connecting rod has a right hand spiral and a left hand spiral hinging on it so as to provide a balanced belt that is an inherently straight tracking belt.

The present invention also provides a corduroy weave fabric belt with notched connecting rods formed on a diagonal to match the helix angle of the spirals connected thereto, and in which individual spirals envelop an even number of connecting rods, which number of connecting rods is at least four, and each connecting rod has a right hand spiral and a left hand spiral hinging on it and the diagonally notched connecting rods allow a precise fit between the hinging surfaces.

The present invention also provides a corduroy weave fabric comprising groups of helically coiled spirals in nested relationship, with right and left hand spirals in alternate relationship, and connecting rods extending transversely of said spirals, said spirals being hinged to said rods, with left and right hand spirals hinged on each one of said rods, with an even number of rods enclosed in each of said spirals, and each of said rods being notched and said spirals being hinged therein in the notches.

While this invention has been shown and described in detail, it is to be understood that this detailed description is given merely by way of illustration and that many

variations may be made therein without departing from the spirit of this invention and that the invention is to be limited only by the scope of the appended claims.

What is claimed is:

1. A corduroy weave wire belt comprising:

a plurality of helically coiled spirals, the spirals comprising spirals of right-hand twist and left-hand twist of approximately equal pitch positioned alternately in a nested relation; and

a plurality of connecting rods extending lengthwise through the spirals, each of the spirals having an even number of rods extending therethrough and the number being at least four, each rod being transversely notched and each rod having the right-hand twist and the left-hand twist spirals alternately hinged thereon across the length of the rod in the notches so as to maintain a straight-tracking belt.

2. The corduroy weave wire belt defined in claim 1 wherein the notches are diagonal with respect to the major axis of the rod so as to accommodate the helical angle of the spiral.

3. The corduroy weave wire belt defined in claim 1 wherein the notches have a transverse flat bottom.

4. The corduroy weave wire belt defined in claim 1 wherein the notches have a transverse arcuate bottom.

5. The corduroy weave wire belt defined in claim 1 wherein the notches are alternately positioned on opposite sides of the rod, the notches on one side having spirals of one twist hinged therein and the notches on the other side having spirals of the other twist hinged therein.

6. A corduroy weave wire belt comprising:

a plurality of helically coiled spirals, the spirals comprising spirals of right-hand twist and left-hand twist of approximately equal pitch positioned alternately in a nested relation; and

a plurality of connecting rods extending lengthwise through the spirals, each of the spirals having an even number of rods extending therethrough and the number being at least four, each rod bing notched substantially perpendicular to the major axis of the rod and the notch having an arcuate bottom and each rod having the right-hand twist and the left-hand twist spirals alternately hinged thereon across the length of the rod in the notches so as to maintain a straight-tracking belt.

References Cited by the Examiner

UNITED STATES PATENTS

1,282,171	10/18	Barnes	245—2
2,147,328	2/39	Scherfel	245—6

SAMUEL F. COLEMAN, *Primary Examiner.*

RICHARD E. AEGERTER, *Examiner.*