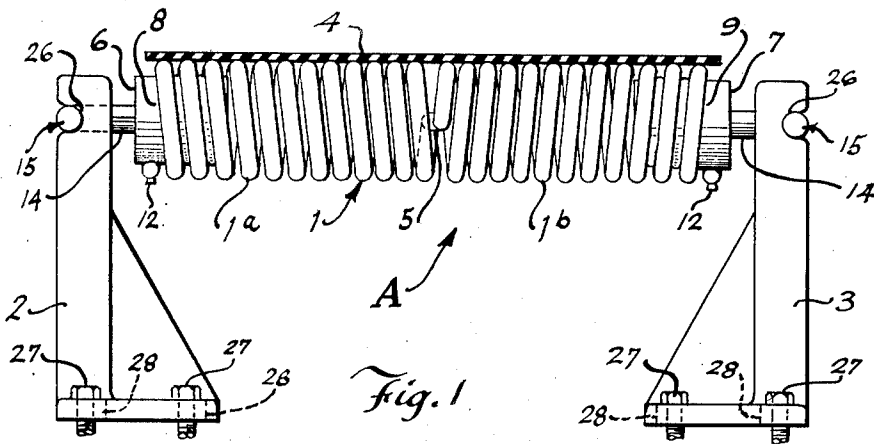
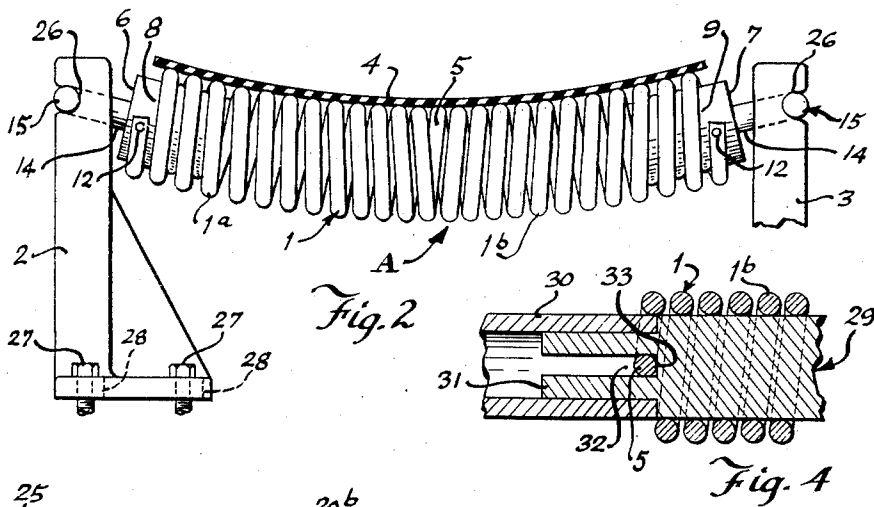
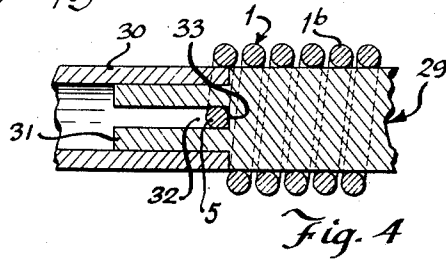
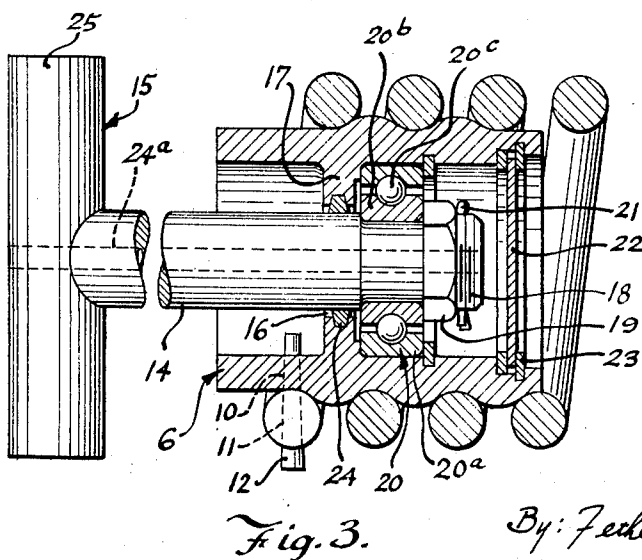
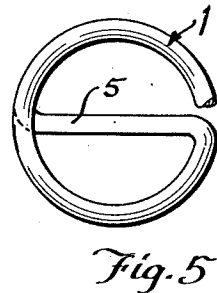


June 5, 1951

H. T. SHANK  
TROUGHING IDLER

2,555,765

Filed Nov. 21, 1947



INVENTOR  
H. SHANK  
By: Fecherstonhaugh & Co.  
ATT'YS

## UNITED STATES PATENT OFFICE

2,555,765

## TROUGHING IDLER

Harvey Tillman Shank, Toronto, Ontario, Canada

Application November 21, 1947, Serial No. 787,293

1 Claim. (Cl. 198—192)

1

This invention relates to a troughing idler for a belt conveyor of the class in which a coil spring is employed as the idler member.

Troughing idlers in which the belt supporting idler element is formed from a coil spring have been known for a long time. They are superior in many respects to the more common troughing idler which comprises a plurality of unyielding pulleys rotatably mounted beneath the conveyor belt with their principal axis of rotation in the form of a trough. For example, the bending strain on the belt due to the troughing of the belt is more evenly distributed in the coil type idler than in the type having a series of troughed rollers. Also, due to the gradual troughing obtained with a coil type idler, a greater load can be carried without spilling. In spite of these advantages obtainable with the coil type idler, it has not come into general use because the rotating spiral coils continually tend to carry the conveyor belt sideways, off of the idlers. This trouble is especially prevalent when the conveyor operates at no load. I have invented a coil type troughing idler which overcomes this great disadvantage in coil idlers.

It is then an object of my invention to provide a coil type troughing idler which will not force the conveyor belt sideways off of the idlers.

It is a further object of the invention to provide a simple means for constructing a coil type troughing idler having the above characteristics.

It is also an object of the invention to provide a coil type troughing idler which will not force the conveyor belt sideways, which is cheap to manufacture.

It is a still further object of the invention to provide a troughing idler of the spring type having a means in connection therewith for taking up spring fatigue.

With these and other objects in view a troughing idler according to my invention has a coil spring idler member which is formed from its centre, in a right handed coil towards one end and in a left hand coil towards its other end. The idler coil is then mounted beneath a conveyor belt which causes it to rotate in such a direction that each edge of the belt is urged onto the idler due to the rotation thereof. The invention will be clearly understood after reference to the following detailed specification taken in conjunction with the accompanying drawings.

In the drawings:

Figure 1 is a front view of a troughing idler according to this invention.

2

Figure 2 is a partly broken away view of the troughing idler shown in Figure 1 carrying a load.

Figure 3 is an enlarged sectional view from the top showing the members used for mounting the idler coil in its end supports.

Figure 4 is a sectional view showing a mandrel for forming an idler coil according to the invention.

Figure 5 shows the construction of the centre of an idler coil according to this invention.

Referring to the drawings, numeral A indicates a troughing idler according to this invention generally. It comprises a coil spring idler 1, rotatably mounted between the rigidly mounted spaced apart end supports 2 and 3. A conveyor belt 4 travels over the spring idler 1.

Specific reference will first be made to the coil spring idler 1. It is preferably made from a single piece of spring wire which is formed from a straight portion 5 adjacent its centre, in a right handed helix 1a towards one end, and a left handed helix 1b towards the other end, the right handed helix 1a having the same pitch as the left handed helix 1b. The straight portion 5 preferably extends through the longitudinal axis of the coil spring idler 1.

The spring coils 1a and 1b are preferably wound closer together adjacent the centre of the idler 1, because of the heavy load borne adjacent that point. In this connection it is desirable to design the straight portion 5, from which the right handed helix 1a and the left handed helix 1b are turned, at a slight incline to the longitudinal axis of the coil idler 1 when it is in an unflexed position as shown in Figure 1. This permits the first turn from the centre in each of the helical portions 1a and 1b to lie closer to each other without interfering with the straight portion 5.

Reference will next be made to the manner in which the coil spring idler 1 is rotatably mounted between the rigidly mounted end supports 2 and 3. This is effected through similar bearing cups 6 and 7 which are inserted into the open ends 8 and 9 of the idler 1. The idler coil is mounted in the same way at either end and therefore only the mounting of the right handed portion 1a of the coil 1 will be described in detail.

The bearing cup 6 fits into the open end of the coil spring idler 1 and is locked therein in any suitable manner. In the embodiment of the invention shown, the cup 6 and end of the spring 1a are bored as at 10 and 11 respectively to receive a pin 12 when the two bores are aligned.

The shank 14 of the T-section bolt 15 passes through a circular opening 16 formed by the in-

terior annular shoulder 17 of the bearing cup 6. The end of the shank 14 is threaded as at 18 to receive a nut 19. The nut 19 is designed to hold the thrust ball-bearing 20 between it and the annular internal shoulder 17 of the bearing cup 6, and is locked in position by the cotter pin 21. Numeral 22 indicates a plate adapted to form an inner oil seal for the bearing cup 6, and is secured thereto by any suitable manner such as the spring washer 23. A suitable oil seal 24 is preferably employed around the shoulder 17 to seal the outer end of the bearing cup 6. The cup can be lubricated through the hole 24a.

The top portion 25 of the T-bolt 15 is circular in cross-section and is designed for mounting in a complementary recess 26 in the upper portion of the end support 2, the shank portion 14 being adapted to extend through a longitudinal slot (not shown) in the end support whereby to permit the cup to pivot vertically when a load deflects the coil spring 1.

The operation of the mounting will be apparent. The bearing cup 6 rotates with the idler spring 1. The bolt 15 is prevented from rotating by the end support 2, while the thrust bearing 20 permits relative rotation between the cup 6 and the bolt 15. In this connection, the outer bearing race 20a bears against the annular shoulder 17 and the inner race 20b bears against the nut 19 while the ball bearings 20c permit free relative rotation between the two. The bolt 15 is free to pivot vertically in its mounting as load is applied to deflect the conveyor.

Figures 1 and 2 of the drawings will serve to explain the operation of the unit as a whole. The conveyor belt 4 moves out of the page to cause the idler 1 to rotate in a clockwise direction when viewed from the left side, that is from the side of the end support 2. It will be apparent that the spiral coils of each of the rotating spiral coil sections 1a and 1b will both tend to urge the respective halves of the conveyor belt 4, which they support, towards the centre. Figure 1 shows the conveyor belt 4 operating at no load. The spring idler 1 assumes almost a horizontal position between the end supports 2 and 3. The conveyor is shown in a loaded condition in Figure 2. The weight of the load has caused coil spring idler 1 to flex downwardly.

The end support 3 is preferably made adjustable with respect to the end support 2 and to this end the bolts 27 which secure it to the floor, pass through longitudinal slots 28. To adjust the support 3 with respect to the support 2 it is only necessary to loosen the bolts 27, adjust the support 23 lengthwise of the slots and reclamp it in position by tightening the bolts 27.

Figure 4 shows in section a mandrel 29 which could be used for the purpose of forming a coil idler according to this invention. It is a two-piece cylindrical mandrel, the section 31 fitting within the section 30. Section 31 has provision for the passage therethrough of the wire, or other material from which the coil spring idler 1 is to be formed, which in the embodiment shown, comprises a slot 32. The slot 32 passes through the longitudinal axes of the mandrel 29.

To form an idler coil with this mandrel, the centre of the wire length from which the idler is to be formed is passed through the slot or passage 32 with its free ends projecting therefrom. One of the free ends is then coiled in a right-handed coil towards one end of the mandrel while the other free end is coiled in a left-handed coil of equal length and pitch towards the other end of the mandrel.

As mentioned above, the straight portion 5 adjacent the centre of the coil idler 1 is preferably formed at an incline to the longitudinal axes thereof. In this connection the slot 32 can be formed with its bottom 33 at an incline to the longitudinal axes of the mandrel. It is understood, of course, that in the coil winding operation the straight portion 5 of the wire is maintained against the bottom 33 of the slot 32 in order to locate it at the centre of the resulting spring idler.

From the above, it will be apparent that I have disclosed a new construction for a coil idler which completely fulfills the objects of my invention. My inventive idea is the forming of the mandrel with a left-handed and a right-handed coil extending from each side of its centre point. I have shown one embodiment of this invention in my specification. Other embodiments will be apparent to those skilled in the art. I do not intend, therefore, that my invention should be restricted in scope to the embodiment shown, except for the restrictions expressed by the following claim.

What I claim as my invention is:

In a conveyor idler, a coil spring idler formed, from its centre, in a right-handed coil towards one end, and in a left-handed coil towards the other end, the pitch of said right-handed coil being the same as the pitch of said left-handed coil, the pitch of each of said right-handed and left-handed portions of said coil being smaller adjacent the centre of said coil spring, and cup means carried by each end of said coil for rotatably mounting it to support the conveyor.

HARVEY TILMAN SHANK.

#### REFERENCES CITED

The following references are of record in the file of this patent:

#### UNITED STATES PATENTS

| Number    | Name      | Date          |
|-----------|-----------|---------------|
| 857,610   | Dull      | June 25, 1907 |
| 857,772   | Thomas    | June 25, 1907 |
| 1,171,148 | Simonsen  | Feb. 8, 1916  |
| 1,189,846 | Lockwood  | July 4, 1916  |
| 1,483,985 | Price     | Feb. 19, 1924 |
| 1,710,634 | Schlaich  | Apr. 23, 1929 |
| 1,980,777 | Zollinger | Nov. 13, 1934 |
| 2,391,178 | McKnight  | Dec. 18, 1945 |

#### FOREIGN PATENTS

| Number  | Country       | Date          |
|---------|---------------|---------------|
| 496,987 | Great Britain | Dec. 9, 1935  |
| 672,218 | Germany       | Feb. 22, 1939 |