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3,092,240

IDLER ASSEMBLY

Filed May 2, 1960

2 Sheets-Sheet 1

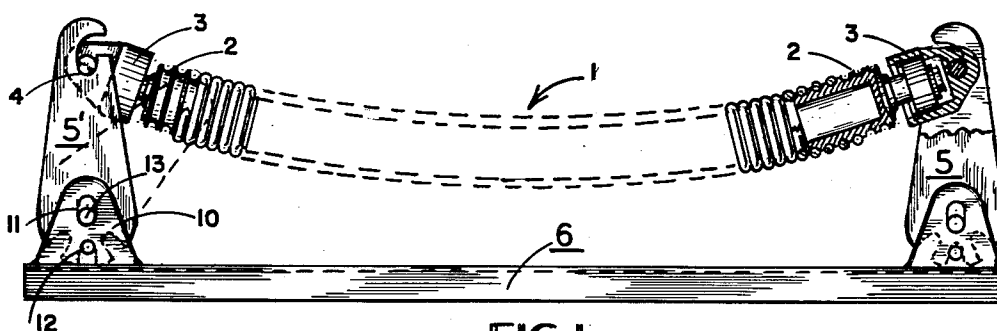


FIG. 1.

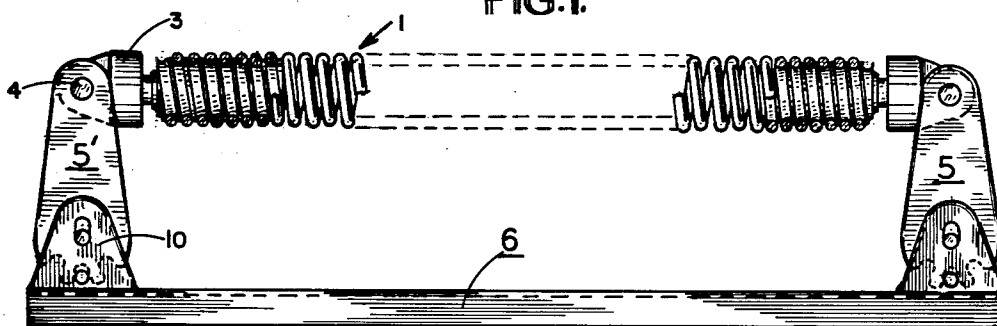


FIG. 2.

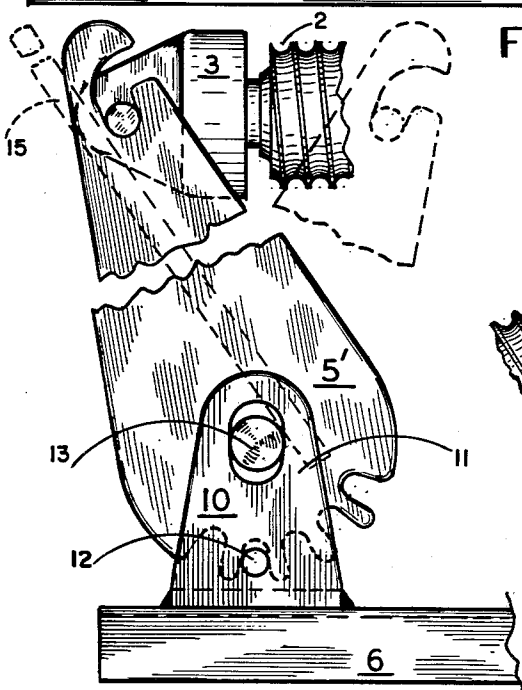


FIG. 3.

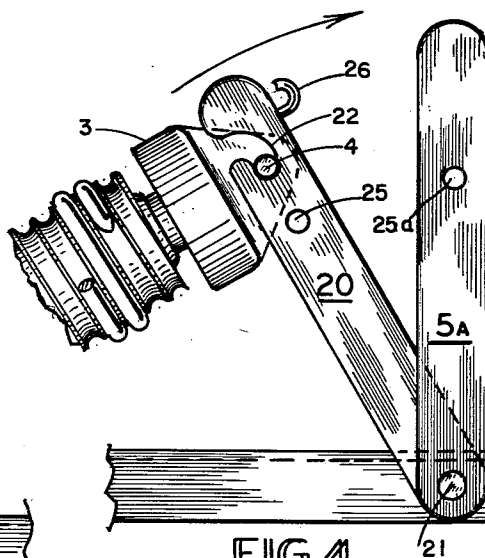


FIG. 4.

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2 Sheets-Sheet 2

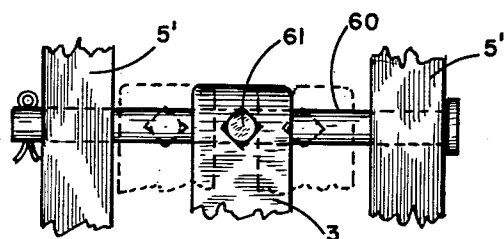


FIG. 6.

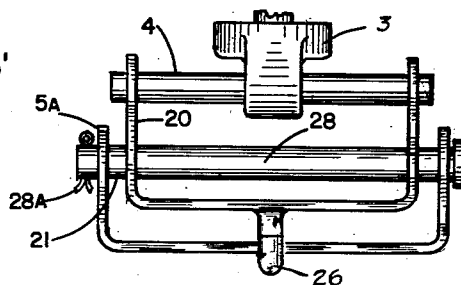


FIG. 4A.

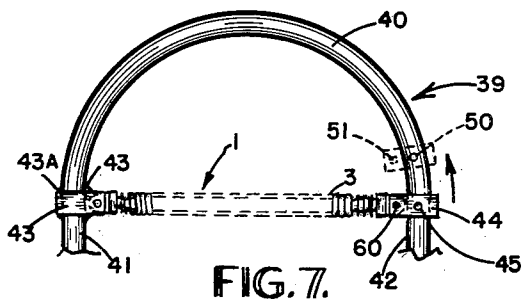


FIG. 7.

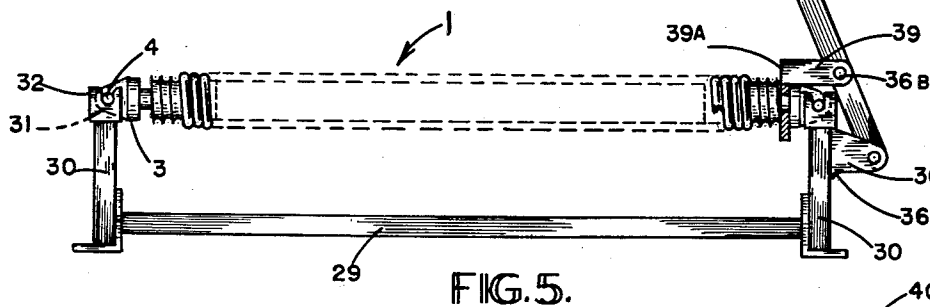


FIG. 5.

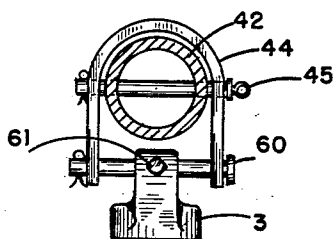


FIG. 7A.

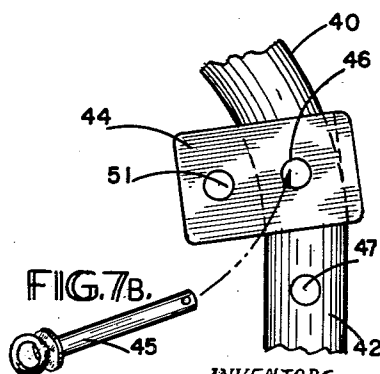


FIG. 7B.

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IDLER ASSEMBLY

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1 Claim. (Cl. 198—192)

This invention relates to belt conveyors and more particularly to supporting structures for spring idlers and auxiliary apparatus for adjusting such idlers.

This invention comprises improvements in spring idlers and supporting structure of the type disclosed in co-pending application Serial No. 828,089 filed July 20, 1959.

Although spring idlers have been known for some time, they have not been commercially successful since even those made of the better steels are made with loose or open coils, and reach their fatigue limit at about two million repetitions. Further, supporting structure for such idlers have been unwieldy, making assembly of the conveyor difficult and expensive.

The capacity of a belt conveyor depends to a considerable extent on the width and depth of the trough formed in the belt. Ideally, a section through the belt trough is in the form of a catenary curve and it is this curve that determines the depth of trough and thus the capacity. At times, it is desired to change the belt trough by changing the catenary curve; and we have discovered that by changing the effective length of the coil spring which forms the idler, it is possible to vary its catenary curve.

Recognizing the above is not a complete or satisfactory solution since coil spring idlers have certain inherent natural tendencies which make dealing with them a difficult operation. For instance, when coil spring idlers are used, threading the coil on one of the spindles is relatively simple. It is simple because the coils of the spring have the natural tendency to open or spread, thus making the threading operation relatively easy. However, when unthreading the coils, the natural tendency of the coils is to tighten and bind thus making the operation difficult. When the coils are under tension, as they would normally be when in position between two spaced idler pivot points, it is even more difficult adding to the foregoing mentioned tension in the coils, and further tightening them on the mounting spindle.

When dealing with 30 inch belt widths and up, the supporting spring idler must be quite heavy, and a substantial force is required to stretch it between its supporting structure. However, our invention, by simple and very inexpensive means, effectively and simply permits assembly or changing of the spring idlers, their lengths and thus easily and effectively change the catenary curve of a supported conveyor belt.

Briefly, the invention comprises fixedly holding the spindle of a spring idler at one end and providing means by which the spindle at the other end may be moved to cause a loose inoperative spring configuration for threading or unthreading of the idler relative to a spindle. Thereafter the shortened or lengthened idler is easily moved into position over the natural tendency of the spring to resist extension.

Among the objects and advantages of this invention are to provide simple and inexpensive means to vary the catenary curve of spring idlers; to provide means by which heavy gauge, tightly coiled spring idlers may be positioned between spaced pivot points; and to provide means by which the effective length of spring idlers may be varied.

Other objects and advantages will become readily ap-

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parent to those skilled in the art from the following description with reference to the appended exemplary drawings. In these drawings:

FIG. 1 is an apparatus according to my invention in loose idler configuration;

FIG. 2 is the apparatus of FIG. 1 in a short or tightened idler configuration;

FIG. 3 is an enlarged detail of the portion of the apparatus of FIG. 1;

FIG. 4 is an alternative arrangement for installing idlers under tension in the apparatus of FIG. 1;

FIG. 4A is a top sectional view of the apparatus of FIG. 4 as it would be when the idler has been installed;

FIG. 5 is another alternative arrangement by which the idlers may be installed under tension;

FIG. 6 is a fragmentary view of another alternative arrangement;

FIG. 7 is an additional alternative arrangement within our inventive concept by which a spring idler may be installed;

FIG. 7A is a section through a portion of the apparatus of FIG. 7; and

FIG. 7B is an enlarged detail of a portion of the apparatus of FIG. 7.

Before describing the drawings in detail, we wish it understood that they are merely exemplary of one mode of practicing the invention and do not desire to be limited thereby, but rather by the scope of the hereafter appended claim.

In the apparatus illustrated in FIG. 1, a spring idler 1 is supported at each end on elongated externally threaded spindles 2. Each spindle is slightly oversize with reference to the internal diameter of the spring idler and has a roughened surface configuration to aid in retention of the spring thereon and prevent slippage. Each spindle is journaled in a bearing assembly 3. Each bearing assembly 3 is pivotally mounted by means of integral extensions 4 on upright members 5 and 5' in position to permit the spring to hang in substantially a catenary curve. The upright members 5 and 5' are pivotally mounted at opposite ends of a horizontal base member 6. Since both of the members 5 and 5' are identical, for the purposes of explanation only 5' will be discussed. The bottom or base portion of the upright member 5' is arcuate, bifurcated or notched at spaced points, and designed to be positioned within the upright brace 10 which is fixedly secured to the base member 6. The brace member 10 has elongated slot 11 therein. Passing through the lower portion of the brace member 10 is a pin or rod member 12. The upright member 5' has a pin 13 in registering association with the elongated slot 11. Thus, for a given position, it is possible to raise the member 5' and the pin 13 will slide up in the elongated slot 11; and to then position the upright 5' and lock it in another position, the pin 13 moves downward in the elongated slot 11 and the bifurcated bottom will lock over pin 12.

In FIG. 1 the spring coil is in a relatively loose configuration, thus forming a deep catenary curve. In the arrangement of FIG. 2, the catenary curve is much shallower and the spring is in a tighter configuration. This tighter configuration is achieved by threading the spindle into the coils of the spring. However, as was pointed out above, when dealing with tightly coiled springs, there is a considerable amount of pressure necessary to position such a short or tight spring in position. However, with the apparatus shown in FIGS. 1 and 2, by lifting the upright member 5' through its associated pin and elongated slot in the brace member 10, it is possible, by use of a lever means 15 such as that shown in dotted lines in FIG. 3 to forcefully stretch the spring and then secure the member 5' into locked relation with the pin 12

of the member 10 and elongated slot 11. If it is desired to thereafter change the catenary configuration, by again using such as the lever 15, it is possible to lift upright member 5' out of its locked configuration and move it inward as is generally shown in dotted lines in FIG. 3.

In a similar manner, installation of a new spring is accomplished by threading one end of the new spring within the spindle associated with upright member 5 and thereafter threadedly engaging with the other spindle and moving it into association with member 5' as described above. FIG. 3 is an enlarged detail of the arcuate notched bottom of the member 5' and its association with the elongated slot and pin of the brace member 10.

FIGS. 4 and 4a are illustrative of an alternative arrangement of auxiliary parts by which the above described stretching and loosening of the spring idler may be accomplished. The upright member is in the form of a channel and is designated 5A in FIG. 4. The idler assembly through its integral extensions 4 is associated with a second smaller channel 20 which is pivotally secured as by pivot pin 21 to the lower portion of the member 5A. At the upper portion of the smaller channel, there is a slot 22 which is designed to receive and hold the extensions 4 of the spindle 3. Spaced below the slot 22 is an opening 25 designed for registering relation with a similar opening 25a in the larger upright channel 5A. At the upper portion of the inner channel 20, near its top, is a hook 26. In operation, after the spring idler has been threaded on the spindle 3 and the spindle mounted in the slot 22, the hook 26 is associated with means to exert force thereon, such as a truck or the like, the openings 25 and 25a in the respective channels are brought into registering relation and a lock pin 28 (see FIG. 4A) is passed therethrough, thus locking the spring idler in operative working position. A cotter pin 28A may be used to hold the pin 28 in place.

FIG. 5 is an alternative arrangement by which, after the desired threading of a spring idler on the spindle has been accomplished, it is possible to stretch the spring idler into position. Essentially, the apparatus is comprised of a pair of upright members 30, each having an enlarged section 31 at the top thereof. Each top section has a slot 32 arranged for receiving the extensions 4 of the spindles 3. A base member 29 is secured across the bottom of the members 30 to hold them in the desired spaced arrangement. One of the upright members 30 carries auxiliary apparatus which is capable of exerting the necessary leverage to stretch the spring idler into position. The auxiliary equipment is comprised essentially of a member 36 fixedly secured as by welds 36A to the side of the upright member. Pivotally secured thereto is a lever 37 which extends a considerable distance above that connection. A short distance above the member 36 is a second member 39 also pivotally secured at 36B to the lever 37. The forward extension 39A of this second member 39 is bifurcated and adapted to be positioned over the spindle 3 between the end of the coil spring and the spindle 3. Thus, after a spring has been lengthened or shortened to its desired length, the bifurcated portion 39A is placed over the bearing housing and the lever rotated to stretch the spring and drop the extensions 4 into the slots 32 in the member 31.

FIG. 6 is additional auxiliary means by which the spring idler is positioned or adjusted between the spaced points of connection to the upright members, such as members 5 and 5' of FIG. 1. In such an arrangement, the upright members 5 or 5' are of a channel design and of considerable depth. Passing across the channel and through the spindle is the member 60 which is not integral with the spindle 3. A set screw 61 passes through the spindle housing and into association with the member 60. Thus, if after tensioning and positioning the spring idler is not satisfactorily normal to a conveyor belt, the set screw is loosened and the bearing housing moved back and forth on the member 60 until the desired normal

configuration is found. After such positionment, the set screw is again tightened.

In the alternative arrangement shown in FIG. 7, the supporting structure 39 is generally of an inverted U-configuration and has substantially vertical leg portions 41 and 42 connected by an arcuate portion 40. FIG. 7A is illustrative of the tubular construction of the structure 39 and its relation to the brace 44. The tubular structure 39 has a pair of braces 43 and 44 associated with the legs 41 and 42, respectively. The brace 43 is fixedly secured to the leg 41 by means, such as welds 43A. The other brace 44 is slidable on the arcuate portion 40 of the structure 39 but is lockable in position on the leg 42 by passing a pin 45 (see FIGS. 7A and 7B) through the opening 46 in association with the complementary opening 47 of the leg portion 42. The brace 44, in an unlocked position, is indicated in dashed lines by reference character 50.

Each of the braces 43 and 44 has an opening 51 for receiving a pivot pin associated with a spindle, such as the spindles 3 shown in FIGS. 1 and 2, except the pivot pin is not integral but rather is similar to pin 60 as shown in FIG. 6.

In operation, one spindle is mounted on the brace 43. The other spindle is mounted on the brace 44 when that brace is positioned on the arcuate portion 40 of the structure 39 as is generally indicated by reference character 50. Thereafter, pressure is exerted on the brace 44 to move it to the position shown in solid lines and the pin 45 is passed through the complementary brace and structure openings 46 and 47, respectively.

In operation upright members such as upright members 5 and 5' are associated with a suitable supporting base structure. A spring idler having associated extensions 4 or 60 is positioned in one of the upright members. The spring idler is then threaded to the desired configuration on either or both of the elongated externally threaded oversize spindle portions. Thereafter, by the various leverage means, tension is applied to the idler and the extensions are positioned in place on the second upright member.

Having thus described our invention, what we desire to protect by Letters Patent is set forth in the following claim.

We claim:

A belt conveyor idler assembly comprising, in combination, an inverted U-shaped idler support means and a pair of support braces slidable on the spaced apart legs of said support means, each support brace arranged to releasably and pivotally support a rotatable spring idler spindle, at least one of said support braces being telescoped over and slidable a substantial distance along said U-shaped member from a lower upright belt operation position to an upper position closer to the other support means in a slack idler position whereby an idler may be assembled or disassembled with said assembly, and means for locking said movable support means in belt operative position.

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