Aug. 18, 1959 R. L. SHARPS 2,900,070

TENSIONING APPARATUS FOR ROPE SIDEFRAME CONVEYORS

Filed Jan. 23, 1958 2 Sheets-Sheet 1

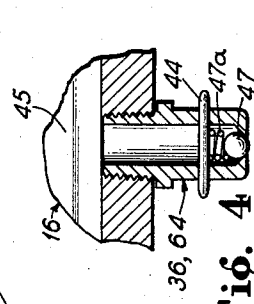


Fig. 4

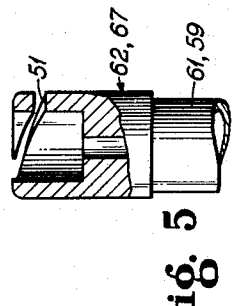


Fig. 5

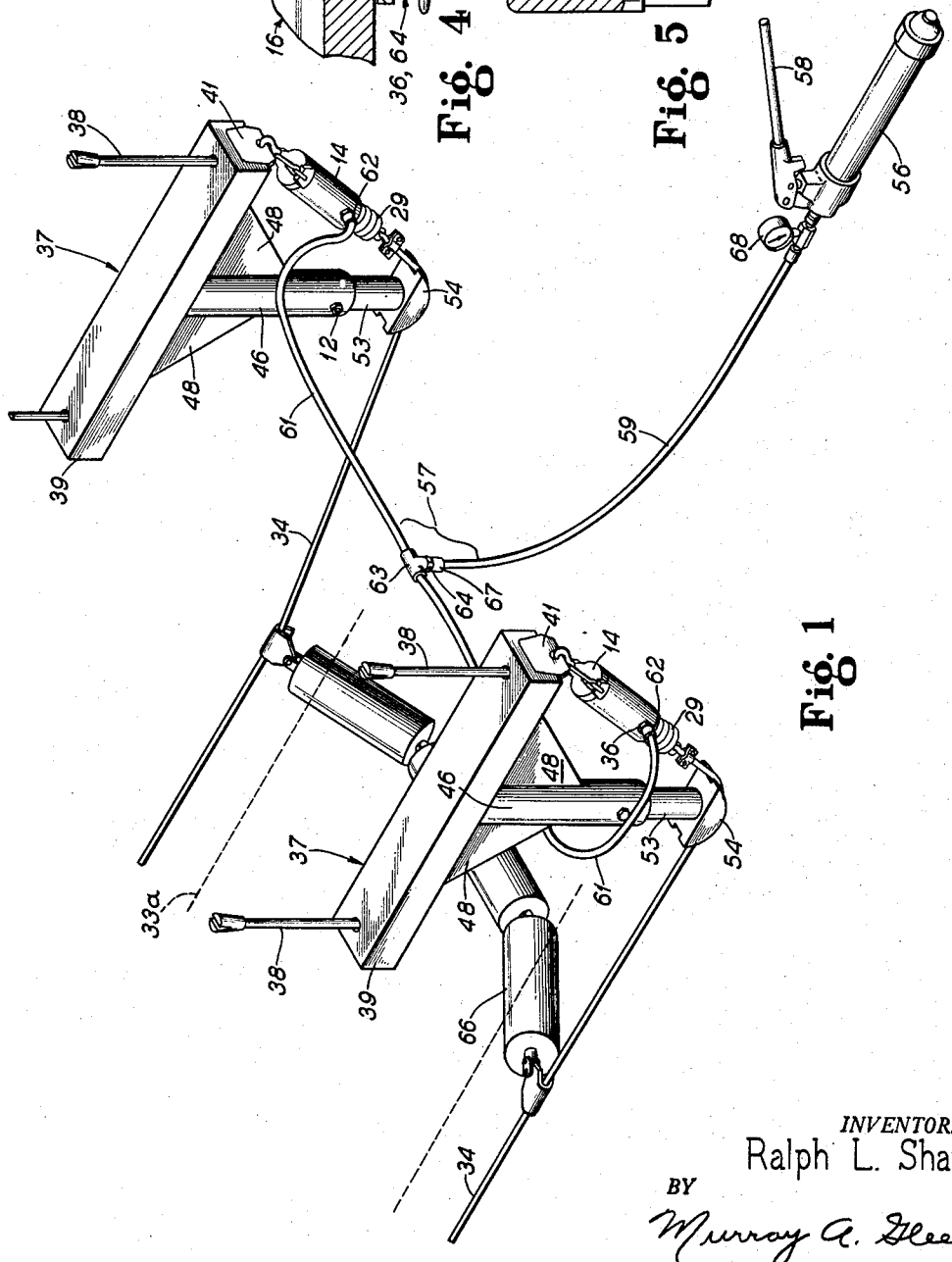


Fig. 1

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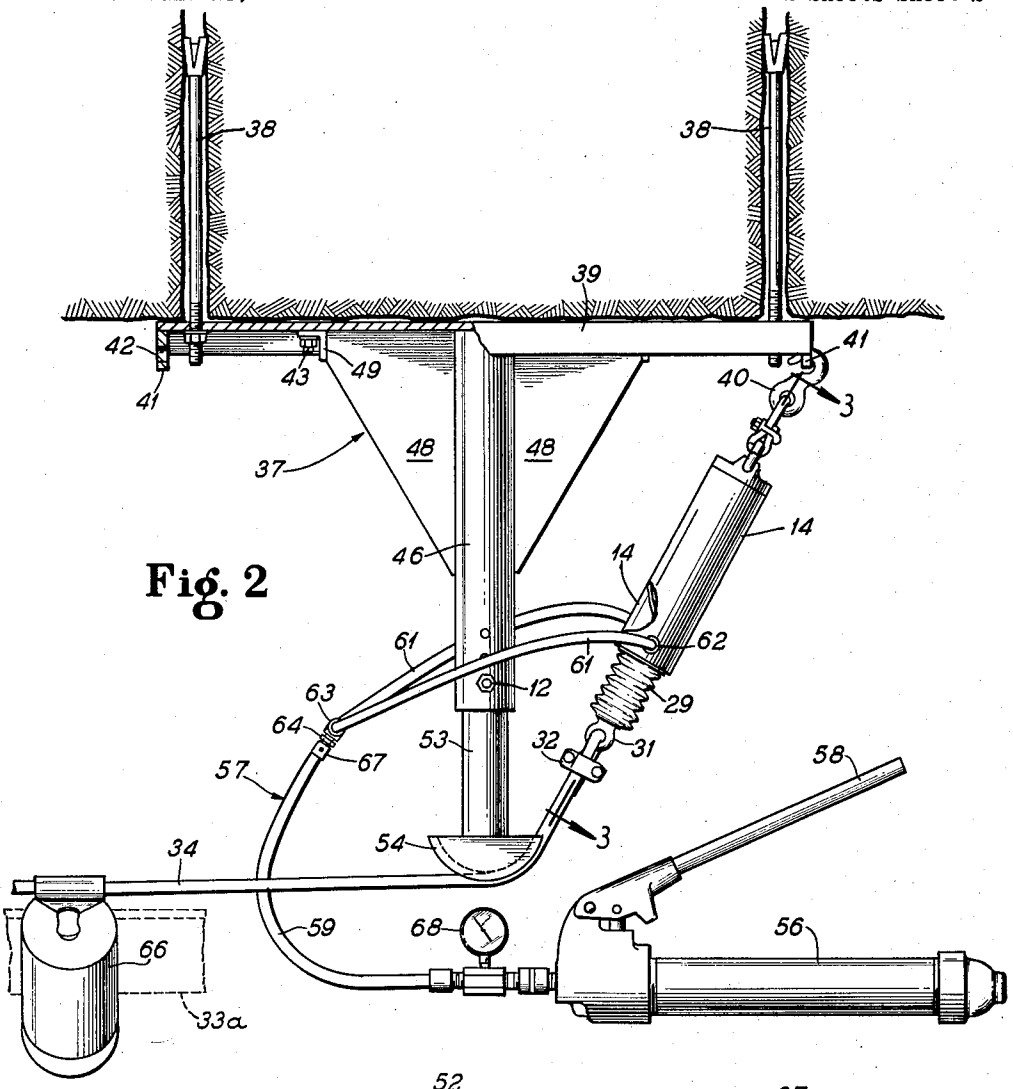


Fig. 2

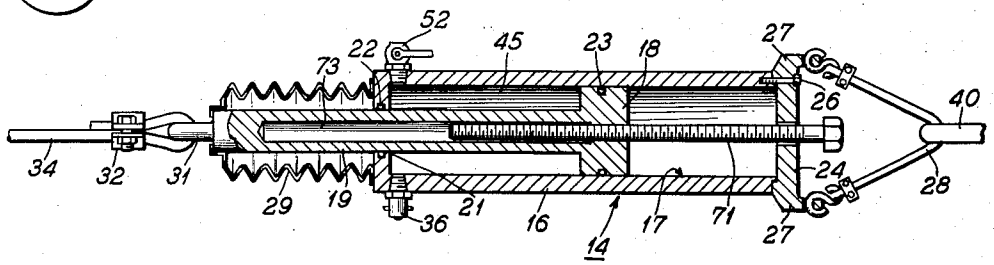


Fig. 3

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TENSIONING APPARATUS FOR ROPE SIDEFRAME CONVEYORS

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Application January 23, 1958, Serial No. 710,647

8 Claims. (Cl. 198—208)

This invention relates generally to rope sideframe conveyors and particularly to improvements in controlling the tension in the rope sideframes themselves.

One example of a rope sideframe conveyor is shown in Craggs and McCann patent application Serial No. 521,095, filed July 11, 1955, now U.S. Patent No. 2,842,257, issued July 8, 1958, where pairs of wire ropes are trained along a course and they support the load-carrying reach of an orbitally movable conveyor belt. The ropes are tensioned by means of turnbuckles. In practice, these turnbuckles are time-consuming to use, the torques required to tension the ropes properly can be applied to them only with difficulty, and they do not afford any means of indicating tension in the ropes.

Accordingly, it is an object of the present invention to provide apparatus for tensioning the ropes which is better than that conventionally employed, which is easy and quick to use, and which provides an immediate and accurate indication of rope tension.

In rope sideframe conveyors, if the rope on one side is too tight and the other is too loose, trouble may be encountered in training the belt; it is therefore another object of the present invention to provide apparatus for precisely tensioning both ropes to exactly the same degree.

Other objects and advantages will be apparent from the following description taken in connection with the drawings in which:

Figure 1 is an anchor station, at the end of a pair of wire ropes used to support the load-carrying reach of a belt conveyor, illustrating a preferred embodiment of the present invention;

Figure 2 is a side view of Figure 1;

Figure 3 is an enlarged cross-sectional view of Figure 2 taken along the line 3—3;

Figure 4 is an enlarged cross-sectional view of a portion of Figure 3; and

Figure 5 is one form of coupling which may be employed with the fitting shown in Figure 4.

Like parts are referred to by like reference characters throughout the figures of the drawings.

Referring now more particularly to the embodiment shown in the drawings, a pair of ground-supported anchors 37, 37 is shown mounted in the ground at the roof of a mine. These anchors 37 and their use, are described in the above-mentioned U.S. Patent No. 2,842,257. Briefly, each anchor comprises a base or liner 39 fixed into the ground by conventional mine roof bolts 38. The lower section of each anchor is removable from the base and comprises a telescopically assembled pair of tubes 46 and 53, held together by a bolt 12. A triangular reinforcing web 48, terminating in a short, transverse angle member 49 is welded along each side of the larger tube 46, the entire lower section being secured to the base by bolts 43. At the lower end of the adjustable tube 53 is a curved shoe 54 about which a corresponding flexible strand means such as a wire rope 34 is trained.

A troughing idler assembly 66 is shown, mounted across

the wire ropes 34, 34, for supporting a load-carrying reach 33*a* (shown in broken lines) of an orbitally movable belt.

The present invention is concerned with tensioning the ropes 34, 34 by means of extensible-retractable hydraulic cylinders generally designated 14, 14. Each cylinder 14 comprises a body 16, with a bore 17, within which is fitted a piston 18 having a piston rod 19 extending through an end opening 21. Both the opening 21 and the piston 18 are sealed by sealing grooves and O rings indicated 22 and 23 respectively.

The head end of the body 16 is closed by a cover 24 held in place by bolts 26. A pair of ears 27, 27 is provided and they are disposed on opposite sides of the cover 24 and are connected by a rope sling 28 and a hook 40 to an opening 42 in a transverse channel member 41 which forms a portion of the base 39.

A bellows 29, made of grease resistant rubber-like material such as "neoprene," is carried between the outer end of the piston rod and the cylinder body so as to protect the external portion of the piston rod from rough usage. An eye 31 is formed at the end of the piston rod and the end of a corresponding rope 34 is looped through it, being held by a "crosby" clamp 32.

A pin type grease fitting 36 is provided at the lower end of the body 16 for admitting fluid such as grease to a chamber 45 beneath the piston. The fitting 36 contains a ball check valve 47 seated in an outward direction by spring 47*a* which is backed by a through-pin 44. The ball check valve functions to retain the fluid in the chamber 45 and is adapted to receive fluid through a bayonet type nozzle such as indicated by 62 in Figure 5 and which can be secured in place by feeding the ends of the pin 44 in slots 51.

Thus it will be seen that fluid under pressure admitted to the chamber 45 contracts the cylinder 14 causing it to apply tension on the corresponding rope 34 to an extent determined by the pressure.

To relieve the pressure from the chamber 45 so the cylinder can be extended, the grease fitting 36 may simply be removed. Or, alternatively, a valve 52 may be provided which can be opened by its operating handle.

One convenient and usually available device for applying pressure to the cylinder is a grease pump 56 which feeds a pressure line, generally designated 57, upon operation of the handle 58.

In the embodiment illustrated, the pressure line is bifurcated, having an inlet section 59 and two outlet sections 61, 61 which may be identical. The outlet sections have bayonet type sockets 62 which are of the type illustrated in Figure 5 for coupling with the fittings 36. The sections 61, 61 are interconnected by means of a T 63 having an input fitting 64 the same as that shown in Figure 4 and the end of the inlet line section 59 is fitted with a bayonet socket nozzle 67 which is the same as that shown in Figure 5. The pressure line 57 communicates with a pressure gauge 68 mounted on the output side of the pump 56 so that readings corresponding to tension in the rope can be made progressively during the tightening operation which can be stopped when the exact degree of tension is reached.

The bifurcated pressure line enables an operator to tighten both ropes simultaneously, to exactly the same tension. Alternatively, only one rope can be tensioned, by disassembling the pressure line at 64—67 and coupling the nozzle 67 onto one of the cylinder fittings 36.

The operation for assembling a pair of wire ropes 34 about a corresponding pair of anchors 37 will now be described. First, the ropes will be pulled as taut as possible by hand and will then be pulled up to somewhere near the tension desired by means of a "come-along,"

sometimes called a coffing hoist which is hooked into the opening 42 on the anchor 41 and which engages the rope a few feet from the end. The cylinder 14 is then hung from the end of the anchor as shown and the end of the rope made fast in the piston rod eye 31 and the crosby clamp 32 is snugged up.

Both pressure line sections 61, 61 are coupled to the grease fittings 36 whereupon the pump handle 58 is pumped up and down until the pressure indicated on the gauge 68 corresponds to the tension desired in both ropes. The pressure line can then be removed and used elsewhere.

Locking means is provided to hold the rope tension against the possibility of leakage from the cylinder 14 on long-time standing. This is accomplished simply by turning down on a safety bolt 71 (which is threaded into the piston 18 and which runs back and forth in a bore 73) until the bolt head is on, or close to, the cover 24. In case of leakage, the entire rope tension may be held by the safety bolt and subsequent loosening of the ropes by extending the cylinder may best be preceded by pumping grease into the cylinder sufficient to jack the bolt head off the cover after which it can be readily turned out.

While one form in which the present invention may be embodied has been shown and described it will be understood that various modifications and variations thereof may be effected without departing from the spirit and scope of the invention as defined by the appended claims. While the terms "rope" and "wire rope" have been used herein, both in the description and in the claims, it will be obvious that other equivalent flexible strands such as chains may be employed within the scope of the invention.

I claim as my invention:

1. In a flexible sideframe conveyor having a pair of flexible strand means trained along a course, anchor means for supporting each of the strand means along the course, tensioning means for simultaneously substantially equally tensioning the strand means, said tensioning means including an extensible-retractable hydraulic cylinder connected to and interposed between each of the strand means and the respective anchor means, each of said cylinders having an inlet port for admitting grease under pressure to extend the cylinder and tension the corresponding strand means, an outlet port for expelling grease to enable the cylinder to retract and release tension from the corresponding strand means and means for selectively closing off the outlet port to maintain pressure within the cylinder, a grease pump, a bifurcated pressure line coupled between the grease pump and each of the inlet ports for pressurizing each of the cylinders, a pressure gauge communicating with said pressure line to indicate the tension in the strand means, and means for locking each of the cylinders against movement in case of leakage of the grease therefrom.

2. The structure as set forth in claim 1, wherein each of the inlet ports includes a grease fitting having a check valve for retaining grease under pressure within the corresponding cylinder and said bifurcated pressure line comprises an inlet section and a pair of outlet sections with quick-disconnect couplings between each outlet section and a corresponding one of said grease fittings whereby the grease pump and pressure line may readily be employed to tension different pairs of strand means.

3. The structure as set forth in claim 2, together with a quick-disconnect coupling between each of said pressure line outlet sections and the inlet section with the inlet section being coupleable directly to either of said cylinder grease fittings for selectively pressurizing either cylinder.

4. In a flexible sideframe conveyor having a pair of flexible strand means trained along a given course, anchoring means for supporting said strand means, tensioning means for simultaneously substantially equally tensioning the supported strand means, said tensioning means including an extensible-retractable hydraulic cylinder connected to and interposed between each of the strand means and the anchor means, each of said cylinders having an inlet port, a check valve in said inlet port to retain pressure fluid within the cylinder, an outlet port and means for selectively opening and closing the outlet port to control the expulsion of fluid from the cylinder, a source of fluid under pressure, a pressure line connecting said source of fluid and each of said inlet ports to pressurize said cylinders and tension the strand means in accordance with pressure in the pressure line, and means in communication with the pressure line for indicating the tension in each of the strand means.

5. In a flexible sideframe conveyor having a pair of flexible strand means trained along a course, anchor means for supporting each of the strand means along the course, tensioning means for simultaneously substantially equally tensioning the strand means, said tensioning means including a hydraulic cylinder connected to and interposed between each of the strand means and the respective anchor means, each of said cylinders having an inlet port for admitting fluid under pressure into the cylinder to tension the corresponding strand means, a check valve in the inlet port to retain fluid under pressure within the cylinder, an outlet port for expelling fluid from the cylinder to release tension on the corresponding strand means and means for selectively closing the outlet port to maintain pressure within the cylinder, a source of fluid under pressure, and a bifurcated pressure line coupled between the source of fluid and each of the inlet ports for simultaneously pressurizing each of the cylinders to tension the corresponding strand means.

6. The structure as set forth in claim 5 together with a pressure gauge means in communication with the pressure line to indicate the tension in the strand means.

7. The structure as set forth in claim 5 together with means for locking each of the cylinders against slippage in event of leakage of the fluid therefrom.

8. The structure as set forth in claim 5 together with pressure gauge means in communication with the pressure line to indicate the tension in the strand means and means for independently locking each of the cylinders against slippage in event of leakage of the fluid therefrom.

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