July 3, 1934. F. H. LAMB ET AL 1,965,244

SELF LAYING TRACK FOR TRACTORS

Filed March 28, 1932 3 Sheets-Sheet 1

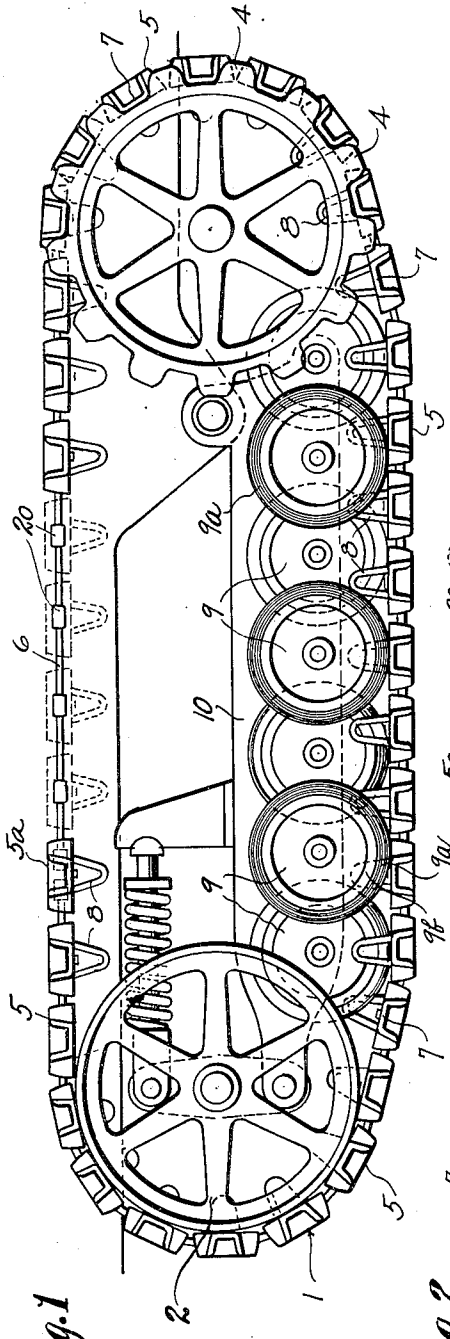


Fig. 1

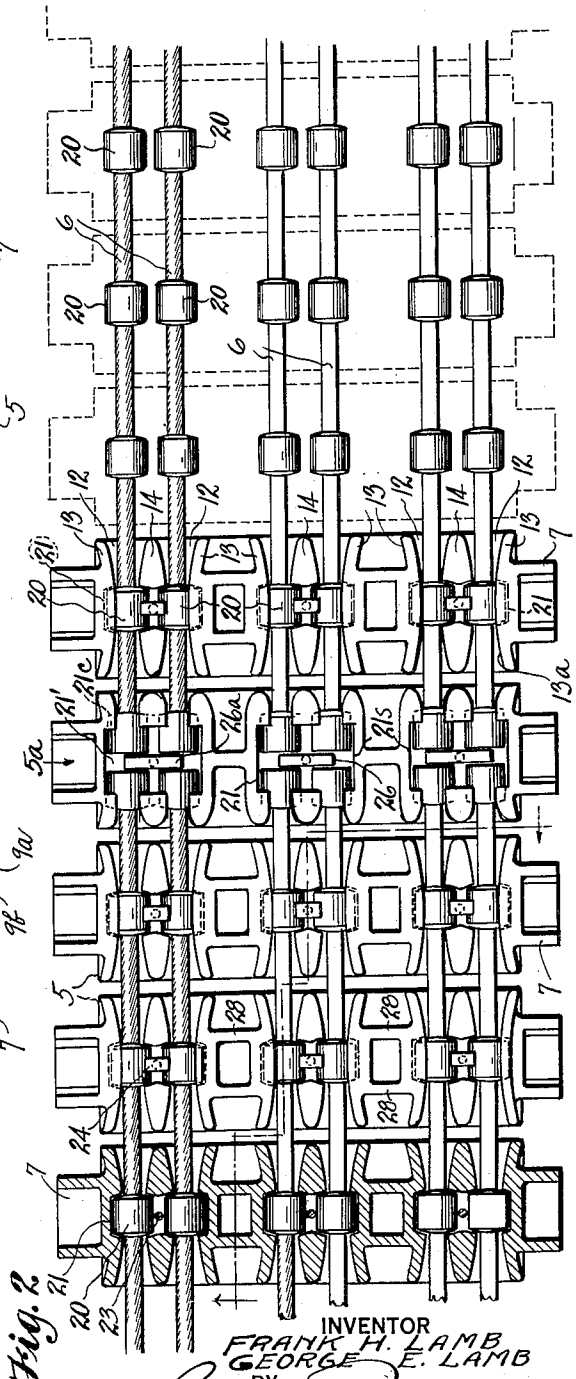


Fig. 2

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Filed March 28, 1932 3 Sheets-Sheet 2

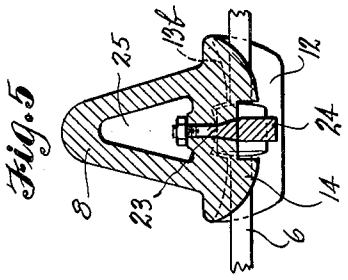


Fig. 5

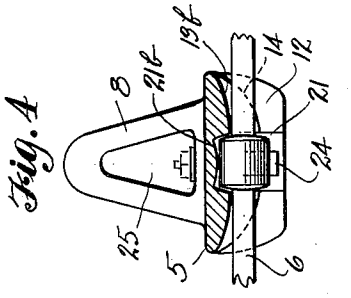


Fig. 4

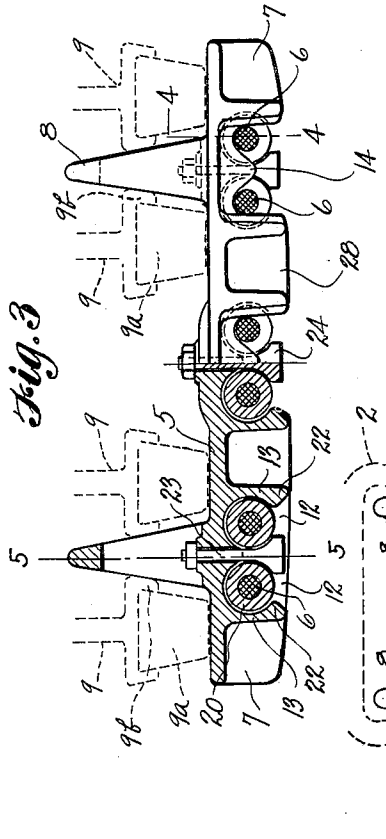


Fig. 3



Fig. 7

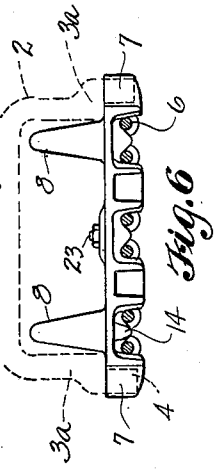


Fig. 6

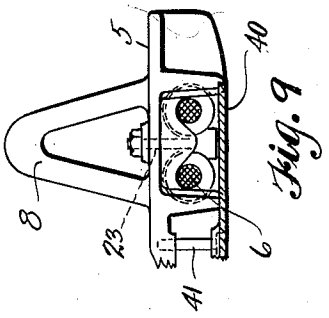


Fig. 9

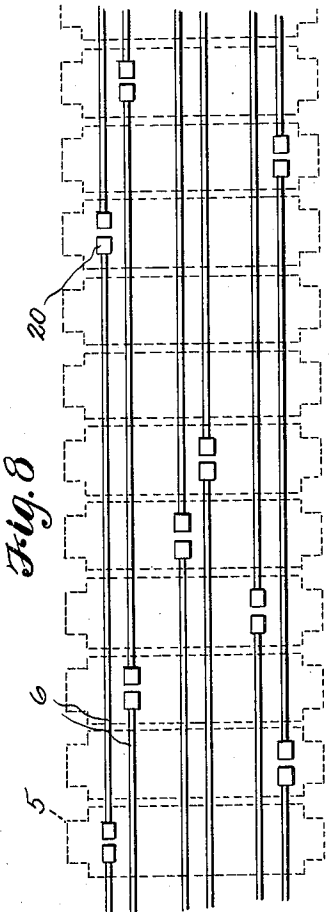


Fig. 8

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SELF LAYING TRACK FOR TRACTORS

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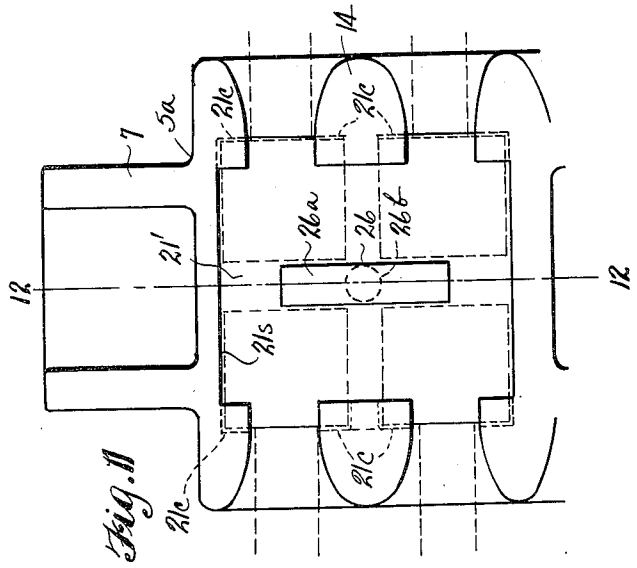


Fig. 11

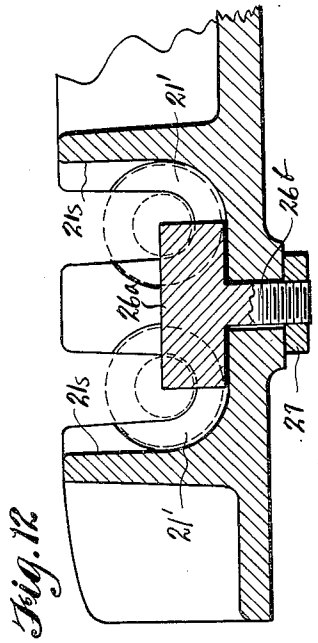


Fig. 12

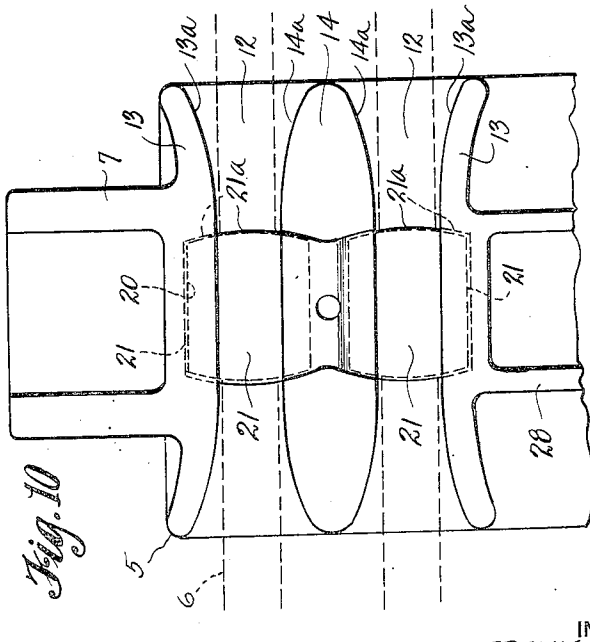


Fig. 10

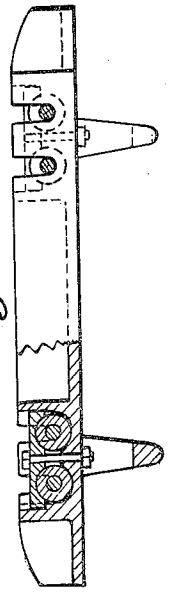


Fig. 13

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UNITED STATES PATENT OFFICE

1,965,244

SELF LAYING TRACK FOR TRACTORS

Frank H. Lamb and George E. Lamb, Hoquiam, Wash.

Application March 28, 1932, Serial No. 601,696

7 Claims. (Cl. 305—10)

This invention relates to tractors of the track laying type, and it has reference in particular to a flexible, self-laying track construction for tractors, trailers and the like.

The principal objects of this invention reside in the construction of a track for tractors, trailers, trucks and other vehicles, comprising a continuous belt made up of closely disposed, one piece, reversible track shoes functionally joined together by a plurality of wire strand ropes, or cables, which extend lengthwise of the track and transversely of the shoes, each of said shoes being formed with transversely directed, cable channels in its outer face and with sockets co-axial of the channels and the cables being provided, at definite intervals therealong, with ferrules for pivotally seating in the shoe sockets, thereby to definitely space the shoes as well as to secure them functionally in place with respect to each other and against slippage on the cables.

Other objects of the invention reside in the details of construction of the shoe, especially with respect to the formation of the cable channels and sockets, to avoid wear on the cables and in the details of and method of securing the ferrules on the cables so that when the shoes are assembled therewith, the latter will have maximum freedom of movement without wear on the cables, but will be held positively against slippage longitudinally of the cables.

Another object is to provide a track requiring minimum means for retaining shoes and cables functionally assembled, and wherein centrifugal force in the moving track will operate to more securely anchor the shoes to the cables.

Other objects of the invention reside in the details of construction of the various parts, in their combination and in their mode of use as will hereinafter be more fully described.

In accomplishing these objects of the invention, we have provided the improved details of construction, the preferred forms of which are illustrated in the accompanying drawings, wherein—

Fig. 1 is a side elevation of a part of a tractor having a track constructed in accordance with the present invention.

Fig. 2 is an outer plan view, enlarged for better illustration of a part of the track showing the special shoe in which the cable ends are anchored.

Fig. 3 is an enlarged, longitudinal edge view of one of the shoes, partly in section.

Fig. 4 is a cross section on line 4—4 in Fig. 3.

Fig. 5 is a cross section on line 5—5 in Fig. 3.

Fig. 6 is a side view of one of the shoes, and showing in dotted lines, the rim portion of a driving wheel about which the belt travels.

Fig. 7 is an enlarged, sectional view of a portion of track cable.

Fig. 8 illustrates use of short cable lengths in a track in lieu of the continuous cables.

Fig. 9 is a sectional detail showing use of a cover plate on a shoe to protect the cables from road abrasion.

Fig. 10 is an enlarged face view of a part of one shoe.

Fig. 11 is a similar view of a part of an anchor shoe.

Fig. 12 is a sectional view on line 12—12 in Fig. 11.

Fig. 13 is a side view of a shoe embodying an alternative means for retaining the cable ferrules seated.

Track belts of the present type, as used on tractors, trucks, trailers and the like, are usually mounted by a track frame which carries spaced wheels so arranged that the lower run of the belt between the wheels has tractional and supporting contact with the ground. In the event that there is considerable distance between the belt mounting wheels, then guides, idler wheels or other means is provided for holding the track properly in place against lateral displacement. If the track is driven, as in the case of its use with a tractor, power is generally applied thereto through one of the mounting wheels. It is to be understood, however, that it is the intention that the present application shall apply principally to the track construction, irrespective of the type of vehicle it is used on or the manner in which it is mounted or driven.

Referring more in detail to the drawings—

In Fig. 1 there is shown a partial side elevation of a tractor equipped with a self laying track embodied by the present invention. The track, designated in its entirety by reference numeral 1, when assembled functionally on the track frame, is of continuous belt form and is extended about spaced mounting wheels 2 and 3 which have rim portions of channel form, as at 3*a*—3*a* in Fig. 6. In this instance the wheel 2 has sprocket teeth 4 adapted to cooperate with lugs provided on the ends of the track shoes, as presently described in detail, to positively drive the track belt when the wheel 2 is driven.

The track belt is made up of transversely disposed traction shoes 5 all of the same size and all of the same construction with the exception of the shoes within which the cable ends are anchored, as presently described, and when as-

sembled on the cables, the shoes are slightly spaced so as to avoid any interference one with the other incident to travel of the track and to give additional traction to the belt. The shoes are functionally secured together in continuous belt like relation by a plurality of wire strand ropes or cables 6 which extend preferably in parallel relation lengthwise of the track and in symmetrical relation relative to the central line of the belt.

Each shoe of the track consists of a one piece casting of rectangular form, provided at its opposite ends with the symmetrically disposed sprocket lugs 7 adapted to engage between the sprocket teeth 4 of wheel 2 to drive the belt. On the inner face of each shoe, near its ends, and at the center if desired, tapered lugs 8 are formed and these are so located as to co-act with alined idler wheels 9 which are mounted within the track frame structure 10, thus to retain the lower rim of the belt in tractional contact with the ground surface and to prevent any lateral displacement of the track from the frame. In some instances it may be desired to use these lugs as the driving means for the belt by arranging for them to engage with sockets in the driven wheel. When so used, the special lugs 7 might be eliminated.

The idler wheels 9 as track guiding means, are arranged in two or more parallel rows and with the wheels in one row overlapping those of another. The lugs 8 pass between these two rows of idlers and at all times are in contact with a wheel of one of the other row so that no lateral displacement of the track is possible. Also, it is preferred that the idler wheels have rubber tired treads, as at 9*a* which will engage flatly with the inner surfaces of the shoes outside and between the lugs 8. Also, the rims 9*b* of these wheels, as seen in dotted lines in Fig. 3, which mount the rubber tires, shall project beyond the side surfaces of the tire to engage with the guide lugs 8, thereby to protect the tire against abrasion incident to rubbing contact with the lugs.

In the preferred arrangement, the several cables or ropes 6 which join the shoes together are arranged in pairs. In the present instance three pairs are shown and they are symmetrically disposed with respect to the central longitudinal line of the belt. It is to be understood, however, that the number of cables employed is optional, as this would depend to a great extent upon the width of track, its use or requirements and also upon the strength of the particular cables employed. In some instances it may be preferred to employ but one cable, or one pair. In other instances it may be desirable and practical to use two or more pairs.

When three pairs of cables are used, as in the present instance, each of the track shoes is provided on its outer, or what may be termed the traction face, near its opposite ends and also medially thereof, with spaced, transversely extended cable guide channels 12 within which the cables 6 are individually disposed. These channels are in pairs and each pair is formed by spaced apart flanges 13—13 cast integral with the shoe plate and transversely thereof and between each pair of flanges a rib 14, also integral with the shoe plate, is located so as to divide the space between the flanges into two channels of equal dimensions. The inner faces 13*a* of the flanges 13—13 and also the opposite side faces 14*a* of the rib 14 are arcuately curved, as seen best in Fig. 2, so that the paired channels gradually widen out in opposite directions from the medial line of the shoe. Also, the bottom surface 13*b* of each channel is arcuately curved downwardly from the medial line in opposite directions; so that the cables will have a desired freedom of movement without any direct contact with the shoes.

Each cable is provided, at equally spaced interval with ferruled enlargements 20. These enlargements are designed to seat pivotally within sockets 21 provided therefor in the shoes; the sockets being located in the medial line of the shoe and symmetrically within the channels. The ferrules, which fit loosely in the sockets, are of cylindrical form with opposite end surfaces spherically rounded outwardly and the sockets are shaped accordingly and retain the ferrules in a sort of ball and socket manner which permits of a very desirable flexibility in the track construction without possibility of slippage of any shoe on the cables. Also, the form and relationship of the sockets to the channels is such that the ferrules, when seated in the sockets are self centering and support the cables free of the side and bottom surfaces of the shoe channels and thus wear on the shoes, as well as on the cables, is eliminated from this cause.

The ferrules are of such diameter as to provide sufficient end surface that any unusual wear thereon, or on the ends of the sockets, is avoided. Also, it will be observed by reference to Fig. 10 that the end surfaces 21*a* of the sockets 21 are spherically curved to permit of the desired pivotal movement of the ends of the ferrules, and also the bottom surface, as at 21*b* in Fig. 4, is accurately curved so that the cylindrical ferrule may rock lengthwise thereon.

It is apparent also that by the provision of the arcuately curved surfaces of the channels in which the cables are contained, and the ball and socket action of the ferrules in their sockets, there will be a certain freedom of movement of the cable that will permit flexing laterally or inwardly relative to the shoes without possibility of kinking or bending as would be the result should the ferrules be rigidly held and the cables bent or flexed laterally across a sharp corner. The present design permits the cables to be flexed evenly and without any abruptness and to rest against the rounded base surfaces of the guide channels as the shoes pass about the supporting wheels. Also, when the track is passing across the ground run, should two adjacent shoes be displaced upwardly in ridge like relation, or in an inverted V relation, the character of the retaining channels and freedom of the ferruled portions permits the cables to bend evenly and without any damaging abruptness. Since the cable connections on the shoes are on the outside of the shoes, and the cables are on the outside of the shoes in the completed track, the normal action of the shoes, by reason of centrifugal force, is to hold the shoes all the more securely to the cables. Also under tension, as in use, the cables hold the ferrules all the more securely within their seats.

While freedom of movement of the shoes relative to the cables is permitted, by reason of the special design of flanges and ferrules, this movement is limited to motion at right angles to the longitudinal axes of the shoe.

A novel feature of this track construction resides in the outward or lateral offsetting of the ferrule sockets from the guide channels. This

detail provides for the automatic retention of the ferrules in their sockets so long as the cables are taut. This will be apparent from the cross sectional view of Fig. 3, which shows the overhanging flanges at 22 which retain the ferrules in their sockets It has been found by experiment that under ordinary working conditions, retaining or locking means is not actually required but it is desirable that some holding means, later described, be used as a safety factor to prevent any possibility of the ferrules becoming unseated by lateral pressure exerted against the cables. It is to be understood, however, that without the holding means in place, an easy detachment of the shoe from the cables is possible simply by slackening tension on the cables so that by bending them laterally toward each other, a slight distance, the ferrules may be unseated and the shoe dropped therefrom

The holding means here used consists of bolts 23, that are projected through the shoes between the paired ferrules. Each bolt at its outer end has a head 24 with side surfaces overlying and conforming in shape to the adjacent surfaces of the ferrules, and cooperating with the flanges 22 to retain the ferrules seated. The outer ends of the bolts extend into passages 25 in the lugs 8 and have retaining nuts applied thereto to hold them in place.

It is preferred in this form of track to secure the ferrules in place on the cables by pressure rolling. The ferrules, in the form of sleeves, are slipped onto the cables then they are properly spaced and rolled under great pressure so that they are mashed onto the cables; the final result being that the ferrules are practically integral with the cables. This method of attachment avoids placing any more holding strain on any one strand of the cable than on any other and pull on the cable may be applied through the ferrule to substantially the full strength of the cable.

The cables 6, preparatory to their use in one form of construction of the track, are cut in lengths corresponding to the circumference of the track. The ends of the cables are not joined but ferrules are applied thereto flush with the ends. One of the track shoes is designed especially as an anchor shoe to receive these end ferrules. Such a shoe is designated at 5*a* in Figs. 1 and 2. This particular shoe is practically the same in the arrangement of flanges and ribs as any of the other shoes, but the ferrule receiving sockets 21′ therein provided are of a length sufficient to accommodate the two cable end ferrules in end to end relation and with sufficient space between their ends for the insertion of a key or locking bolt 26. It will be noted also that while the side surfaces 21S of these particular sockets are practically straight up and down so as not to restrict the entrance to the sockets, the ends of the sockets are counter sunk as at 21C to receive the base ends of the ferrules which are held against displacement by insertion of the locking key or bolt 26. This bolt has a flattened head 26*a* adapted to fit between the ends of the ferrules and it has a shank 26*b* extended through the shoe and held in place by a nut 27 threaded thereonto.

Fig. 3 shows the end sections of the longitudinal ribs rounded or curved toward their ends so that considering the shoe from end to end, it is of rocker form when in contact with the ground surface and this has the special advantage that it provides for easier turning of the tractor incident to driving the track at one side at a speed different from that at the other side. These flanges give added strength to the shoe and, with the additional several flanges 13 and ribs 14, which prevent lateral slippage on grades, and give ample traction, so that additional grouser cleats are not required. Furthermore, the surface area of these flanges is quite sufficient and so distributed that they will not under ordinary travel cut into or damage a roadway or pavement on which they operate.

It is also observed that the inner faces of the shoes provide, between the lugs 8, flat bearing surfaces or considerable width for bearing against the tires of the idler wheels which may be of width corresponding thereto so as to reduce to a maximum degree the wear on these parts.

In Fig. 9, is illustrated in cross section an alternative construction illustrating means for the protection of the cables and ferrules against road abrasion should such means be desired. In this arrangement, a plate, or plates, 40, are secured to the flanges across the socketed channels and are held by anchor bolts 41. These plates are sufficiently spaced from the ferrules and cables so as not to interfere with their freedom of movement. This protection is useful and desirable where work is carried on in rocky surfaces, or where sharp objects and road abrasion are damaging to the cables.

In Fig. 13 we have shown an alternative means for retaining the ferrules seated in the shoe sockets. In this type of construction the sockets are not undercut but open directly outward. A clamp plate 30 overlies paired ferrules and this is fastened in place by a bolt 31 which extends downwardly through the plate and shoe as shown; the ferrules in this case being securely clamped in the sockets. Such clamp plates may be made, if desired, to extend clear across the shoe to take care of the ferrules of all cables.

The special advantages of the track construction herein set forth resides in the absence of pivot pins, bolts or the like for attaching the shoes, and the absence of friction between shoes. It also has the advantage in an easy and quick removal and replacement of any shoe without dismounting the track. Simply slacken the tension on the cables, remove the locking bolt and unseat the ferrules from the shoe sockets.

The present track for the most part is made of but two different kinds of parts, viz., the traction shoes and cables. The shoes are of novel form in that they are of one piece construction, complete with sockets, flanges, driving and guide lugs. The cables are complete with regularly spaced ferruled enlargements. The cables automatically space the shoes when applied thereto and retain them in place by reason of tension on the cables. Dismounting of the track is made possible by disconnection of the cable ends from the anchor shoe. Dismounting of any shoe is readily done by displacement of the ferrules for that shoe from the channel sockets.

Tracks of this character may be made for various purposes in various widths and lengths and any suitable number of cables employed without departing from the spirit of the invention which resides primarily in the method of and means of providing a positive yet flexible connection between adjacent shoes of the belt and between the shoes and cables.

While we have illustrated the various longitudinally extending cables as being provided with ferrules for seating in sockets of each shoe of the track, it is to be understood that such is

not always essential, and it is contemplated that the ferrules may be so arranged that successive shoes will have connection with some cables and be free of others, for example, in a track using four longitudinal cables, the outer two may be connected with a shoe and the other cables be free of a ferruled connection. Then for the next adjacent shoe the inner cables would be connected and the outer ones free. In a six cable track, a like arrangement could be employed with two or four cables attached to each shoe and two passing freely across it.

Having thus described our invention, what we claim as new therein and desire to secure by Letters-Patent is—

1. A track of the character described comprising a plurality of cables extending lengthwise of the track in parallel relation with ends joined to form a track of continuous belt form, ferrules with rounded ends secured at regular intervals to the cables, traction shoes applied to the cables transversely thereof having channels across their traction surfaces within which the cables are movably contained free of the channel walls and having sockets with rounded ends formed in the channeled portions pivotally containing the said ferrules.

2. A track of the character described comprising a plurality of cables extending lengthwise of the track in parallel relation with ends joined to form a track of continuous belt form, ferrules secured at regular intervals to the cables, traction shoes applied to the cables transversely thereof having channels across their traction surfaces within which the cables are movably contained and having sockets formed in the channeled portions pivotally containing the said ferrules; said channels being flared from the sockets toward their outer ends to permit lateral movement of the cables and said sockets having their base portions arcuately curved to permit rocking of the ferrules thereon.

3. A track of the character described comprising a plurality of longitudinally extending cables, ferrules fixed to the cables at regular intervals, traction shoes applied to the cables having channels across their traction faces containing the cables and having pairs of sockets coaxial of the channels removably containing the said ferrules; said pairs of sockets each having an intermediate entrance common to both sockets of a pair and through which the ferrules may be unseated by lateral displacement of the cables.

4. A track of the character described comprising a plurality of longitudinally extended cables in paired relation, ferrules fixed thereon at regular intervals in paired relation, track shoes assembled with the cables transversely thereof and having channels across their traction faces for containing the cables and having alined sockets removably containing the ferrules and means removably fixed in the shoes between paired ferrules to retain them in their respective sockets.

5. A track of the character described comprising longitudinally extending cables arranged in pairs and having ferrules fixed thereon at regular intervals in pairs, traction shoes applied to the cables transversely thereof and having channels across their traction faces for containing the cables and having pairs of sockets in the channeled portions removably containing the ferrules of paired cables; said sockets each having an entrance laterally offset from the line of the cables, a bolt removably fixed in the shoe between the ferrules of paired cables and having a head overlying the ferrules to retain them against displacement from their seats.

6. In a track of the character described, in combination, a plurality of flexible cables extending lengthwise of the track, cylindrical ferrules fixed on the cables at spaced intervals, track shoes having transverse channels opening to the sides and to one face thereof for movably containing the cables, and having sockets embodied in the channels to contain the said ferrules for the attachment of the shoe to the cable and for supporting the cable free of the channel walls; said ferrules having their ends curved spherically, and said sockets having end surfaces curved accordingly for pivotal movement of the ferrules thereon.

7. In combination, a plurality of parallel, longitudinally extending cables with ferruled enlargements fixed thereon at regular intervals and track shoes formed on their traction surfaces with outwardly opening, transverse channels containing the track cables therein and having outwardly opening sockets incorporated in the channels in the longitudinal, medial lines of the shoes for seating the ferruled enlargements on the cables; said cables having their side and bottom surfaces curved away from the medial lines of the channels to provide for lateral movement of the cables.

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