Nov. 11, 1947. A. S. KROTZ 2,430,573

CUSHIONED CONNECTION

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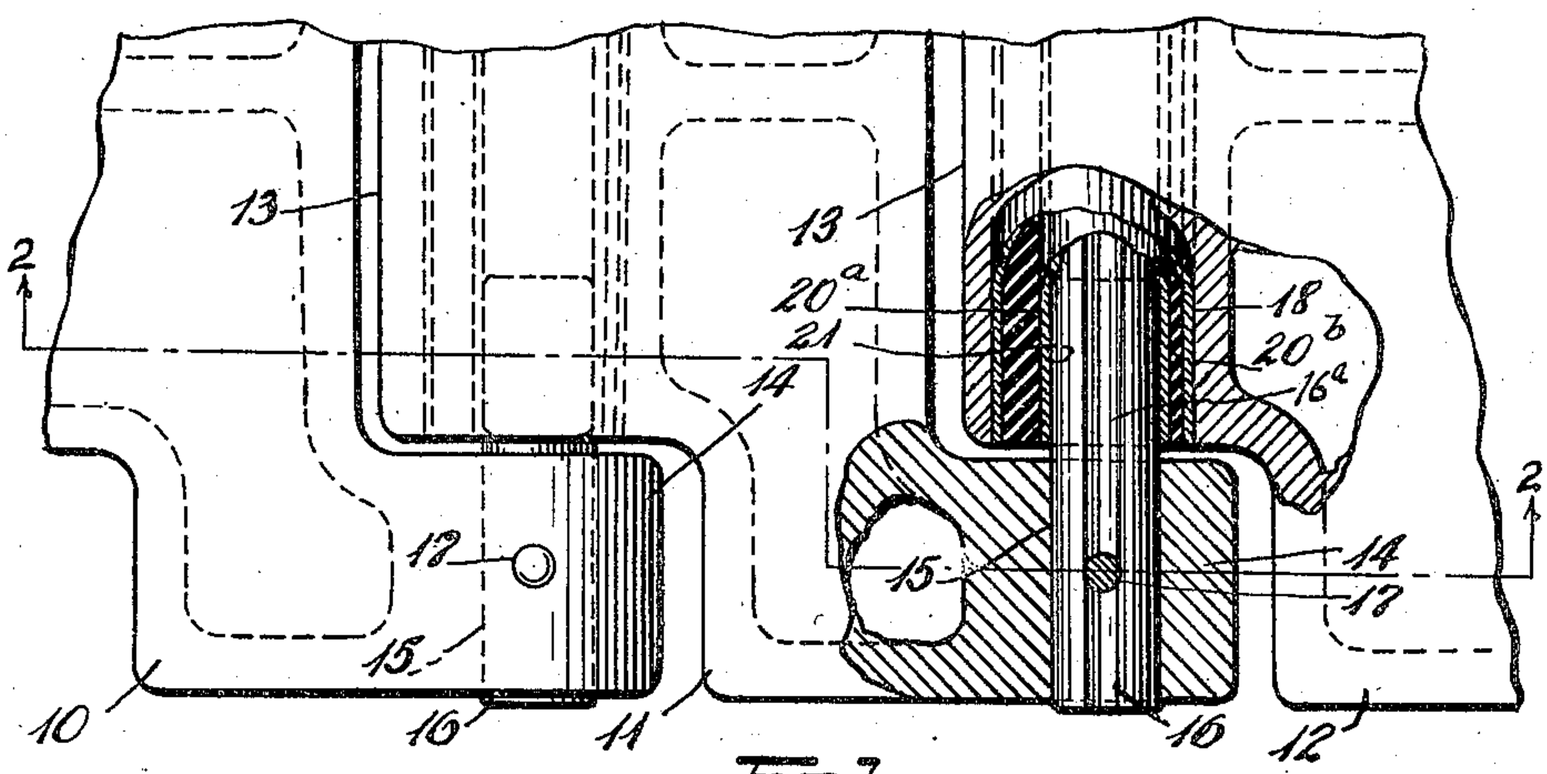


FIG. 1.

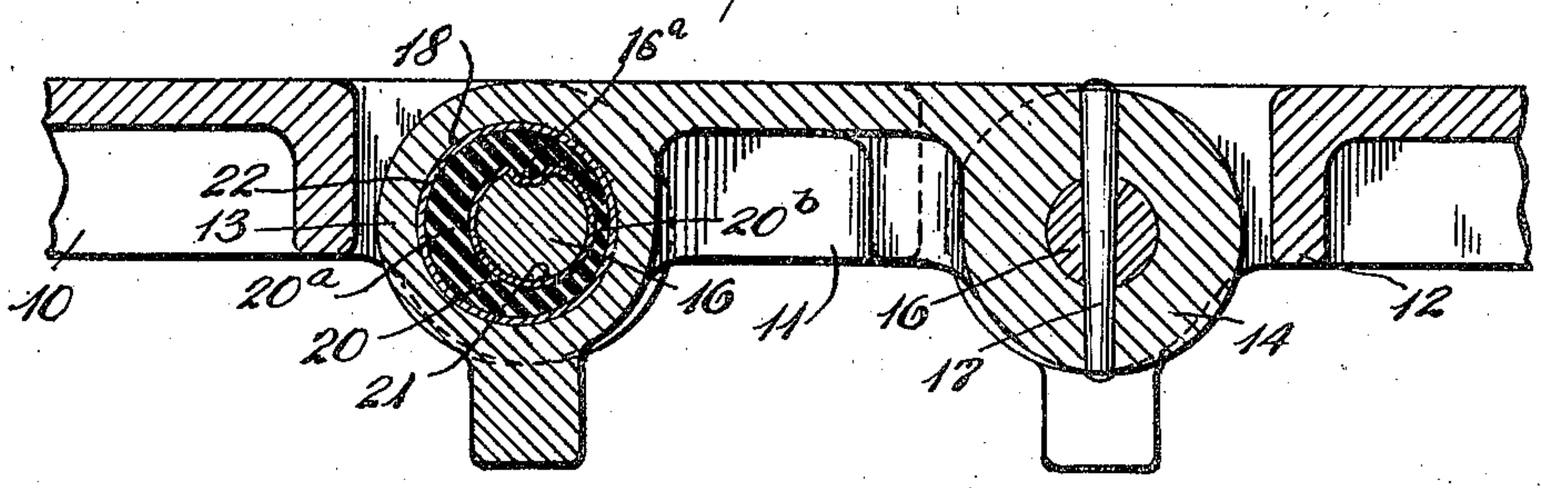


FIG. 2.

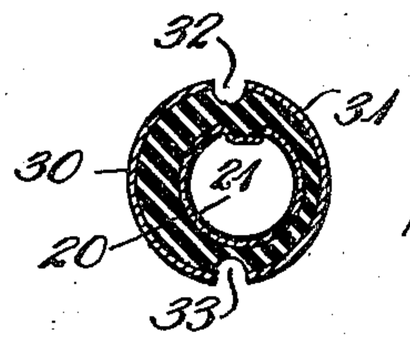
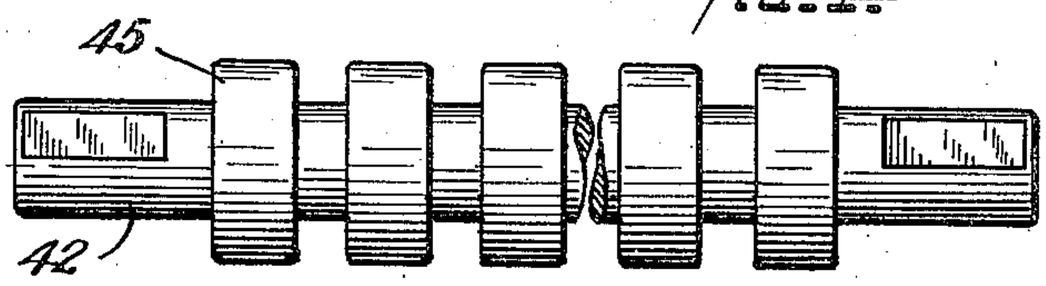


FIG. 3.

FIG. 4.



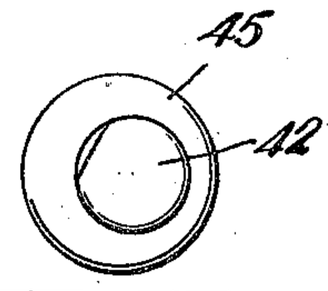


FIG. 5.

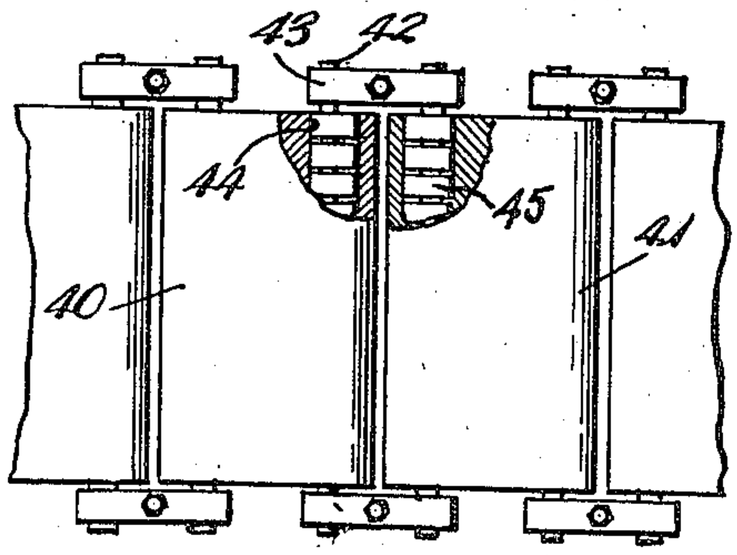


FIG. 6.

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CUSHIONED CONNECTION

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5 Claims. (Cl. 305—10)

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This invention relates to cushioned connections and is especially useful in the construction of self-laying tracks for vehicles.

The principal objects of the invention are to provide high resistance to rupture of the cushioning material with adequate cushioning of the connection, to provide a high degree of cushioning in minimum space, to provide cushioning of tension of a track while providing torsional cushioning of hinging movement, to provide for increased life of the structure, and to facilitate construction, assembly and repair of the track.

These and other objects will appear from the following description and the accompanying drawing.

Of the drawing:

Fig. 1 is a partial plan view of a self-laying track constructed in accordance with and embodying the invention, parts being broken away.

Fig. 2 is a cross-section thereof, taken on line 2—2 of Fig. 1.

Fig. 3 is a section of a modification of the cushioned connection.

Fig. 4 is a side view of a modified form of the invention.

Fig. 5 is an end view thereof.

Fig. 6 is a plan view of a portion of a self-laying track embodying the modified form of cushioned connection of Figs. 4 and 5.

Referring to the drawings, and first to Figs. 1 and 2, thereof, the numerals 10, 11, 12 designate successive block links of a self laying track. Each block link has one or more knuckles 13 on one end thereof and at least a pair of knuckles such as 14 at its opposite end, the knuckles being arranged in intercalated relation with a knuckle 13 of one link extending between a pair of knuckles 14 of the next link. The knuckles 14 have aligned cross bores 15 to receive hinge pins 16 which extend through the pair of knuckles 14 and through the knuckle 13 therebetween and are secured against movement within the knuckles 14, as by taper pins 17 extending therethrough or other fastening means. The knuckles 13 are formed with cross bores 18 larger than the pins 16 to provide space for the connecting cushions.

For cushioning the joints between the links both against pull of the track and torsionally against hinging, cushioning bodies 20 of soft vulcanized rubber or other rubber-like material are provided within the bores 18 about the hinge pins 16. Each cushioning body surrounds a metal sleeve 21 adapted to engage over the hinge pin, and is surrounded by a tubular metal sleeve 22 adapted to be pressed into the bore 18, and is

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bonded to both metal sleeves as by a bond resulting from vulcanization of the rubber-like material thereto.

To provide for increased resistance to rupture of the rubber-like material at the side of the body which is subjected to compression by pulling forces acting on the track, while at the same time providing maximum strength of the knuckles within minimum space, the cushioning body 20 is made thicker at the side subject to compressive forces when the vehicle is travelling than at the opposite side thereof. This may be accomplished readily by an eccentric relation of the metallic sleeves, as shown in Fig. 2, which provides greater space at the position 20*a* than at the opposite position 20*b*, the wall of the rubber-like material gradually increasing in thickness from 20*b* to 20*a* in both directions around the body. The arrangement not only provides a greater thickness of rubber at the position most subject to compressive forces tending to rupture the rubber-like material, but also provides a gradually decreasing space to resist by a crowding or congesting action the flow of the rubber-like material away from the zone of compression about the inner sleeve, while the bonding of the rubber-like material to the metal of the sleeve also resists such flow. At the same time, the thickness of the track is not increased over that required by a cushion body having concentric sleeves.

Any tendency for the hinge pin to shift position due to such compressive forces will be in a direction tending to move the pin to a less eccentric position within the body of rubber-like material.

For retaining the sleeve 21 against rotation relative to the hinge pin 16, the hinge pin may be grooved, as at 16*a* throughout its length, and the sleeve formed with an inwardly directed rib to fit the groove. In assembling the track, the sleeve 22 with the body of rubber-like material and the sleeve 21 attached thereto, is pressed tightly into the bore of the knuckle 13. The hinge pin 16 may then be pressed into position through the sleeve 21 and through knuckles 14.

In the modified construction illustrated in Fig. 3, the sleeve 21 and the body 20 of rubber-like material are similar to the corresponding parts of Figs. 1 and 2. The outer sleeve is, however, of circumferentially discontinuous construction. As shown it is split or otherwise formed of arcuate spaced-apart semi-sleeve members 30, 31 bonded to the outer surface of the body 20. The sleeve members are spaced apart as at 32, 33 at positions circumferentially between the thickest and thinnest portions of the cushioning body, and the

body at these positions may be grooved axially to clear the axially extending margins of the sleeve members, so as not to be pinched therebetween. This construction permits placing of the body of rubber-like material under greater compression during assembly of the connection and the knuckle thereby relieving any tension on the rubber body resulting from shrinkage of the rubber body upon vulcanization.

In the modification shown in Figs. 4 to 6 the track is constructed of successive track blocks **40**, **41** having hinge pins **42** extending crosswise therethrough. Pairs of hinge pins are connected to each other at opposite margins of the track by links **43** which clamp the hinge pins against rotation.

For providing a cushioned connection, the links **40**, **41** are formed with cross bores **44** of larger diameter than the hinge pins, and annular bodies **45** of resilient rubber or other rubber-like material are arranged about the hinge pin **42** and bonded thereto as by a bond of vulcanization. The annular resilient bodies are of larger diameter than the bores **44** and are spaced longitudinally of the hinge pin to provide clearance for deformation due to assembly. In assembling the hinge pin and the link, the annular bodies **45** are forced into the bore under sufficient compression to prevent their slipping during hinging of the track.

To provide increased resistance to rupture of the rubber-like material at the side of the hinge pin where the rubber is subjected to further compression due to tensioning of the track, the annular bodies **45** are made eccentric with the hinge pin in a direction providing a thicker wall of rubber-like material at the zone of compression than at the opposite side. This provides a thick body of rubber-like material at the side subject to the greatest compressive force while at the same time, the space between the hinge pin and the bore of the link narrows in both directions away from the zone of greatest compression and resist flow of the material under pressure away from that zone. The arrangement provides more cushioning material at the zone subject to compression without requiring change in the dimensions of the links.

Variations may be made without departing from the scope of the invention as it is defined by the following claims.

I claim:

1. In a self-laying track for vehicles having track blocks hinged to each other, one of said blocks having a cross passage and an adjacent block having a hinge pin extending into said passage, a cushioning member located in said passage upon said hinge pin, said cushioning member comprising an outer sleeve retained in said passage, an inner sleeve upon said hinge pin, and a body of resilient rubber-like material between said sleeves and bonded thereto to resist the hinging movement by stress of said material, said body having a wall of increased thickness at a side of said hinge pin subjected to compression resulting from tensioning of the track and of lesser thickness at the sides of said pin adjacent and opposite the first said side providing increased resistance to movement of said material away from the first said side by virtue of the crowding action under such compression.

2. In a self-laying track for vehicles having track blocks hinged to each other, one of said blocks having a cross passage and an adjacent block having a hinge pin extending into said passage, a cushioning member located in said passage about said hinge pin, said cushioning member comprising an outer sleeve retained in said passage, an inner sleeve upon said hinge pin, and a body of resilient rubber-like material between said sleeves and bonded thereto, said body having a wall of increased thickness at a side of said hinge pin subjected to compression resulting from tensioning of the track, said outer sleeve being of circumferentially discontinuous construction to permit assembly of said track with said body of rubber-like material under radial compression.

3. In a self-laying track for vehicles having track blocks hinged to each other, one of said blocks having a cross passage and an adjacent block having a hinge pin extending into said passage, a cushioning member located in said passage about said hinge pin, said cushioning member comprising an outer sleeve retained in said passage, an inner sleeve secured upon said hinge pin against relative rotation, and a body of resilient rubber-like material between said sleeves and bonded thereto, said body having a wall of increased thickness at a side of said hinge pin subjected to compression resulting from tensioning of the track, said outer sleeve being of circumferentially spaced apart arcuate sleeve members to permit assembly of said track with said body of rubber-like material under radial compression, said sleeve members being separated at positions other than in line with said compression.

4. A pivotal spring for connecting structures to transmit load from one to the other and cushioning relative turning movement of the structures, said spring comprising a substantially cylindrical sleeve, a member within the same, a body of rubber-like material enclosing the inner member within said sleeve and bonded to both to resist relative turning movement of said sleeve and member by stress of said material, said inner member being disposed in said material eccentrically with relation to said sleeve in the unloaded condition providing a zone of said material of greatest thickness at one side of said inner member and decreasing thickness at the regions adjacent said zone and opposite said zone to resist movement of said material into the adjacent and opposite regions by crowding action when load is applied compressively through said zone in the radial direction.

5. A spring as defined in claim 4 in which said sleeve is divided at a position circumferentially spaced from said zone of greatest thickness of said material.

ALVIN S. KROTZ.

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