United States Patent

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[73] Assignee Diehl Nuremberg, Germany
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[33] Germany
[31] P 17 80 016.7

[54] TUBULAR CHAIN LINK BODY

13 Claims, 6 Drawing Figs.

[52] U.S. Cl. 305/36, 156/173
[51] Int. Cl. B62d 55/20
[50] Field of Search 305/35, 36, 38; 156/173

[56] References Cited

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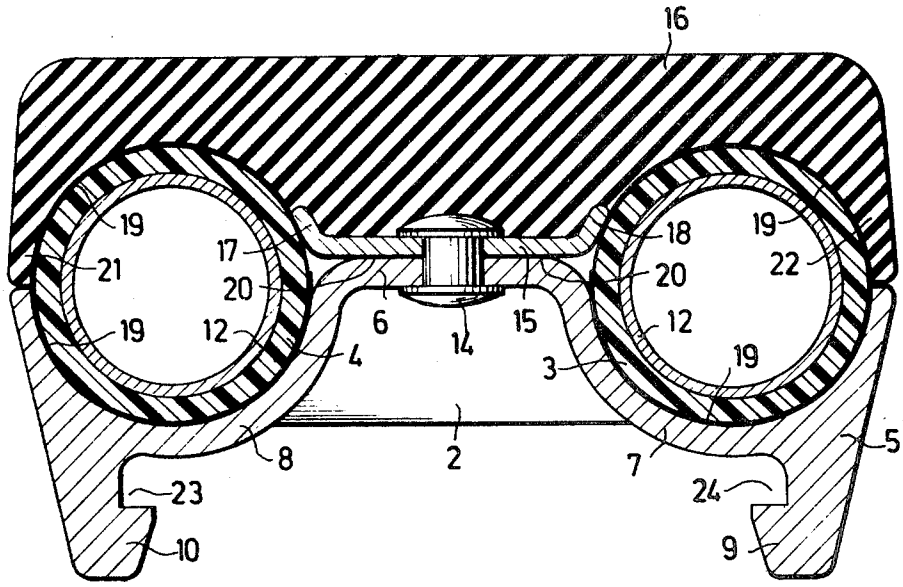
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Primary Examiner—Richard J. Johnson
Attorney—Walter Becker

ABSTRACT: A track link body for track-laying vehicles and method of making such track link, according to which two glass-fiber-reinforced tubular members of synthetic resin which are arranged in parallel spaced relationship to each other are interconnected by glass-fiber-reinforced sideplate means, respectively located on opposite ends of said tubular members.



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SHEET 1 OF 3

FIG. 1

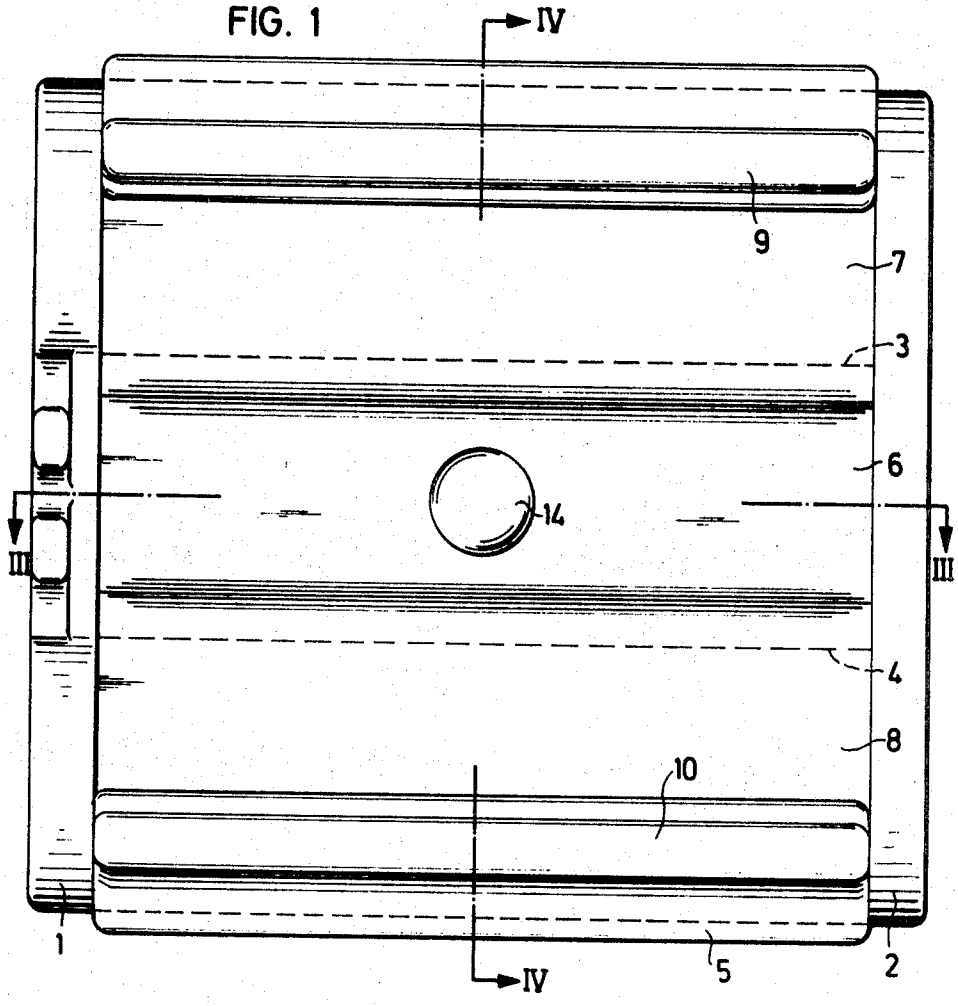
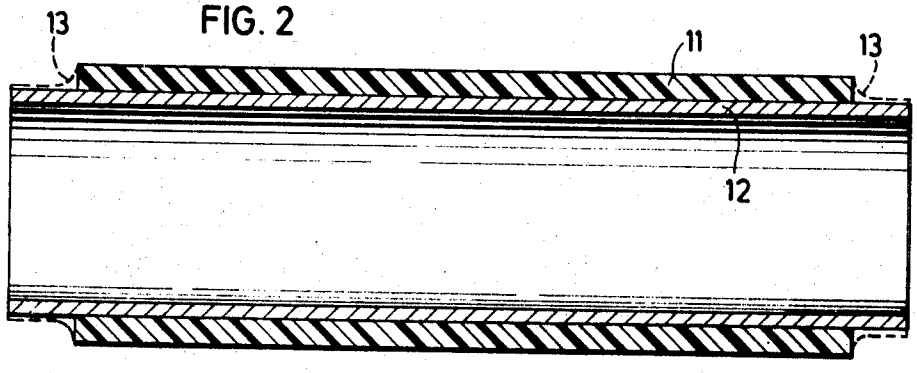


FIG. 2



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FIG. 3

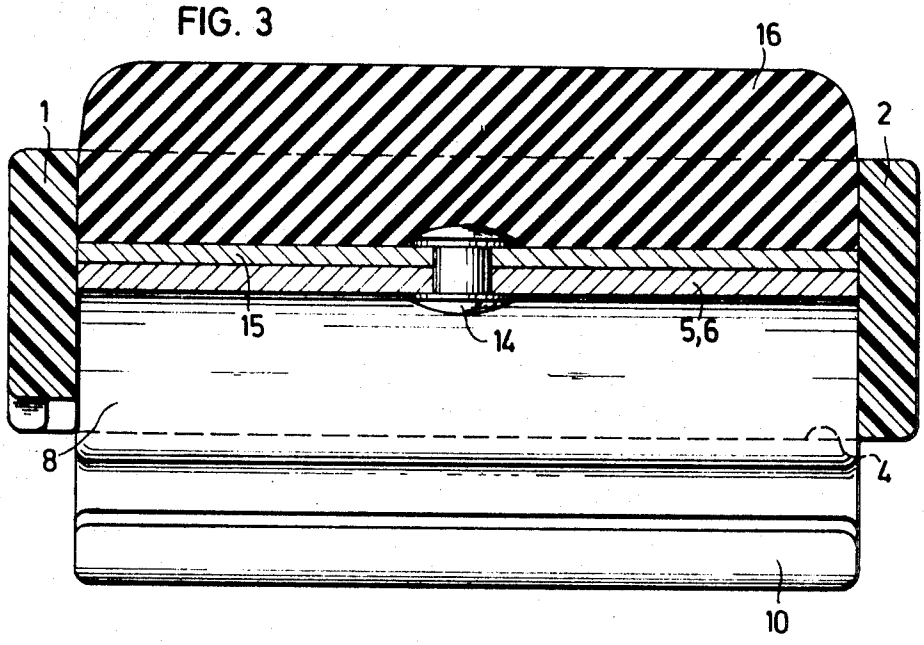
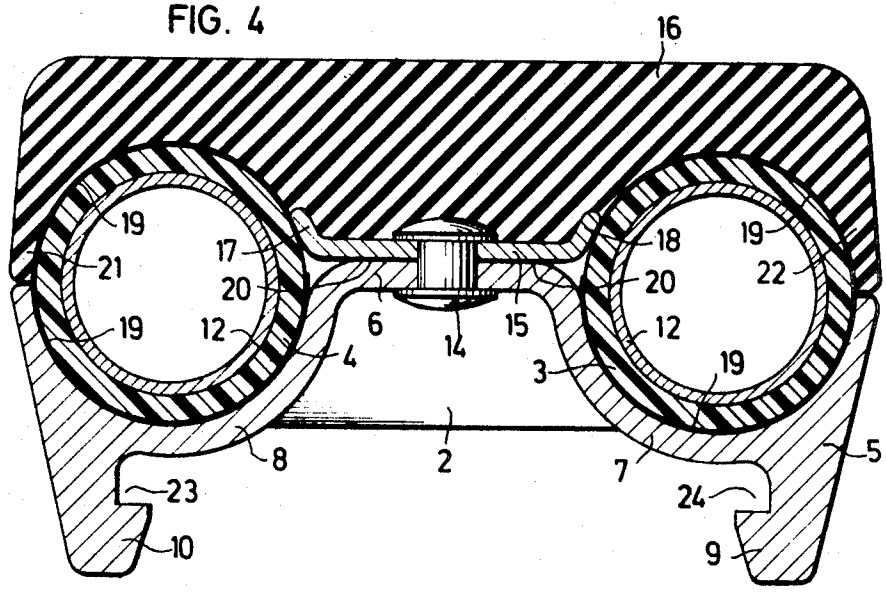


FIG. 4



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FIG. 5

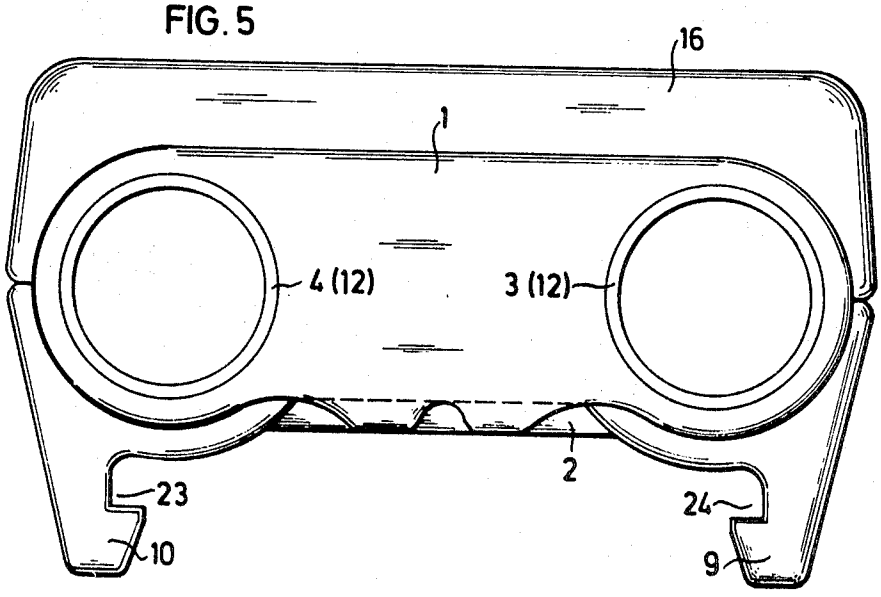
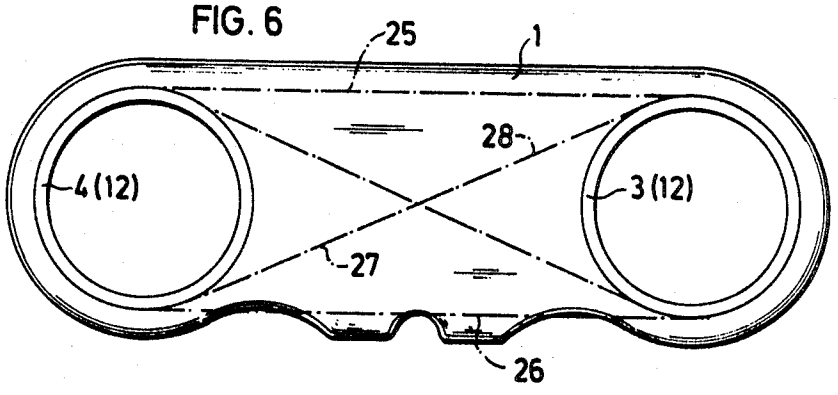


FIG. 6



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TUBULAR CHAIN LINK BODY

The present invention relates to a tubular chain link body for track-laying vehicles, in which the tubular bodies receiving the track bowls are interconnected by lateral spectacle-shaped fish plates.

With heretofore known tubular chain link bodies of the above-mentioned type, steel pipes are press fit into the two fish plates and hard soldered thereto. In order to impart the necessary strength upon the tubular body, it has also become known to interconnect the two spectacle-shaped plates by a rib. Inasmuch as the soldering connections of the tubular bodies are always liable to disorders, sometimes additional reinforcements are soldered to the tubular bodies. Furthermore, it has become known to cast or forge such tubular bodies in one piece while such tubular body of cast steel also without additional reinforcements has a high strength and forms stability.

Attempts have furthermore been made to make tubular bodies of the above mentioned type of light metal in order to save weight. The strength and form stability of such light metal tubular bodies is, in spite of various types of bracing and reinforcements, too weak in order to withstand the rough load by armored cars.

It is, therefore, an object of the present invention to provide a track link tubular body, the strength of which will at least correspond to that of a steel forged or cast tubular body.

This object and other objects and advantages of the invention will appear more clearly form the following specification, in connection with the accompanying drawing, in which:

FIG. 1 is a bottom view of a track link tubular body according to the invention without running plates or pads.

FIG. 2 is a section through a prefabricated pipe of glass-fiber-reinforced synthetic material as part of the tubular body.

FIG. 3 represents a longitudinal section through the tubular body, said section being taken along the line III–III of FIG. 1.

FIG. 4 is a transverse section through the tubular body, said section being taken along the line IV–IV of FIG. 1.

FIG. 5 is an end view of the tubular body according to FIG. 1.

FIG. 6 illustrates by way of a diagram the winding of material onto the pipes within the area of the fish plates.

The track link tubular body according to the present invention is characterized primarily in that glass-fiber-reinforced synthetic pipes, which are produced by coating a cylindrical core-forming bolt having an outer diameter corresponding to the rated inner diameter of the pipe, or a thin-walled pipe with glass fiber mats or strands and impregnating the same with each hardening synthetic resin and are wound upon an outer diameter corresponding to the required strength; said glass-fiber-reinforced synthetic resin pipes are interconnected at their ends by plates of glass-fiber-reinforced synthetic material while said plates of preferably prefabricated glass fiber fabric pieces and/or are formed by glass fiber strands applied by winding the same along straight paths or paths crossing each other so as to have a spectacle shape, the plates receiving their rated outer shape preferably by mold cups which hold the prefabricated synthetic resin pipes in the desired actual distance until the synthetic resin of the fish plates has fully hardened.

From below, a steel plate can be inserted into the said double pipe body of glass-fiber-reinforced synthetic resin, whereas from the top an inner rubber cushion may be inserted, said steel plate and inner rubber cushion being connected to each other and to the tubular body.

A track link tubular body according to the present invention has the advantage that while it has the same strength as steel, it represents a considerable weight saving over steel. With the tubular body according to the invention which is made of glass-fiber-reinforced synthetic material a strength up to 3.00 kp. mm.^{12} is obtained which is not obtainable when the tubular body consists of steel.

Referring now the drawings in detail, FIG. 1 shows two pipes 3, 4, as they are illustrated in FIG. 2, which are laterally interconnected by fish plates 1, 2. Into the thus tubular base body there is inserted a steel plate 5 (FIG. 4) which has a plane central portion 6 and two semicylindrical cup portions 7, 8 which correspond to the shape of the pipes 3, 4. At the bottom side, the steel plate 5 which is primarily produced by forging or casting has ribs or strips 9, 10 extending in a transverse direction.

As will be seen from FIG. 2, the pipes 3, 4 comprise a layer 11 of glass-fiber-reinforced synthetic resin which is deposited, for instance, upon a thin-walled supporting inner pipe 12 of metal or likewise of glass-fiber-reinforced synthetic resin. Such pipe 11, 12 is, in a manner known per se, primarily by winding thereupon glass fiber, fleece, glass fiber strands, or glass fiber mats, or glass fiber fabric pieces upon a mandrel or form bolt which previously had been sprayed with a separating layer, for instance, tetrafluorethylene and by permeating the lap with standard synthetic resins as, for instance, polyesters, while in particular when employing glass fiber, fleece, or glass fiber strands, each time a smooth winding is followed primarily by a crosswise winding in order thereby also to increase the axial pull resistance of the pipe 11, 12. The thus prefabricated pipes which have been covered by said windings so as to have the rated outer diameter are—after the prehardening of the synthetic resin at the end faces or near the marginal areas on the outer circumference where the glass fiber winding ends as indicated, for instance, in dash line by the marginal line 13 in FIG. 2,—roughened in order to enable the further windings to adhere sufficiently. The arrangement of FIG. 1 furthermore comprises a screw or riveting head 14 by means of which the steel plate 5 is connected to a counterpart on the upper side of the track link body as will presently appear.

By means of this rivet or screw connection 14, as shown in FIG. 3, an inner rubber running cushion 16 is connected to the steel plate 5 which is inserted into the tubular body 1—4 from the top, and which is vulcanized onto a steel supporting body 15. FIG. 4 illustrates that the marginal areas 17, 18 of the steel supporting body 15 are in conformity with the pipes 3, 4 bent upwardly and thus support the rubber cushion 16 in a nondisplaceable manner in the tubular body frame structure 1—4 and on the other hand pull the steelplate 5 firmly against the tubular body 1—4. As indicated by a double contour 19 or as has been indicated by gluing margins 20, the inner rubber cushion 16 which extends over the pipes 3, 4 by means of semicylindrical cups 21, 22 corresponding to the outer diameter of the pipes 3, 4, and also the steel plate 5 are firmly cemented to the oppositely located contacting surfaces.

According to FIGS. 4 and 5 the ribs or strips 9, 10 of the steelplates 5 have oppositely directed grooves 23, 24 for inserting a nonillustrated running cushion or a gripper shoe. FIG. 5 clearly indicates that the lateral spherical-shaped plates 1, 2 which connect the pipes 3, 4 to each other have a shape which corresponds somewhat to the shape of corresponding steel bodies. This is realized primarily by molding cups which serve as receiving means for the prefabricated pipes 11, 12; 3, 4 when mounting the fish plates 1 and 2, and in their central portion, corresponding approximately to the steelplate 5 hold the pipes 3, 4 at a rated distance.

According to FIG. 6, the fish plates 1, 2 preferably consist of prefabricated glass fiber fabric pieces which in the form of inserts are in toto stacked upon the roughened adhesive-covered ends of the ends 13 of the pipe 3, 4; 11, 12 and/or said fish plates 1, 2 consist of glass fiber strands 25, 26 which are just being wound upon the pipe ends 13, and are then deposited in crosswise direction upon further glass fiber strands 27, 28. These glass fiber strands 25 to 28 are then, in customary manner, permeated with synthetic resin as already mentioned above and are on the outside in conformity with the divideable casting or injection molds cast to measure or injection molded to measure in conformity with the rated dimensions. The said mold is then withdrawn as soon as certain hardening degree of the synthetic resin has been realized.

Since the pouring of the synthetic resin into the mold and the insertion of glass fiber fabrics, mats or strands do not exert large mechanical or thermal stresses upon the molds, the molds may, in a manner known per se, consist of prefabricated thin cups which can be produced at low costs.

Only when the tubular bodies 1—4 have hardened to a corresponding extent, the steelplate 5 and the inner rubber cushion 16 are riveted in, screwed in or glued on while expediently, prior to the gluing step, the surface of the tubular bodies 1—4 which is normally smooth is roughened at the gluing areas.

It is, of course, to be understood that the present invention is, by no means, limited to the particular construction shown in the drawings, but also comprises any modifications within the scope of the appended claims.

It may furthermore be noted that while various types of synthetic resins may be employed for the glass-fibered-reinforced tubular members 3 and 4, the employment of an epoxy resin sold and marketed by the company Ciba under the name Ly 556 (based on the components bisphenol and epichlorohydrin) with a hardener Ciba HT 971 has proved particularly successful in this connection.

Similarly, while various types of polyesters may be used for permeating the glass fiber fleece or the like used in connection with the building up of pipes 11, 12, a polyester sold and marketed under the name "Palatal" by Badische Analin & Soda Fabrik, Germany, or under the name "Leguval" W 41 by the Beyer Company of Uerdingen, Germany, have proved particularly suitable in this connection.

What we claim is:

1. A track link body for track-laying vehicles, which includes: two glass-fiber-reinforced tubular members of synthetic resin arranged in spaced substantially parallel arrangement with regard to each other, and glass-fiber-reinforced sideplate means respectively arranged on opposite sides of said tubular members and interconnecting the same.

2. A track link according to claim 1, in which said sideplate means include glass fiber fabric material.

3. A track link according to claim 1, in which said sideplate means include glass fiber strands permeated with synthetic resin and looped around said tubular members in a continuous manner and also in a manner so as to cross each other between said tubular members.

4. A track link according to claim 1, which includes metallic insert plate means partially extending between said tubular members and comprising portions cupping said tubular members.

5. A track link according to claim 4, in which said insert plate means is of steel.

6. A track link according to claim 5, in which said tubular members are cemented to said cupping portions.

7. A track line according to claim 4, in which said insert plate means has those areas thereof which are adjacent to said cupping portions provided with rail means defining groove means for receiving ground-contacting members.

8. A track link according to claim 4, which includes rubber cushion means connected to said metallic plate means and cupping those areas of said tubular members which are opposite to those cupped by said metallic insert plate means.

9. A track link according to claim 10, in which said cushion means is connected to said tubular members.

10. A track link according to claim 8, which includes supporting plate means having vulcanized thereto that portion of said cushion means which is adjacent said insert plate means, and connecting means connecting said supporting plate means to said insert plate means.

11. In a method of producing a track link body for track-laying vehicles which has two glass-fiber-reinforced tubular members of synthetic resin in parallel spaced relationship to each other, the steps of: preparing each of said glass-fiber-reinforced tubular members by applying glass fiber material to a cylindrical core member having an outer diameter corresponding to the inner diameter of the tubular member to be prepared, and permeating the said applied glass fiber material with synthetic hardenable resin while winding said glass fiber material upon said core member until the thus obtained structure has reached a diameter corresponding to the desired strength of said tubular member and securing the ends of the tubular members in spaced parallel relationship to each other by a pair of connecting plates to thereby form a track link body.

12. A method according to claim 1, in which said glass fiber material is applied in the form of glass fiber woven pieces.

13. A method according to claim 1, in which said glass fiber material is applied in the form of glass fiber strands and looped around said core members in a continuous straight and in an intercrossing manner.