F. RICHARD.

TORQUE TUBE STRUCTURE.

APPLICATION FILED JAN. 15, 1917.

1,330,550.

Patented Feb. 10, 1920.

2 SHEETS—SHEET 1.

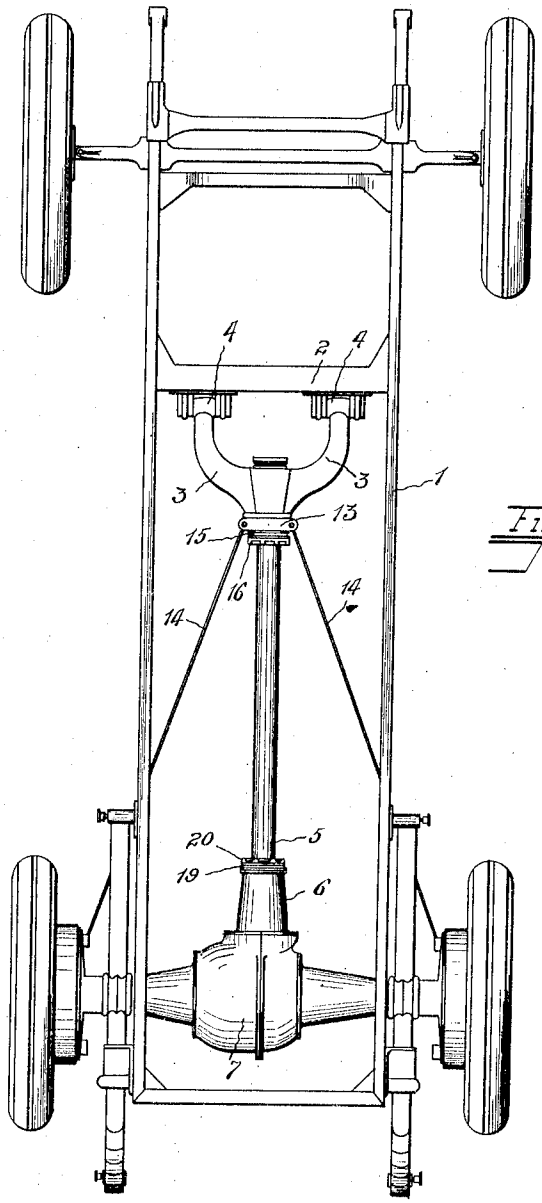


Fig. I.

Inventor:
François Richard
by his atty

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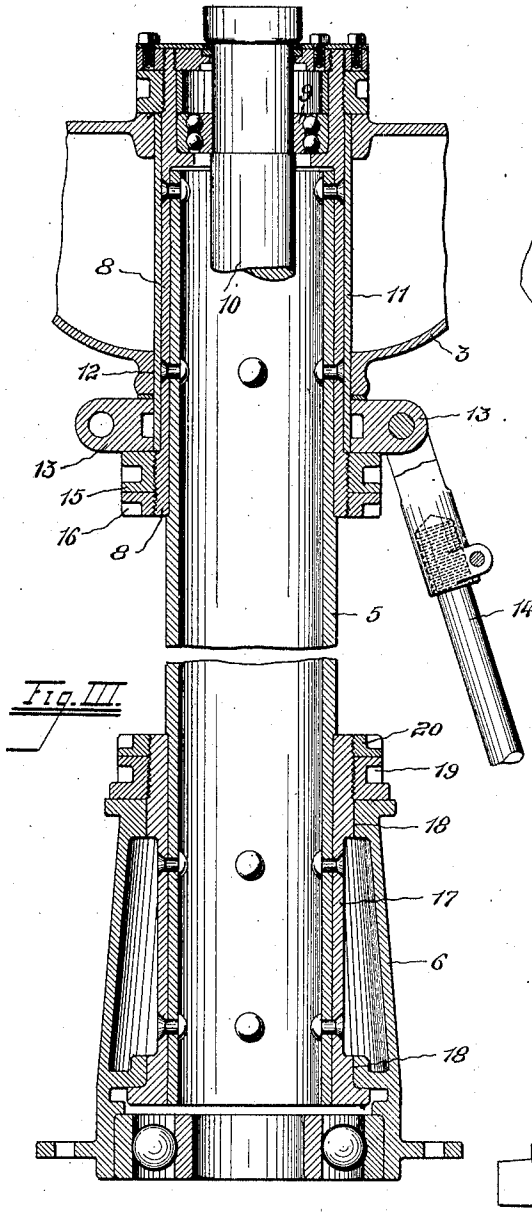


Fig. III.

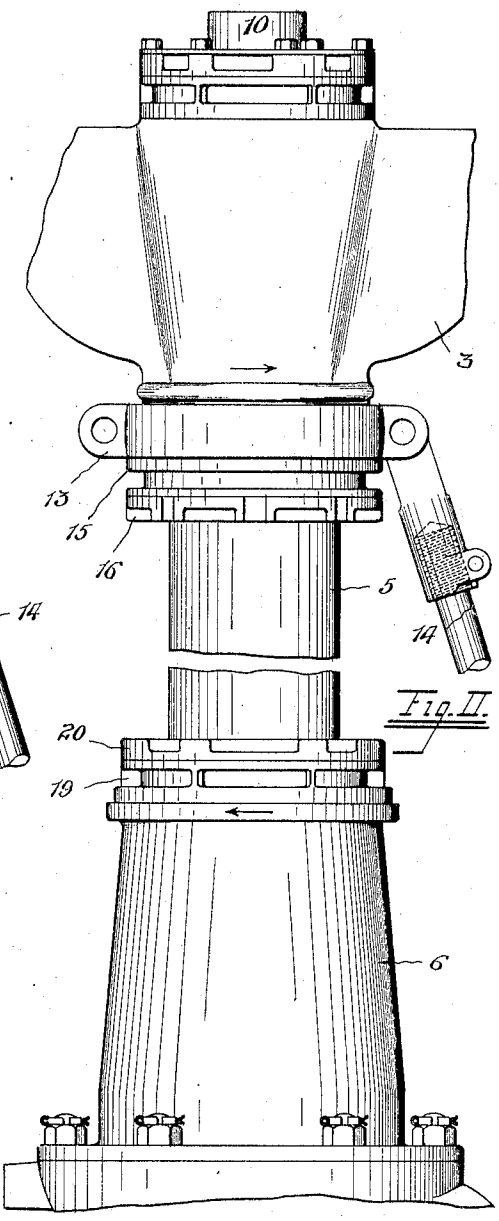


Fig. II.

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François Richard

by his atty

Curt R. Mueller

UNITED STATES PATENT OFFICE.

FRANÇOIS RICHARD, OF CLEVELAND, OHIO, ASSIGNOR TO THE RICHARD AUTO MFG. COMPANY, OF CLEVELAND, OHIO.

TORQUE-TUBE STRUCTURE.

1,330,550. Specification of Letters Patent. Patented Feb. 10, 1920.

Application filed January 15, 1917. Serial No. 142,477.

To all whom it may concern:

Be it known that I, FRANÇOIS RICHARD, a citizen of the Republic of France, residing at 7800 Finney avenue, Cleveland, in the county of Cuyahoga and State of Ohio, have invented a new and useful Improvement in Torque-Tube Structures, of which the following is a specification, the principle of the invention being herein explained and the best mode in which I have contemplated applying that principle, so as to distinguish it from other inventions.

This invention relates to a torque tube structure and more particularly to an improvement in a connection of this character adapted for employment in the construction of the modern type of automobile.

The strains to which torque tubes are subjected in automobile usage are very severe owing to the constant vibration and varying road conditions under the different wheels, in consequence of which latter circumstance the chassis, and hence necessarily the torque tube, is regularly caused to resist tendencies toward distortion. To such tendencies a torque tube is peculiarly sensitive owing to the manner of its connection whereby it develops progressive crystallization tendencies, which eventually sufficiently weaken it so as to bring about its fracture, usually at the rear or weakest end.

The object of my invention is to avoid such happening and I have succeeded in doing so by permitting a relative rotary movement in either direction at two points along the torque tube so as to compensate for and counteract the torsional tendencies at each end, either independent of or coincident with the other.

I would have it expressly understood that I in no wise limit myself to this specific application or embodiment of my invention, which I have selected as a basis for illustrating and describing my invention merely for the purpose of rendering a clear and comprehensive understanding of the scope and novel features thereof.

Adverting to the drawing:

Figure I is a plan of an automobile chassis, showing a torque tube incorporating the principle of my invention.

Fig. II is an enlarged detail partly broken of the torque tube, embodying my invention.

Fig. III is a mainly horizontal section of Fig. II.

The frame 1 has a cross brace 2 to which a yoke 3 is pivotally connected at two points 4. This yoke supports one end of the torque tube 5 after the manner of my invention to be presently described. The other end of the tube 5 is supported by a forward extension 6 of a differential housing 7. Fixed to the forward end of the tube 5 by means of rivets or otherwise is a hollow casting 8 carrying interiorly at its front end a roller bearing 9 within which the driving shaft 10 is to rotate. In turn surrounding the casting 8 is a sleeve 11 adapted to have a close mechanical fit within the bearing 12 of the housing yoke 3. The sleeve 11 extends somewhat rearwardly beyond the yoke 3 and about such portion is a collar 13 to opposite sides of which tie-rods 14 are pivoted. The whole is held in place by means of lock-nuts 15 and 16. It will be understood from the foregoing that the yoke 3 is enabled to turn in either direction. Similarly riveted to the rear end of the tube 5 is a member 17 provided with a pair of bearing surfaces 18, about which the extension 6 is closely fitted, so as to turn in either direction relatively thereto. The parts are likewise further secured by the locknuts 19 and 20.

It should be understood that the yoke 3 would normally be subject to considerable torque as the frame became tilted and that the extension 6 would be subjected to torsional strain whenever either of the rear wheels or other side of the frame assumed a greater elevation than at the opposite side. Heretofore torque tubes have been designed to compensate for localized torsional strains. I believe however, that I am the first to perceive the advisability of providing for a total compensation, namely, at each end of the tube, so that reverse torsional strains which might be encountered at opposite ends of the tube might be simultaneously off-set. For example, if the left fore wheel and the right hind wheel were each simultaneously jolted upwardly the tendency would be to subject to torsional forces in opposite directions. In such event, a construction which permitted of movement at only one end would not suffice and experience has demonstrated that torque tubes do tend to crys-

tallize and eventually fracture as heretofore mounted. According to my invention assuming the left front and rear right wheel to have been thrown upwardly at any given moment the yoke 3 and extension 6 will turn in opposite directions as indicated by the arrows in Fig. II. Only in this wise is the tube 5 wholly relieved under all conditions of the torsional wrenches.

I claim:

1. A torque tube structure comprising the combination with a vehicle frame, of two parts each connected with said frame and each rotatably supporting a third part.

2. A torque tube structure comprising a pair of parts adapted for connection with a motor vehicle frame, and a middle part located between said first mentioned parts and rotatably connected with each, whereby rotatable action in opposite directions may occur simultaneously at both connections between said parts whenever diagonally opposite ends of the frame are lifted or dropped in the same direction.

3. A torque tube structure comprising the combination of a wheeled vehicle frame, two parts movably connected with said frame and three axially alined members rotatably connected together in pairs and two of said members being additionally rotatably connected with said parts respectively.

4. A torque tube structure comprising three axially alined hollow members, the middle of said members being rotatably connected with each of the others whereby simultaneously to compensate for opposed torsional tendencies.

5. A torque tube structure comprising a wheeled vehicle frame, three axially alined hollow members, extending lengthwise of the frame, the middle of said members being rotatably connected with each of the others and distinct means for connecting the other two members with said frame whereby simultaneously to compensate for opposed torsional tendencies by allowing rotational movement at two longitudinally spaced points.

6. A device of the character described comprising the combination of an automobile frame, an axle housing yieldingly attached thereacross, a member pivotally connected with said frame and adapted for up and down movement relatively thereto, and a torque tube rotatably connected both with said member and with said housing.

7. A device of the character described comprising the combination with a four wheeled automobile frame, of an axle housing, springs yieldingly connecting said frame and housing, a yoke pivotally connected across said frame some distance from said springs and adapted for up and down movement relatively thereto, and a torque tube rotatably connected both with said yoke and with said housing whereby each of the latter may turn around in directions relative to said tube whenever diagonally opposite wheels are simultaneously either lifted or allowed to sink.

8. A torque tube structure comprising the combination with an automobile frame of three axially alined members rotatably connected, one of said members being yieldingly connected with said frame, another of said members being pivotally connected with said frame.

9. A torque tube structure comprising the combination with an automobile frame of three axially alined members rotatably connected longitudinally of said frame, the rear one of said members having its rear end yieldingly supporting said frame, the front one of said members being pivotally connected with said frame for swinging movement relative to the horizontal plane of the latter.

Signed by me, this 5th day of January, 1917.

FRANÇOIS RICHARD.