B. P. F. DEANE.

RADIATOR FOR MOTOR VEHICLES AND THE LIKE.

APPLICATION FILED NOV. 1, 1920.

1,416,337. Patented May 16, 1922.

Fig. 2.

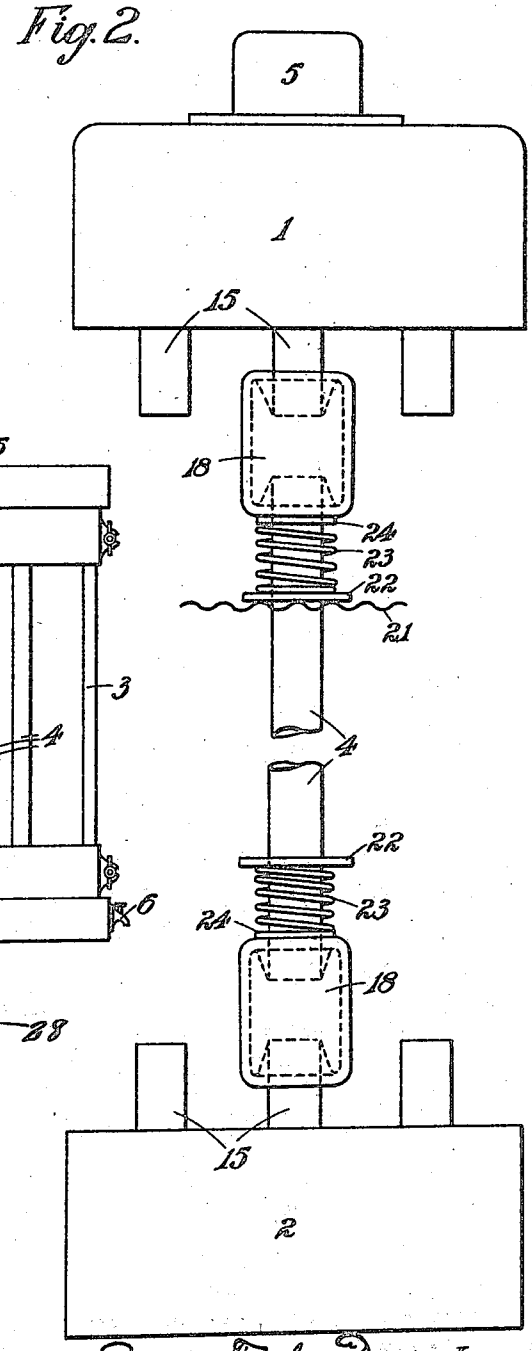


Fig. 1.

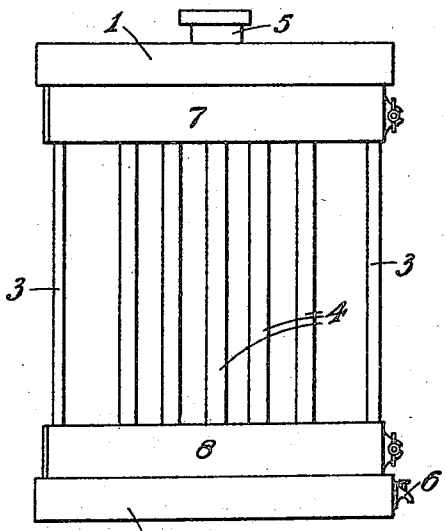


Fig. 4.

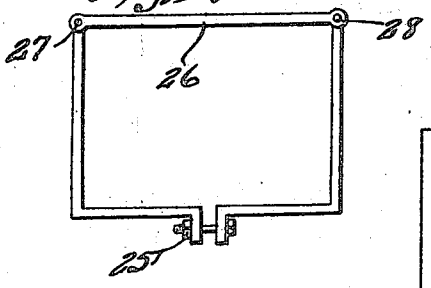


Fig. 3.

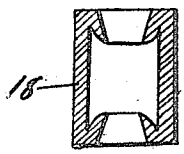
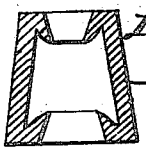


Fig. 3A.



Bernard Palmer Fisher Deane Inventor.

by Seward Davis his Attorney

UNITED STATES PATENT OFFICE.

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RADIATOR FOR MOTOR VEHICLES AND THE LIKE.

1,416,337. Specification of Letters Patent. Patented May 16, 1922.

Application filed November 1, 1920. Serial No. 421,108.

To all whom it may concern:

Be it known that I, BERNARD PALMER FISHER DEANE, a subject of the King of England, residing at 43 Arundel Gardens, Ladbroke Grove, Kensington, in the county of London, England, have invented new and useful Improvements in Radiators for Motor Vehicles and the like, of which the following is a specification.

This invention relates to radiators of the kind comprising an upper and a lower water chamber connected together by water tubes and has for its object to provide a flexible connection between the parts whereby leaky joints resulting from engine, road and other vibrations are prevented and the removal of one or more of said tubes can be readily effected without the use of tools.

In carrying this invention into practice each water or cooling tube is connected at each end to a nipple situated respectively on the adjacent surfaces of the upper and lower water chambers by flexible expansion joints comprising a sleeve or cylinder of rubber or other elastic material having inturned flanges which preferably taper to a feather edge and grip the pipe. Between these parts a chamber is formed which is filled with the fluid contents of the radiator that serves to tighten the grip of the joint upon the tube and nipple when under pressure.

This invention therefore consists of the combination in a radiator of water chambers, means for securing said chambers in spaced relationship, nipples on said chambers, water tubes of shorter length than the distance between said chambers and arranged between pairs of nipples and slidable flexible connectors having internal flanges embracing one end of each water tube and one nipple so as to form detachable water-tight expansion joints. A further feature of this invention consists in the employment of flexible hollow sleeves as connectors in which the internal flanges are tapered to a feather edge and the sleeve is unarmoured or uncased and also unanchored.

The water tubes in radiators according to this invention may be stated to "float" that is to say they are retained by frictional grips at their ends only by slidable flexible water-tight connectors constituting a floating suspension.

This invention is illustrated in the accompanying drawings in which:—

Figure 1 is a diagrammatic elevation of a radiator, and

Figure 2 is a partial elevation showing one tube in position and the method of detachably mounting same.

Figure 3 is a cross-sectional longitudinal view of a flexible connector.

Figure 3A is a cross-sectional longitudinal view of an alternative type of flexible connector.

Figure 4 is a plan view of a tube joint guard.

Referring to the drawings the radiator comprises an upper water chamber 1, a lower water chamber 2, a frame 3 for spacing apart the water chambers and maintaining them in spaced relationship, water tubes 4 establishing communication between the chambers, a filler 5, a drain cock 6 and tube joint guards 7 and 8. Constructional details not necessary for the understanding of the invention have been omitted for the sake of clearness.

Each chamber is provided with a series of staggered or otherwise suitably disposed short pipes or nipples 15 and between each pair—upper and lower—a tube 4 of shorter length than the distance between the chambers is interposed. The tubes are connected at each end to the respective nipples by connectors 18.

These connectors consist of a cylinder of rubber or like flexible and pliable material having inturned flanges tapering to a feather edge as shown in Figure 3. Normally these internal flanges grip the tube extremity and one nipple and retain the tube in position by means of a frictional grip which is also water-tight. Owing to the flexibility and resiliency of the connectors at each end each tube is free to move to a limited extent or "float" with respect to adjacent tubes and the water chambers.

Any increase of pressure within the chamber formed in each connector tends to tighten the grip upon the tube and nipple in the known manner thus retaining the tightness of the joint. In this respect the feather edges are provided to increase the sensitiveness of the material of the connector to slight increases of pressure and to prevent any excessive lateral vibration of the tubes momentarily partially opening a

joint which might happen if the inturned flanges of the connector were too stiff.

One of the gills or cooling fins on each tube is indicated at 21 and if desired a washer 22 may be placed as shown with a spring 23 embracing the tube and engaging another washer 24 in contact with the connector.

The tube joint guards 7 and 8 are provided to protect the joints from the weather and to keep them clean. As shown in Figure 4 these joint guards are hinged at 27 and 28 and can be clamped tightly around the frame 3 by means of the bolt and butterfly nut 25 or the equivalent. For additional security in the case of the upper joint guard the portion 26 may be rigidly connected to the upper water chamber by means of bolts. Access to the joints can thus be had for the purpose of removing a tube.

The operation of removing a tube merely consists in sliding both connectors apart on their nipples—compressing them if necessary and removing the tube or alternatively sliding both connectors on to the tube itself.

Generally the nipples and water tubes are of about the same diameter but in some cases it is desirable to make the nipples of larger diameter than the tubes in which case the flexible connectors are of taper form as shown in Figure 3A.

I claim:—

1. A radiator comprising an upper water chamber, a lower water chamber, means for securing said chambers in spaced relationship, nipples on said chambers, water tubes extending between each nipple on one of said water chambers and a corresponding nipple on the other chamber, flexible tubular connectors, internal flexible flanges extending from each end of said connectors to embrace and grip the end of each nipple and the adjacent end of the associated water tube so as to connect them together and a chamber surrounding said flanges substantially as and for the purpose set forth.

2. A radiator comprising an upper water chamber, a lower water chamber, means for securing said chambers in spaced relationship, nipples on said chambers, water tubes extending between each nipple on one of the said water chambers and a corresponding nipple on the other chamber, slidable flexible tubular connectors, internal flexible flanges tapering to a feather edge extending from each end of said connectors to slide on to and embrace the end of each nipple and the adjacent end of the associated water tube so as to connect them together and a chamber surrounding the tapering end of the said internally extending flanges substantially as and for the purpose set forth.

3. A radiator comprising an upper water chamber, a lower water chamber, means for securing said chambers in spaced relationship, nipples on said chambers, water tubes extending between each nipple on one of the said water chambers and a corresponding nipple on the other chamber, slidable flexible tubular connectors, internal flexible flanges tapering to a feather edge extending from each end of said connectors to slide on to and embrace the end of each nipple and the adjacent end of the associated water tube so as to connect them together, a chamber surrounding the tapering end of the said internally extending flanges and guards to protect the flexible tube connections substantially as and for the purpose set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

BERNARD P. F. DEANE.

Witnesses:
Lois B. Chasteauneuf,
Edgar A. Goddin.