Feb. 9, 1960 F. L. HAUSHALTER 2,924,008

METHOD OF INSTALLING A RESILIENT CUSHION INSERT

Filed Oct. 24, 1955 2 Sheets-Sheet 1

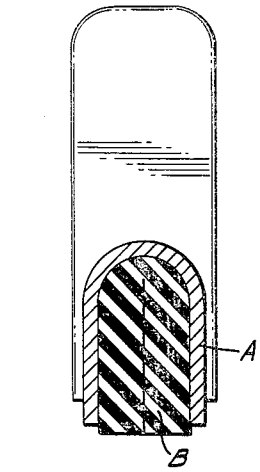


FIG. 1

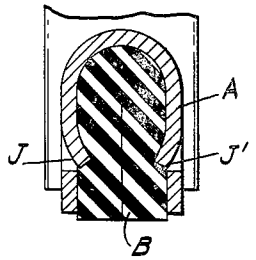


FIG. 7

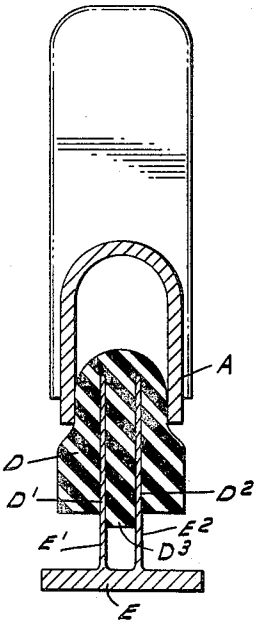


FIG. 3

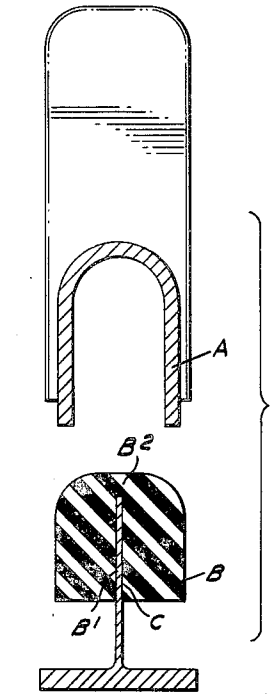


FIG. 2

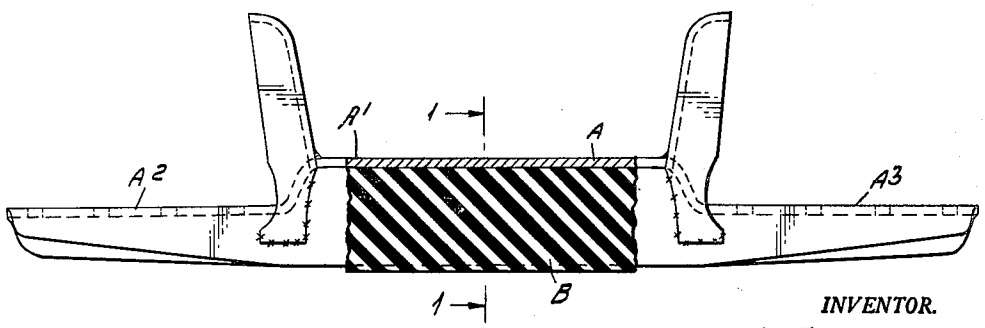


FIG. 4

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Feb. 9, 1960 F. L. HAUSHALTER 2,924,008

METHOD OF INSTALLING A RESILIENT CUSHION INSERT

Filed Oct. 24, 1955 2 Sheets-Sheet 2

FIG. 6

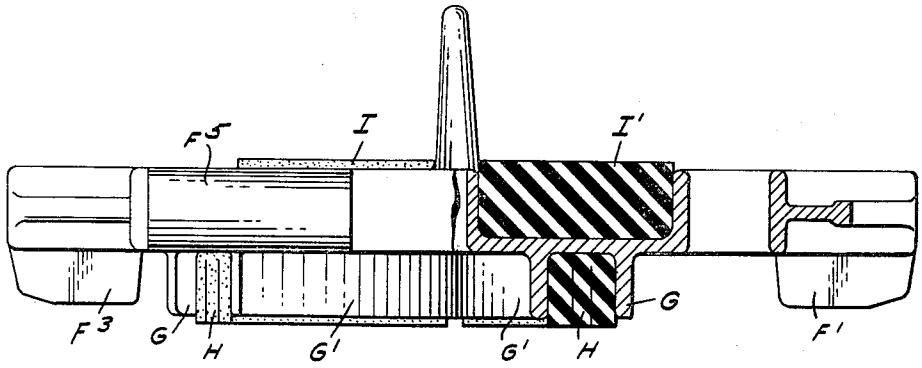
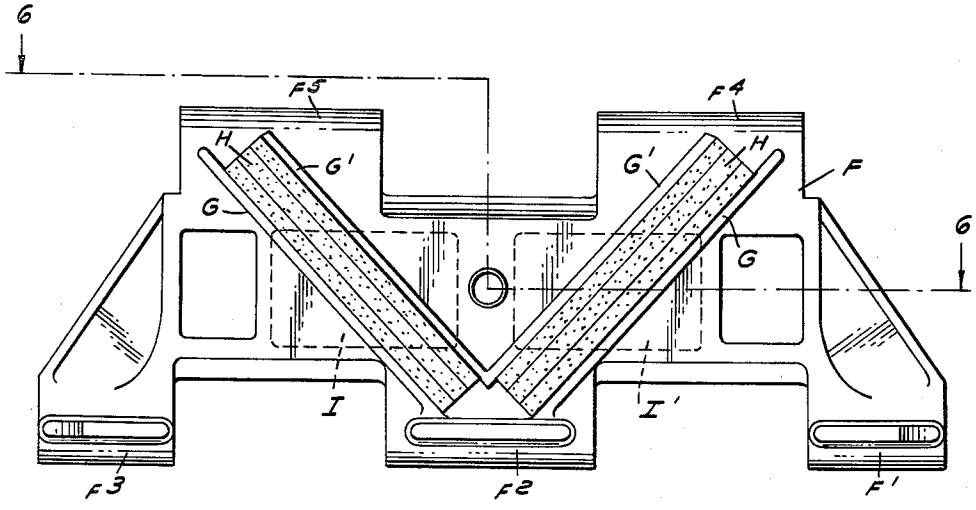


FIG. 5



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METHOD OF INSTALLING A RESILIENT CUSHION INSERT

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Application October 24, 1955, Serial No. 542,354

3 Claims. (Cl. 29—451)

The invention relates to a method of installing resilient cushion inserts within a recess in a rigid member which recess is less in width than the unstressed resilient member. This application forms a continuation-in-part of my pending applications for patents Serial No. 419,225, filed March 29, 1954, now Patent No. 2,795,036 and Serial No. 425,517 filed April 26, 1954, now Patent No. 2,795,037, each being on a vibration damper and including a cushion insert of rubber-like material. The invention consists in the method of installing the insert and pretensioning the same. With the foregoing in view, the invention consists in the construction and the method of forming the same as hereinafter set forth.

In the accompanying drawings:

Figure 1 is a cross section on line 1—1 of Figure 4 through a recessed rigid body having a prestressed rubber-like insert therein;

Figure 2 is a cross section illustrating one method of installing the insert within the rigid body and simultaneously pretensioning the same;

Figure 3 is a similar view showing a slightly modified construction;

Figure 4 is an elevation partly in section of a track bar for a caterpillar type tractor having a resilient cushion insert therein;

Figure 5 is a bottom plan view of one of the shoes of a modified type of caterpillar tractor having a pair of cushion inserts therein;

Figure 6 is a cross section on line 6—6 of Figure 5.

Figure 7 is a section similar to Figure 1 showing a modified construction.

The subject matter of each of my prior applications for patents above referred to, is a vibration damper which includes a pretensioned annular insert of rubber-like material. The pretensioning is obtained by forming the insert of greater cross-sectional width than that of the annular recess in which it is installed and then stretching said insert to reduce the width of the cross section thereof during installation. The walls of the recess are formed by relatively movable generally coaxial members which relative movements are cushioned by said insert. There are, however, many other structures in which it is desirable to place within a recessed rigid body a pretensioned resilient insert. For instance track shoes of caterpillar type tractors have been formed with inserts of rubber-like material which reduce wear when traveling over hard pavements. It has been the practice in forming these shoes to vulcanize the rubber to the metal portion of the shoe which adds a considerable item to the cost of manufacture. Also shrinkage of the insert by cooling after vulcanization is detrimental. With my method of installing the insert, vulcanization is unnecessary and instead of contraction of the installed insert, it is in effect under compression which increases its efficiency. There are other structures having rubber-like inserts in which it would be advantageous to avoid the necessity of vulcanization, and which would at the same time securely retain the insert from displacement.

The essential feature of my construction is that the resilient insert is formed of greater cross-sectional width than that of the recess in the rigid body in which it is installed. This involves the problem of assembly. If the rubber-like body were forced into the recess by pressure against its outer end, the frictional resistance developed between the rubber and the metal by expansion stresses within the former would be difficult to overcome and would probably result in injury to the insert. I have overcome this difficulty by stretching the insert in a direction transverse to its cross-sectional width, thereby reducing the width and the friction between the same and the metal. If, however, the insert is placed in a recess which is closed on all sides other than its entrance, the problem is how to effect this stretching. This I have accomplished by placing a thin member formed of rigid material, such as metal, within the body of the insert to extend from near the entrance end thereof to beyond the rear end. Pressure applied to the rear end of this rigid member will be transmitted to the forward end of the insert to force it into the recess, and frictional resistance by the walls of the recess will only have the effect of stretching the insert and thereby reducing its cross-sectional width.

As shown in Figure 1 the rigid member A is of U-shaped cross section to form a channel-shaped recess within which is placed the insert elongated resilient B. Figure 2 shows the insert B as originally of greater cross-sectional width than the recess within the member A. Such insert B is also provided centrally with a longitudinally extending thin slot B′ which extends in depth from its rear edge to within a short distance of its forward edge which as indicated at B^2 is rounded. C is a thin plate-like rigid member within the slot B′ extending rearward beyond the same. Thus pressure applied on the outer end of the member C will, as above stated, force the insert edgewise into the recess and at the same time stretch it so as to reduce its width. Figure 3 shows a modified construction in which the insert D has a pair of spaced slots D′, D^2 extending therein on opposite sides of the center thereof. The rigid member E has corresponding spaced thin plate-like rigid portions E′ and E^2 for engaging said slots. This will afford a more stable construction than that illustrated in Figure 2 for forcing the insert into the recess. With both constructions the insert will be stretched sufficiently to reduce its width to that of the recess and after complete insertion the rigid members C and E may be withdrawn, whereupon contraction of the stretched member will close the slots B′ and D′, D^2.

However, the contraction in stretched length required for closing the slots is less than the total stretching during insertion so that the insert is still under stress tending to expand the same transversely. This will insure sufficient frictional contact between the insert and the walls of the recess to retain the former without the necessity of vulcanization. As the pressure of the member E is applied to the central portion of the insert and as the side portions thereof are retarded by friction with the walls of the recess, this central portion will be advanced to a greater degree than the side portions. This would result in concaving the outer end of the insert and to avoid such result the central portion is originally extended rearward beyond the side portions. Thus the portion of the insert between the slots D′, D^2 projects rearward at D^3 beyond the portions outside of said slots. During insertion of the member D the friction of the spaced portions E′ and E^2 of the member E on the cen-

tral portion of the insert which is therebetween will draw this projecting portion D^3 inward so that its rear end will be more nearly in line with the side portions.

Figure 4 is a sectional elevation of one of the transversely extending track bars of a caterpillar type tractor and of which Figure 1 is a cross section. It will be noted that the bar A is of inverted U-shape cross section throughout its length but that the vertical depth in the central portion A' of the bar is greater than in the end portions A^2 and A^3 thereof. The insert B also extends the full length of the bar and is fashioned to correspond in depth to the portions A', A^2 and A^3 thereof. It is also provided with one or more longitudinally extending slots such as B', Figure 2, or D', D^2, Figure 3 which slots extend in depth from the lower edge of the insert to within a short distance from the upper edge thereof. Rigid members such as C or E engage these slots and form the means for prestretching the insert and engaging the same with the bar as above described. When these rigid members are withdrawn the insert will still be retained by the resilient stresses remaining therein.

The construction illustrated in Figures 5 and 6 is of a track shoe F having spaced projecting lugs F', F^2 and F^3 at one edge thereof and spaced lugs F^4 and F^5 projecting from the opposite edge for engaging the spaces between the aforesaid lugs in the next adjacent shoe and pivotally connected thereto. As heretofore constructed, these shoes are formed with triangular recesses in their under-faces for receiving rubber inserts vulcanized to the metal of the shoe. I have changed the construction by forming channel recesses each with parallel side walls and adjacent respectively with opposite oblique sides of the triangle extending to a common apex. These channels can either be formed in the original casting or, as shown, by spaced bars G and G' welded to the casting. Cushion inserts H of resilient rubber-like material are inserted edgewise within said channels by the method above described and by the use of thin rigid members which are in slots extending the full length of said members. Thus, the resilient stresses within the insert tending to expand it transversely will so increase the friction with the walls of the recess as to retain the insert without the necessity of vulcanization. Similar prestretched inserts may be placed in recesses in the top of the shoe, as indicated at I and I'.

For some uses it may be desirable to provide the walls of the recess with one or more inwardly projecting lugs which will be embedded in the insert and will assist in retaining the same. Such a construction is shown in Figure 7 in which the member A has portions J and J' thereof struck inward from opposite walls to form said lugs. The insert B may be installed by the method previously described during which the lugs J and J' will become embedded in the rubber.

What I claim as my invention is:

1. The method of anchoring without vulcanization an elongated resilient insert edgewise within a channel-shaped recess in a rigid body, comprising the steps of forming an elongated insert similar in configuration to but of greater cross sectional width than that of said channel-shaped recess with a longitudinally extending central portion thereof projecting rearwardly beyond the rear edge of said insert and with parallel longitudinally extending thin slots respectively upon opposite sides of said longitudinally extending rearwardly projecting central portion and extending in depth from the rear edge of said insert to within a short distance of its forward edge, inserting simultaneously into said spaced slots a pair of correspondingly spaced correspondingly thin rigid portions of a pressure exerting member so that said rearwardly projecting central portion will be received between said spaced thin rigid portions, moving the assembled pressure member and insert toward said rigid body to place the forward edge of said insert lengthwise against the mouth of said channel-shaped recess, applying a forward force to the pressure member to stretch the side portions of said insert disposed between said pressure member and the walls of said recess lengthwise of said spaced thin rigid portions to reduce the width of said side portions and simultaneously move said insert edgewise into said recess and move the rearwardly projecting central portion into said recess between the spaced slots therein while confining said central portion between said spaced rigid portions so that the rear edge of said central portion will be substantially flush with the rear edge of said insert after full insertion thereof into said recess, and withdrawing the thin rigid portions of said pressure member from said slots so that the latter will close automatically by contraction of said stretched insert and said insert will remain permanently in said recess under compression between and in frictional surface to surface engagement with opposite side walls of said recess.

2. The method of anchoring without vulcanization a resilient insert within a recess in a rigid body, comprising the steps of forming an insert similar in configuration to but of greater cross sectional width than that of said recess with a longitudinally extending central portion thereof projecting rearwardly beyond the rear surface of said insert and with parallel lengitudinally extending thin slots respectively upon opposite sides of said longitudinally extending rearwardly projecting central portion and extending in depth from the rear surface of said insert to within a short distance of its forward surface, inserting simultaneously into said spaced slots a pair of correspondingly spaced correspondingly thin plate-like rigid portions of a pressure exerting member so that said rearwardly projecting central portion will be received between said spaced thin rigid portions, moving the assembled pressure member and insert toward said rigid body to place the forward surface of said insert against the mouth of said channel-shaped recess, applying forward force to the pressure member to stretch the side portions of said insert disposed between said pressure member and the walls of said recess lengthwise of said spaced thin rigid plate-like portions to reduce the width of said insert and simultaneously move said insert into said recess and move the rearwardly projecting central portion into said recess between the spaced slots therein while maintaining unchanged the dimensions of said central portion so that the rear surface of said central portion will be substantially flush with the rear surface of said insert after full insertion into said recess, and withdrawing the thin rigid plate-like portions of said pressure member from said slots so that the latter will close automatically by contraction of said stretched insert and said insert will remain permanently in said recess under compression between and in frictional surface to surface engagement with opposite side walls of said recess.

3. The method of anchoring without vulcanization a portion of a resilient ground engaging traction element within an outwardly opening channel-shaped recess in a rigid portion of a track shoe for a caterpillar type tractor comprising the steps of forming an insert of greater width than that of said recess with side faces, said insert having a rearwardly projecting center portion and a thin slot on each side of said rearwardly projecting center portion, each slot being in alignment with a side face of said projecting center portion and being between said center portion and one of the said side faces of the insert, inserting simultaneously into said slots plate-like rigid portions of a pressure exerting member so that said rearwardly projecting center portion will be received between said rigid portions, moving the assembled pressure member and insert toward said rigid body to place the forward surface of said insert against the mouth of said channel-shaped recess, applying forward force to the pressure member to stretch the side portions only of said insert

into said recess and to move the rearwardly projecting center portion into said recess while maintaining unchanged the dimensions of said center portion, and withdrawing the plate-like rigid portions of said pressure member from said slots, so that the stretched portion aforesaid of said insert will remain permanently in said recess under stress between and in frictional surface to surface engagement with opposite side walls of said recess and so that the remaining portion of said insert will remain outside said recess to serve as a ground engaging traction element.

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