

Sept. 22, 1970

R. K. HILDEBRANDT
ELONGATED STRIP OF ELASTOMERIC MATERIAL WITH SPACED
METAL STRIPS EMBEDDED THEREIN

3,530,033

Filed Jan. 26, 1967

2 Sheets-Sheet 1

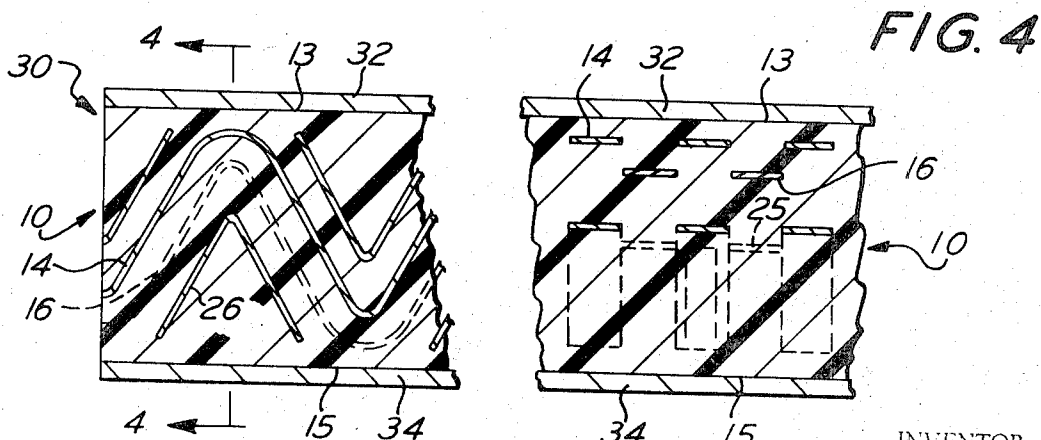
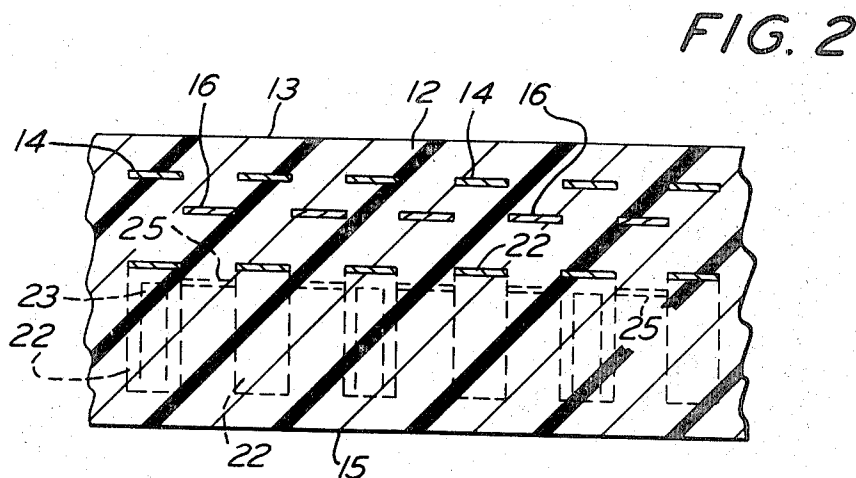
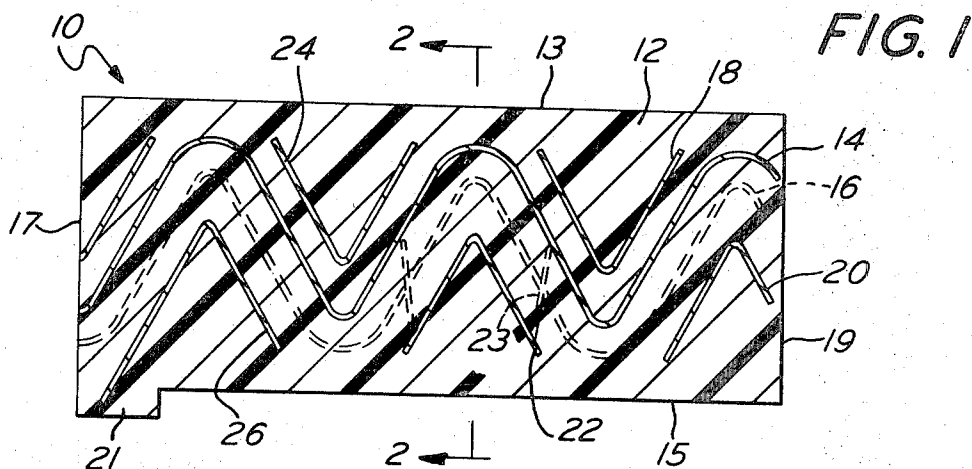


FIG. 3

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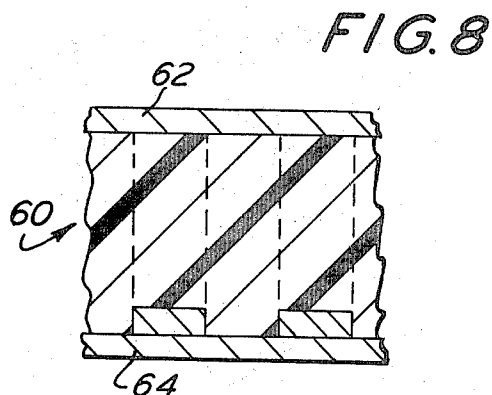
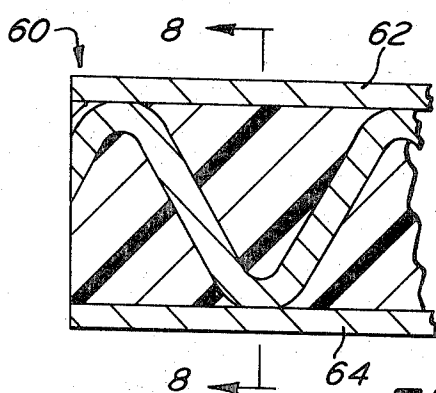
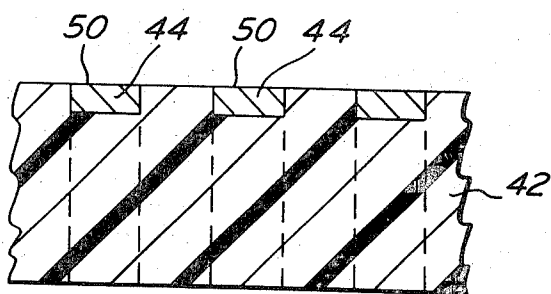
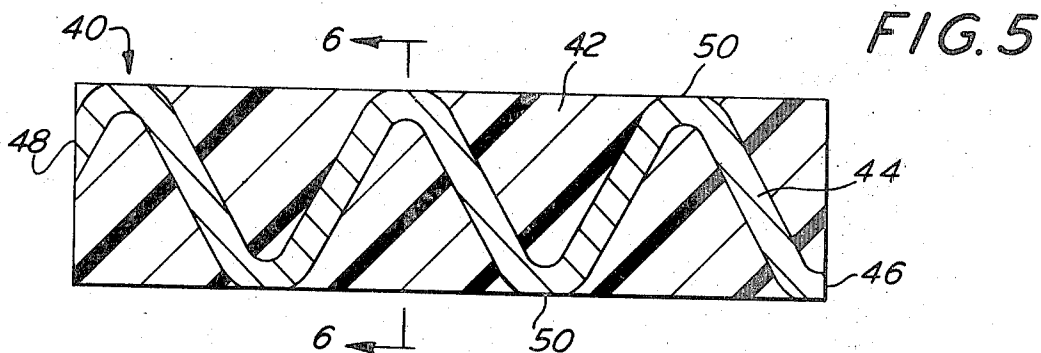
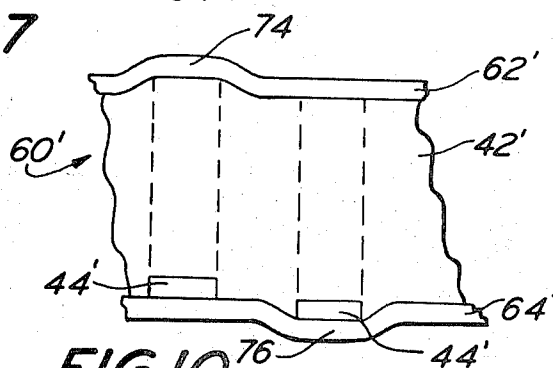
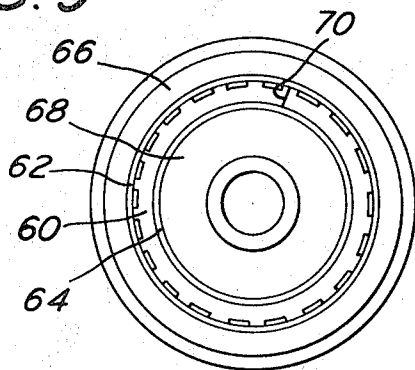


FIG. 9



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1

3,530,033

ELONGATED STRIP OF ELASTOMERIC MATERIAL WITH SPACED METAL STRIPS EMBEDDED THEREIN

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8 Claims

ABSTRACT OF THE DISCLOSURE

An elongated strip of resilient material provided with spaced parallel transversely extending reinforcement strips which perform the function of suppressing noise transmission across the major faces of the resilient strip. The major faces of the resilient strip may be coated with metal and the reinforcement strips may provide electrical continuity between the metal facings.

The present invention relates to a belt, and more particularly, to an elongated strip of resilient material which may be wound on a drum for storage. The material is adapted to be unwound from the drum as needed and the required length cut from the remainder. The resilient strip is reinforced with material extending transversely of the resilient strip. The reinforcement is preferably in the form of a plurality of strips at different levels and transversely disposed along the resilient strip at spaced points therealong. In this manner, the resilient strip may be wound on a drum without unduly flexing or bending the reinforcement material.

The resilient strip may be provided with a metal layer on its major faces to facilitate joining the strip to metallic surfaces. If desired, the reinforcement may be electrically conductive material contacting the metal layers on the opposite faces of the resilient strip.

It is an object of the present invention to provide an elongated resilient strip internally reinforced to suppress transmission of noise across the major faces of the resilient strip.

It is another object of the present invention to provide a resilient strip having noise suppression material embedded therein and extending transversely of the strip so that the strip may be wound on a drum, spool or the like.

It is another object of the present invention to provide a prefabricated elongated strip of material which may be cut to the desired length and applied between two members for suppression of noise and vibration between the two members.

Other objects will appear hereinafter.

For the purpose of illustrating the invention, there are shown in the drawings forms which are presently preferred; it being understood, however, that this invention is not limited to the precise arrangements and instrumentalities shown.

FIG. 1 is a cross-sectional view of a first embodiment of the belt of the present invention.

FIG. 2 is a sectional view taken along the line 2—2 in FIG. 1.

FIG. 3 is a partial sectional view similar to FIG. 1 but illustrating another embodiment of the present invention.

FIG. 4 is a view taken along the line 4—4 in FIG. 3.

FIG. 5 is a transverse sectional view similar to FIG. 1 but illustrating another embodiment of the present invention.

FIG. 6 is a sectional view taken along the line 6—6 in FIG. 5.

2

FIG. 7 is a partial sectional view similar to FIG. 5 but illustrating another embodiment of the present invention.

FIG. 8 is a sectional view taken along the line 8—8 in FIG. 7.

FIG. 9 is a plan view of two members connected together by the strip disclosed in FIGS. 7 and 8 to prevent transmission of noise between the members.

FIG. 10 is a partial side elevation of another embodiment of the belt of the present invention.

Referring to the drawing in detail, wherein like numerals indicate like elements, there is shown in FIG. 1 a transverse sectional view of a belt designated generally as 10 in accordance with one embodiment of the present invention. The belt 10 includes a body of resilient material 12 having a top face 13, bottom face 15, and side faces 17 and 19. The body 12 is preferably an elastomeric material such as silicone rubber, polysulfide compositions, flexible epoxy resins, polyurethanes, etc. depending on the temperature to which it is to be subjected and the desired cost of the belt. Thus, polyurethane is cheaper and easier to handle but has a lower useful temperature range than silicone rubber.

The body 12 is internally reinforced by spaced parallel transversely extending strips such as metal strips 14 and 16. As shown more clearly in FIG. 1, strips 14 and 16 are undulating strips simulating a sine wave with crests and valleys. In each of the valleys, there is provided a generally V-shaped reinforcement strip 18, 20, 22, 24 and 26. As shown more clearly in FIG. 2, the strips 14—26 are spaced from one another by a distance corresponding to the width of the strips measured in a longitudinal direction along the belt 10. Strips 16 are longitudinally offset with respect to strips 14, 20 and 22. None of the strips are parallel to the top face, bottom face, or the side faces of the belt 10.

The body 12 may be provided with a longitudinally extending rib 21 into which strip 26 extends. Rib 21 may be positioned at any desired location on bottom face 15. Rib 21 assists in preventing slippage between the belt and a member joined to it. The strips 14—26 may be spring steel, spring bronze, aluminum, etc.

The belt 10 may be made by positioning the strips 14—26 into a mold wider than belt 10 with the strips 14—26 extending transversely of the mold. Strip 22 could be provided with struck out portions 23 which are used to space strip 14 from strip 22. Alternatively, the ends of the strips could be supported by the mold. To facilitate easier handling and rapid placement in the mold, all of the strips such as strips 22 could be interconnected by webs 25. The body 12 would then be poured into the mold to envelope the strips. Thereafter, the cooled and cured mass would be cut into parallel lengths to form a plurality of belts 10.

In FIGS. 3 and 4, there is illustrated another embodiment of the present invention wherein the belt is designated generally as 30. The belt 30 comprises the belt 10 modified so as to have a layer 32 joined to the top face 13 and a layer 34 joined to the bottom face 15. The body 12 may be joined to the layers 32 and 34 by vulcanization, adhesives, epoxy resins, etc. Layers 32 and 34 may be metal and facilitate joining the belt 30 to metal members. In this manner, the belt 30 may be joined to the metal members by conventional metal-to-metal joining processes such as welding. If the two metal members to be joined by the belt are steel, layers 32 and 34 can also be steel or other materials readily joinable to steel. Belt 30 may otherwise be identical with belt 10.

In FIG. 5, there is illustrated another embodiment of the present invention designated generally as 40. The belt 40 includes a body 42 having a top face, bottom face and

3

side faces. Spaced parallel strips extend transversely across the body 42 as described above. However, the strips 44 extend between the side faces of the body 42 so that their ends 46 and 48 are exposed. Also, the crests 50 of the strips 44 are exposed on the top face and bottom face of the body 42. The strips 44 are preferably made from a good electrical conductor such as aluminum or copper. When the belt 40 is utilized to join two metal members, the metal members will be electrically coupled together by way of the strip 44.

In FIGS. 7 and 8, there is illustrated another embodiment of the present invention wherein the belt is designated generally as 60. The belt 60 comprises belt 40 having a metal layer 62 joined to the top face of the belt 40 and a metal layer 64 joined to the bottom face of the belt 40. Metal layers 62 and 64 may be made from good electrical conductors such as aluminum or copper. The metal layers 62 and 64 may be joined to the belt 40 by vulcanizing, adhesives, epoxy, resins, or spot welding the metal layers to the crests 50 on the strips 44. The purpose of layers 62 and 64 corresponds to that of the layers 32 and 34.

In each of the embodiments of the present invention, the strips extend transversely across the belts at spaced points along the belts. As shown more clearly in FIG. 9, the ring-shaped metal member 68 is joined to the ring-shaped metal member 66 by belt 60. Thus, the metal layer 64 is metallurgically joined to the metal member 68 and the metal layer 62 is metallurgically joined to the member 66. The belts described above are elongated lengths. The length of the belt 60 required to join metal members 66 and 68 is first calculated and then cut from the indefinite length. The ends of the belt 60 are joined together at joint 70 by adhesives, epoxy resins, etc.

Thus, the belts of the present invention are prefabricated belts which may be bent into a circular shape for joining round members and act as a sound suppression barrier for noise and vibrations adapted to be transmitted between the members. By having a prefabricated belt of elongated indefinite length, the step of joining the metal members may be more rapidly done and requires a minimum of equipment and offers other advantages over a process wherein the sound suppression barrier is cast or molded in place between the metal members. In addition the provision of belts of elongated indefinite length facilitates joining flat, straight and irregular shaped metal members with a sound suppression barrier. The elastomeric material has noise suppression properties. These properties are supplemented by the metallic strips which reflect the noise and vibrations until they are eventually absorbed by the body of elastomeric material. As will be apparent from FIG. 1, vibrations can be reflected or ricocheted back and forth from the strips until eventually absorbed.

In FIG. 10, there is illustrated a partial side elevation view of belt 60' which is identical with belt 60 except as set forth hereinafter. Belt 60' has projections on at least one of the top and bottom faces. As illustrated, the top face has an integral projection 74 and the bottom face has an integral projection 76. The projections 74 and 76 extend transversely across the belt 60' at spaced locations therealong. The purpose of the projections 74 and 76 is to enable the belt 60' to accommodate itself to recesses or

4

projections on the metal members to be joined by belt 60'. Belt 60' is desirably utilized when the metal members are subjected to substantial torques. Thus, belt 60' can withstand greater torques and shear stresses. Any of the other belts can be provided with projections like projections 74 and 76.

The present invention may be embodied in other specific forms without departing from the spirit or essential attributes thereof.

It is claimed:

1. A noise suppression belt comprising a body substantially longer than its width, said body being of elastomeric material having top and bottom faces extending from and being wider than the height of side faces thereof, strips embedded in said body of elastomeric material, said strips being spaced and parallel to one another and generally perpendicular to said side faces, said strips extending transversely across the body of elastomeric material at spaced points along the length of the body, said strips having their major faces opposite one of the top and bottom surfaces, said strips being undulating with the undulations of the strips being in a vertical plane, adjacent crests of the undulations being on opposite sides of median plane between the top and bottom faces.

2. A belt in accordance with claim 1 including a second set of strips disposed above the first-mentioned strips at said spaced points along the length of the body, all of said strips being made from a flexible metal.

3. A belt in accordance with claim 2 wherein some of said strips are longitudinally offset with respect to others of said strips.

4. A belt in accordance with claim 4 wherein said strips are made from a good electrical conductor, with crests of the undulations being coupled to one of the metal layers.

5. A belt in accordance with claim 5 wherein adjacent crests on one of said strips are in intimate contact with each of said metal layers.

6. A belt in accordance with claim 5 wherein adjacent crests on one of said strips are in intimate contact with each of said metal layers.

7. A belt in accordance with claim 1 including integral projections on at least one of the top and bottom faces of the body at spaced points therealong.

8. A belt in accordance with claim 1 including a longitudinal rib on one face of the body.

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