

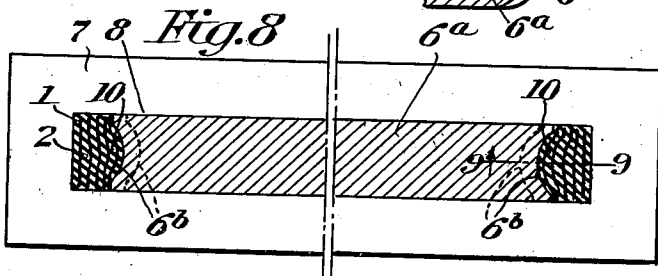
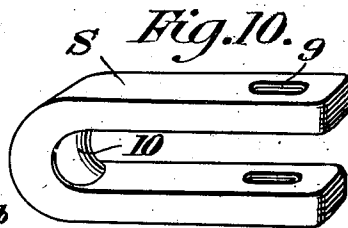
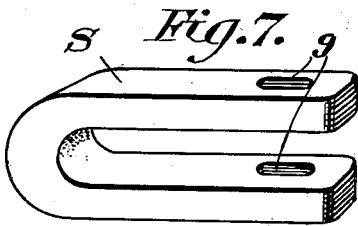
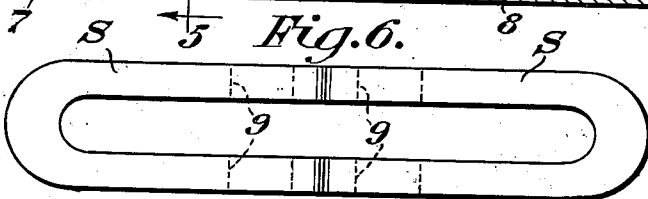
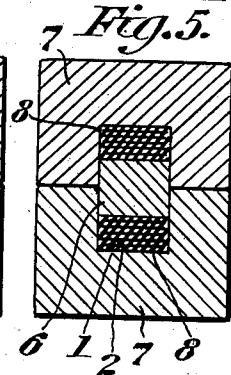
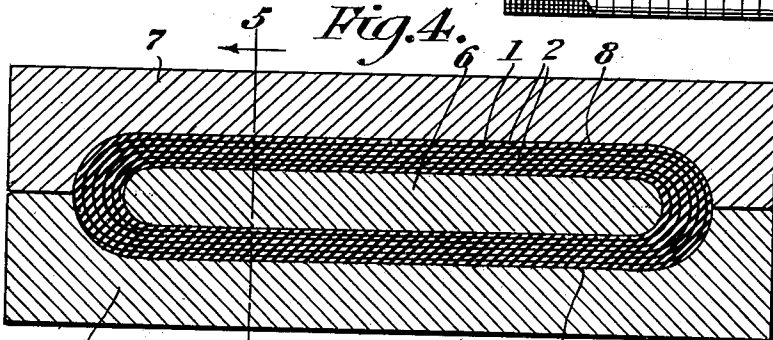
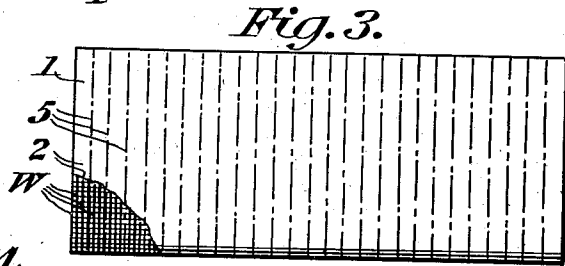
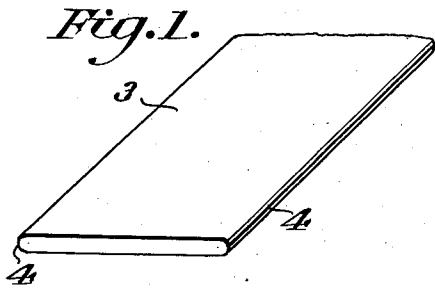
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2,119,479

LUG STRAP

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LUG STRAP

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2 Claims. (Cl. 139—153)

This invention relates more particularly to improvements in lug straps of laminated construction wherein superposed plies of fabric are united by a bonding material to form the strap.

Important objects of the invention are, to provide a very durable lug strap of the said character; to provide such a strap constructed for even distribution of working stress throughout the different plies of fabric; to provide for improved simplified construction of the bend or bow portion of such a strap; and to provide an improved method of making a lug strap of the said laminated type.

Other objects of the invention will appear hereinafter.

In the drawing, Fig. 1 is a perspective view of a core member employed for winding thereon a fabric sheet coated with a bonding material, as a step in lug strap manufacture;

Fig. 2 a cross sectional view of the said core and showing diagrammatically the fabric wound therearound;

Fig. 3 a plan view of the sleeve formed by the wound fabric, with dot and dash lines indicating the transverse severing of the sleeve to form a multitude of double straps;

Fig. 4 a sectional view showing the molding of a double lug strap;

Fig. 5 a transverse section on the line 5—5 of Fig. 4;

Fig. 6 a plan view of a molded double strap;

Fig. 7 a perspective view of a finished single strap;

Fig. 8 a partial sectional view similar to Fig. 4, but on a central plane at a right angle thereto, showing the molding of a double lug strap with integral convex cushions within its bends;

Fig. 9 a detail sectional view of an end of the mold core, taken on the line 9—9 of Fig. 8; and

Fig. 10 a perspective view of the lug strap with such a convex cushion.

Lug straps in use heretofore have customarily been made of leather or wood, bent into shape, or of canvas duck or ticking. In the employment of the latter material it has been customary to roll the fabric spirally, cement it with glue and then bend and mold the roll so formed into the desired U form. In the employment of any of said materials the bending thereof into U-shape materially impaired their strength owing to the fact that the material at the outside of the bend would be stretched and the material at the interior of the bend would be compressed or cramped. Consequently the lug strap would be incapable of uniformly distributed resistance to working stress

and its life would be materially shortened. Particularly in the case of straps constructed of fabric and glue some layers of the fabric became stretched and others became wrinkled so that only the middle layers were in a normal condition of tension, with consequent concentration of stress and injurious strain. Efforts were made to overcome this defect but they involved laborious and costly methods of construction and failed to avoid liability of flawed construction. The employment of glue in the structure of the strap is also objectionable for the reasons that the glue tends at times to soften under the humidity of the weave room and at other times it cracks under the shocks and flexure to which the strap is subjected in service and in handling.

My invention overcomes the defects noted and provides a strong, durable lug strap and a convenient and comparatively inexpensive method for manufacturing lug straps in large quantities and with minimum liability of flawed construction. The invention also provides a lug strap made of such material as to render the strap free from attack by rodents and having other advantages which will appear hereinafter.

In the manufacture of lug straps embodying the improved construction I select a wide sheet of square-woven textile fabric with maximum warp strength and with pick strength consistent with easy handling. Both sides of this sheet are coated with a bonding material which is preferably a rubber composition capable of being vulcanized to a hard state and having a low viscosity prior to vulcanization. Other bonding materials having the required thermo-flowing and setting properties may be employed but rubber is preferred, for reasons which will appear hereinafter.

The sheet, coated with the rubber composition is wound around a core whose cross section conforms substantially to the interior of an elongated loop such as would be defined by placing two U-shaped lug straps end to end. The side edges of the core are rounded, as at 4, in accordance with the curvature of the interior of the bend or bow of the lug strap. An oak plank so formed will serve satisfactorily for the core. As the sheet is wound it is kept sufficiently taut for smoothness, and the winding is continued to form a number of superposed plies sufficient to build the structure up to a desired thickness exceeding that of the finished lug strap. The sheet should be wound with its warp threads or strands, designated W in Fig. 3, running straight lengthwise of the windings, around the core. Thus the coated sheet is formed into a flat, multi-ply sleeve

with the plies lying smoothly one upon another. This sleeve is removed from the core 1 and severed along the transverse lines 5 equally spaced along the sleeve to thereby provide a multitude of elongated flat loops each conforming substantially to a pair of lug straps arranged end to end. Preferably the width of these partly formed double straps cut from the sleeve, that is, their width between the lines 5 is about one thirty-second of an inch less than that desired for the finished strap.

Each double strap is next subjected to a molding and preliminary vulcanizing operation. This molding and vulcanizing operation is performed to mold the strap to the desired shape and cross sectional dimensions, bond together the plies and vulcanize the rubber composition to a preliminary soft rubber state.

In preparation for the molding and vulcanizing operation a mold core 6 of steel or other suitable material is fitted into the loop defined by the double strap. This core should have precisely the shape and dimensions desired for the interior of the strap. As shown, the core has flat sides and properly rounded ends. The strap and core are placed between opposed blocks 7 of a split mold. Said blocks have in their opposed faces elongated cavities 8 with rounded ends and conform exactly to the desired shape and dimensions of the exterior of the strap. The plane of separation of the blocks occurs at the center of the bends of the strap, and the dimensions of the cavities 8 and of the core 6 are so correlated that when the mold is closed the space between the rounded ends of the core and the rounded ends of the cavities materially exceeds the space between the flat sides of the core and the flat bottoms of the cavities.

The molding operation is performed under heat and pressure to vulcanize the rubber to a preliminary, soft rubber state. Due to the shape and proportions of the parts of the mold, when the mold is closed, the flat, leg-forming portions of the strap will be subjected to greater compression than the bends of the strap, and excess bonding material will be flowed from said flat portions into the bends. Thereby the bends, while also compressed, are made thicker and less dense than the leg-forming portions. The pressure throughout the entire strap is sufficient to unite the plies intimately and evenly.

The molded double strap is next removed from the mold, the core 6 is withdrawn, the strap is cooled and excess, overflow rubber is trimmed off. The double strap is severed in the middle to form two single straps S. Also, the usual slots 9 are made in the legs of the strap either before or after severance. Finally the vulcanization of the rubber is completed to bring it to a hard state. This may be done by subjecting the completely formed straps to dry heat in a suitable oven.

The employment of the materials and the method described produces a superior strap which satisfies all service requirements. Hard rubber is a very satisfactory material because of its non-brittle nature, its high tensile strength, its imperviousness to weave, room humidity and also because rodents will not eat it. The arrangement of the fabric with its warp threads running lengthwise of the strap contributes to tensile strength, and the manner in which the coated fabric is preformed into straps by continuous, smooth, winding of the sheet 1 ensures even distribution of tension throughout all of the plies. It will be obvious that the preforming operation

is performed in a manner to reduce liability of unevenness in the plies to a minimum. The usual stretching of the plies at the outside of the bow of the strip and the cramping and buckling of the plies at the inner side of the bow is entirely avoided in a simple manner by my preforming method. Substantially all fabric plies employed in the structure of the strap extend continuously throughout the length of both legs of the strap and around the bow. A desired excess thickness of the bow of the strap is obtained by flowing excess bonding material into the bow. This avoids employment of short plies of fabric to build up the thickness of the bow. The thickened bow provides the required cushioning effect. Also while of less density than the legs of the strap the bow has adequate total strength due to its increased thickness.

Due to the fact that the fabric is coated upon both sides with the rubber composition and due also to the fact that the composition is confined in the molding operation the finished strap contains much more of the composition than is required for mere bonding. It comprises a large part of the strap, as shown, and forms a matrix enveloping the fabric. This matrix is hard, tough, non-friable, resilient and moisture-impervious. It surrounds the individual threads of the fabric and is reinforced throughout the strap by the fabric plies.

If a plug, not shown, is required for the interior of the bow of the strap it may be fitted, drilled and riveted into place.

It is also possible to form a satisfactory convex cushion in the bow of the strap in a very simple manner. This may be done as shown in Fig. 8 by provision of a mold core 6^a similar to the core 6 except that it has concave ends 6^b conforming to the desired shape of the cushion. The molding pressure causes the fabric and excess bonding material to fill the concavities of the core and form the integral cushions 10. Otherwise the strap with the convex cushion is formed in precisely the same manner as the strap previously described.

What I claim is:

1. A lug strap comprising a U-shaped body formed of a moldable composition of controllable hardness having a rubber base, and a multiplicity of reinforcing plies of woven fabric laid in U-form, one within another successively within the U and evenly distributed in closed spaced relation throughout the thickness of said body and each ply extending the length of both legs of the strap and around the bow and having its warp threads running straight longitudinally of the strap, said moldable composition being compressed, molded and vulcanized and impregnating the fabric of the plies and forming a hard, tough, non-friable, resilient and moisture-impervious matrix enveloping the plies and surrounding the individual threads of the fabric of the plies and reinforced by the plies throughout the entire strap, the number of plies in the bow being the same as in the legs, the moldable composition being of greater thickness in the bow than in the legs of the strap, and the bow being less hard than the legs.

2. A lug strap comprising a U-shaped body formed of a moldable composition of controllable hardness having a rubber base, and a multiplicity of reinforcing plies of woven fabric laid in U-form, one within another successively within the U and evenly distributed in closely spaced relation throughout the thickness of said body and each

ply extending the length of both legs of the strap and around the bow, said moldable composition being compressed, molded and vulcanized and impregnating the fabric of the plies and forming a hard, tough, non-friable, resilient and moisture-impervious matrix enveloping the plies and surrounding the individual threads of the fabric of

the plies and reinforced by the plies throughout the entire strap, the number of plies in the bow being the same as in the legs; the moldable composition being of greater thickness in the bow than in the legs of the strap, and the bow being less hard than the legs.

HENRY MILES BACON.