

Dec. 28, 1954

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CHECK STRAP FOR LOOMS
Filed Feb. 9, 1949

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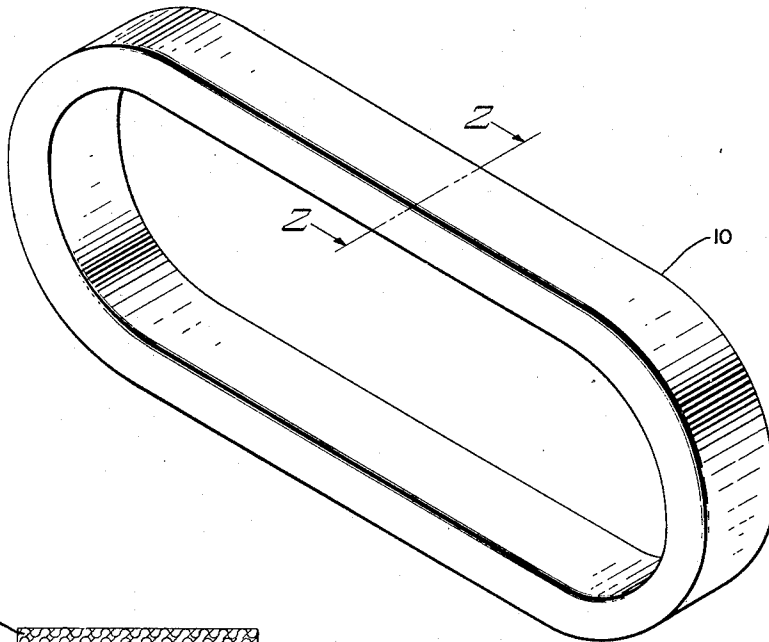
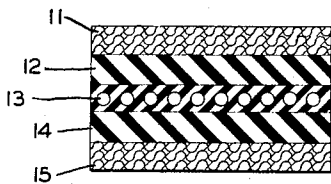


Fig. 2

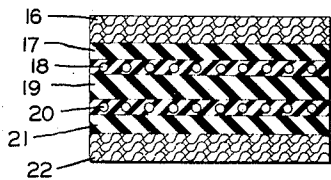


Fig. 3

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CHECK STRAP FOR LOOMS

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Application February 9, 1949, Serial No. 75,387

4 Claims. (Cl. 139—161)

The present invention relates to check straps for looms and more particularly to check straps for fly shuttle looms which are designed to check rearward motion of the picker stick caused by impact of the shuttle, as well as forward motion of the picker stick after it has thrown the shuttle in its return through the loom.

Straps of this type have previously been made of leather either in the form of a strap having the ends bolted together and to the loom frame to form a loop, or in the form of an endless band which surrounds the stick and is supported by friction fingers which restrain movement of the strap under the impact of the picker stick. In order to obtain uniform action of the shuttle it is important that the performance of the check strap should also be uniform. Since the strap is subjected to repeated impacts of the rapidly moving picker stick it must have sufficient strength, flexibility and resilience to provide the necessary restraining action upon the stick without excessive wear and without excessive frictional drag. Furthermore, the strap must not be sensitive to changes in temperature or humidity as is generally the case with leather.

The object of the present invention is to provide a check strap which will not be subjected to the above disadvantages and which will have long life, flexibility, the correct frictional resistance and resiliency, and which shall not be sensitive to changes in temperature and humidity.

In accordance with my invention, a check strap having an endless annular form is provided having a novel construction and which will have a long life while avoiding the objections to the use of leather. This endless type of check strap is particularly adapted for mounting in association with friction fingers in a manner such that each blow of the stick causes the strap to move an increment so that the strap is progressively moved in a horizontal step by step manner between the friction fingers. In this manner each impact is taken by a different point on the strap. In such a strap it is important to have a maximum of strength, flexibility and impact resistance, and also to provide a uniform rate of movement under impact.

These results are obtained by forming a continuous strap composed of successive layers of fabric, rubber and cord, in which the outer surface layers of the strap are formed of one or more layers of fabric and one or more intermediate layers of longitudinally arranged reinforcing members, such as layers of parallel cords, the cord layers being separated from the outer fabric layers by cushioning layers of rubber.

The accompanying drawings illustrate the various forms of my invention in greater detail.

Referring to the drawings:

Fig. 1 illustrates the endless annular check strap of the present invention in perspective.

Fig. 2 is a cross sectional view of one form of the invention taken along line 2—2 of Fig. 1.

Fig. 3 is a cross sectional view of another form of the invention taken along line 2—2 of Fig. 1.

The strap shown at 10 in Fig. 1 is illustrated in a tensed and elongated position. In practice, the strap is disposed with the loop in a horizontal plane with the picker stick positioned within the loop. The strap is supported between friction fingers and is moved in a step by step manner between the fingers as the stick strikes the inner wall.

Two forms of strap construction are illustrated in Figs. 2 and 3. It is generally preferable to make these straps by first forming a cylindrical sleeve of the desired dimensions made up of the various layers of materials, and

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then cut the sleeve into a plurality of bands or straps of the desired width and having a rectangular cross section. In the manufacture of the straps by this method, a drum or mandrel is selected having a diameter conforming to the desired inner diameter of the strap. This mandrel is then wrapped with one or more layers of fabric as shown at 15 in Fig. 1 and 22 in Fig. 3. This fabric may be rubberized, or impregnated with rubber, either natural or synthetic, and may, if desired, have a skin surface coating of rubber. The fabric may be square woven, and either bias laid or straight laid, depending upon the specific ultimate properties desired. If desired, bias and straight laid fabric layers may be alternated. One or more layers of fabric may be applied to the drum. The term "bias laid" means that the fabric is cut at an angle to the direction of the threads or cords thereof and is applied to the drum with the threads at an acute angle to the longitudinal axis of the drum.

Over the fabric layer or layers is superimposed a cushion layer of rubber shown at 14 in Fig. 2 and 21 in Fig. 3. Upon the cushion layer is then wound a layer of cords shown at 13 in Fig. 2 and 20 in Fig. 3. These cords may be of cotton, rayon or nylon and preferably have been preliminarily treated or impregnated to improve their adhesive properties for rubber. This treatment may be by impregnation with rubber latex or rubber solutions, or with a resorcinol formaldehyde latex composition as used in the treatment of tire cord. The cord is wound spirally around the drum in a continuous manner, and the windings may be contiguous or spaced as desired. The cord may be woven together and placed around the drum as a cord fabric and may be applied embedded in rubber.

Another cushioning layer of rubber is then applied over the cord layer as shown at 12 in Fig. 2 and 19 in Fig. 3. In the form shown in Fig. 2 one or more fabric layers 11 are then wound around cushion layer 12. These are preferably rubberized as in the case of Figure 15 and may be of the same or different construction. The number of layers of fabric on the outer layer may be the same as or more or less than those on the inner layer. In the modification shown in Fig. 3 an additional layer of cords 18 is applied followed by another cushioning rubber layer 17 prior to application of fabric layer or layers 16. For certain applications it may be desirable to provide more than two cord layers, each layer being separated from the other by a cushioning layer of rubber.

The assembly of the laminated layers described above is now ready for vulcanization. Preparatory to this it is rag wrapped to place the respective layers under pressure in order to obtain a unitary structure after vulcanization. This is accomplished by tightly winding strips of heavy fabric known as rag wrap material around the assembly. The wrapped drum is then placed in an autoclave where it is vulcanized in the presence of steam in a conventional manner. The various rubber materials have, of course, been compounded with vulcanizing agents, acceleratory agents, pigments, fillers and the like as is well known in the art.

After vulcanization the assembly is taken from the autoclave and the wrapping removed. The cylindrical composite sleeve while on the mandrel is then cut into a plurality of bands or straps of the desired width, being severed circumferentially by means of knives spaced at the desired distance and the resulting check straps removed from the mandrel. As shown in Figures 2 and 3, the side edges of the respective layers are exposed by the severing operation.

It may be noted that in the drawings in Fig. 2, for example, layers 12, 13 and 14 are shown as separate and distinct. This is for the purpose of illustration only since during the vulcanization process the whole is fused into one integral unit with the fabric layers becoming bonded to each other and to the adjacent rubber layers, while the rubber layers become integral with the cords embedded therebetween. The cords are shown as embedded in a rubber layer, but where the cord is wound directly on the cushion layer and then the other cushion layer is applied thereover, the cords may be considered to be embedded between these two layers. The resultant product of Fig. 2 will, therefore, consist of fabric layers, a cushion layer, a row of cords, another cushion layer above the cords, and

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other fabric layers, with the cord embedded between the cushion layers which are integrally united.

Check straps for looms corresponding to the structure shown in Fig. 2 were formed as follows:

- 5 plies rubberized square woven 8 oz. cotton fabric, bias laid
- 1 ply cushion layer of neoprene
- 1 ply rayon cord .053 gauge
- 1 ply cushion layer of neoprene
- 6 plies rubberized square woven 8 oz. cotton fabric, bias laid

The above layers were assembled on a drum in the order given and wrapped, vulcanized and cut in the manner described above to form a number of check straps 9 inches long, 1/2 inch wide and 1/4 inch thick.

Other check straps conforming to Fig. 3 of the drawing were formed as follows:

- 4 plies 8 oz. enameling duck square woven, bias laid, .020 to .025 gauge per ply, skim layer of gum on each side
- 1 ply .012 gauge butadiene acrylic nitrile copolymer rubber (Hycar)
- 1 ply cotton cord .022 gauge
- 1 ply Hycar .012 gauge
- 1 ply cotton cord .022 gauge
- 2 plies 8 oz. enameling duck as above

The above layers were assembled on a drum, as described above, and vulcanized, then cut to form straps 13 1/4 inches wide, 1/16 inch thick and 26 inches long.

In preparing the cushioning layers described herein, or in rubberizing the fabric or cords, either natural or synthetic rubbers as well known to the art may be used. The term "rubber" as used herein is intended to and does include the natural rubbers as well as the synthetic rubberlike and vulcanizable elastic materials known as synthetic rubbers including the rubberlike conjugated butadiene hydrocarbon polymers and copolymers with styrene, acrylonitrile and other monomers copolymerizable therewith containing an active $\text{CH}_2=\text{C}<$ group, the halogenated diolefin polymers of the chloroprene type known as neoprene, the polysulfide rubbers of the thiokol type, and the isobutylene-diolefin copolymers of the butyl rubber type.

For some purposes it may be desirable to substitute a fabric layer for the cord layer and it has been possible to fabricate check straps of this type consisting of a plurality of layers of fabric each separated from the other by cushioning layers of rubber. In general it is preferred to have rubberized fabric on the outer surfaces of the strap due to their high resistance to friction and abrasion. In some cases, however, it may be desirable to have the surface layers of rubber superimposed upon the outer fabric layers. The fabric may thus be considered as embedded in rubber. The cords referred to herein are generally composed of natural or synthetic textile fibers, usually cotton, rayon, or nylon. Instead of being spun or woven, the cords may in the case of synthetic material be of the extruded type. In some cases it may be desirable to utilize as cords, woven or cabled wires of steel or other metal.

While the foregoing structure has been described in connection with a continuous annular member, it may also be utilized in the fabrication of check straps of other types, for example, where a strap is used which is fastened at both ends to the loom.

The foregoing disclosure sets forth the principles of the invention and any other modifications thereof which may come within the scope of the invention are intended to be covered by the appended claims.

I claim:

1. A loom check strap for restraining the movement of a picker stick therebetween comprising a continuous, end-

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less annular cylindrical segment having a rectangular cross section comprising an inner surface layer composed of at least one layer of rubberized woven fabric, a cushioning layer of rubber superimposed upon said inner surface layer, an intermediate layer comprising a plurality of parallel longitudinally arranged reinforcing cords, a cushioning layer of rubber superimposed upon said cord layer, and an outer surface layer comprising at least one layer of rubberized woven fabric, all of said layers being integrally united by vulcanization under pressure to form a laminated member having a normally cylindrical configuration and each of said layers having exposed edges along both sides of the strap, said strap being adapted to be disposed between friction members in a checking mechanism in a tensed, elongated position with its inner and outer surfaces in contact with said friction members.

2. A check strap according to claim 1 wherein the outer and inner surface layers comprise from two to five layers of rubberized fabric.

3. A loom check strap for restraining the movement of a picker stick positioned therebetween and consisting of a continuous, endless annular cylindrical segment having a rectangular cross section comprising inner and outer wear-resistant surface layers composed of square-woven bias laid textile fabric material, an intermediate layer of spirally wound textile cord impregnated with a material promoting adhesion of said cord to rubber, said cord providing longitudinal resistance to stretching of said strap, and layers of rubber positioned between said cord layer and said surface layers spaced and separating said cord layer from said surface layers to provide resilient cushioning of said cords, all of said layers being integrally united by vulcanization under pressure to form a laminated member having a normally cylindrical configuration, said layers having exposed edges along the sides of the strap, said strap being adapted to be disposed between friction members in a checking mechanism in a tensed, elongated position with its inner and outer surfaces in sliding contact with said friction members.

4. A loom check strap for restraining the movement of a picker stick therebetween comprising a continuous, endless, annular, cylindrical segment having a rectangular cross section, comprising an inner surface layer composed of at least one layer of rubberized woven fabric, a cushioning layer of rubber superimposed upon said inner surface layer, a plurality of intermediate layers of parallel longitudinally arranged cords each of said cord layers being spaced and separated from each other by cushioning layers of rubber, a cushioning layer of rubber superimposed upon the outermost cord layer, and an outer surface layer comprising at least one layer of rubberized woven fabric, all of said layers being integrally united by vulcanization under pressure to form a laminated strap member having a normally cylindrical configuration, said strap being adapted to be disposed between friction members in a tensed, elongated position with its inner and outer surfaces in contact with said friction members.

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