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[54] **FRICTION COVERING MATERIAL FOR WEAR SURFACES OF SHUTTLE CHECKING DEVICES**

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[51] **Int. Cl.** **D03d 49/54**

[58] **Field of Search** ..... 139/161 S, 183–187, 139/425; 161/78, 79, 88, 89, 91

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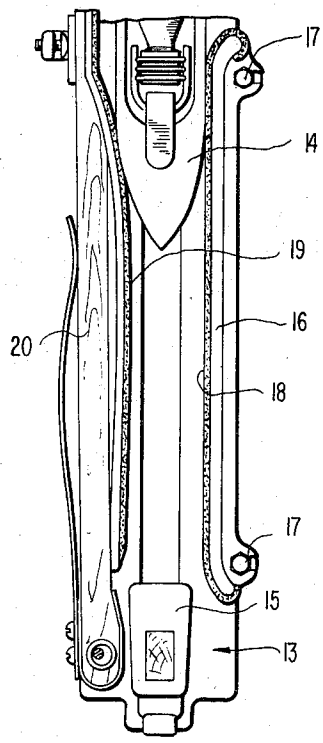
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[57] **ABSTRACT**

The shuttle contacting wear faces of a shuttle checking mechanism are covered or lined with a textile laminate which exhibits the feel, flexibility and shock-resistant qualities of leather and far exceeds leather in resisting wear. The lining material consists of multiple layers of woven fabric of a highly wear-resistant type, laminated and bonded with a rubber-like compound which contains heat dissipating material. The exterior friction face of the lining material may also be coated with an additional heat dispersing and radiating composition and such face may also be embossed to further reduce friction and resultant heat build-up.

2 Claims, 3 Drawing Figures



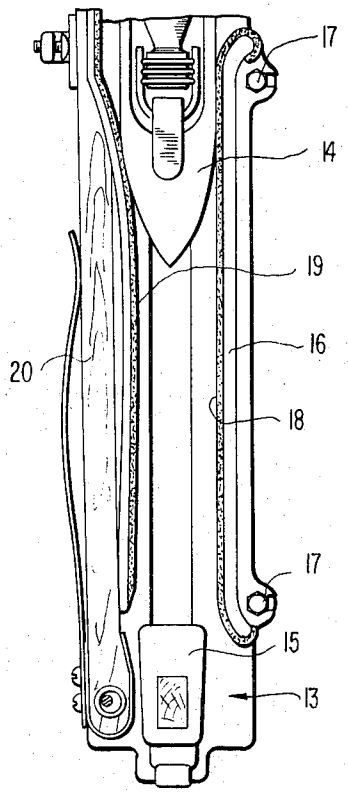


FIG. 1

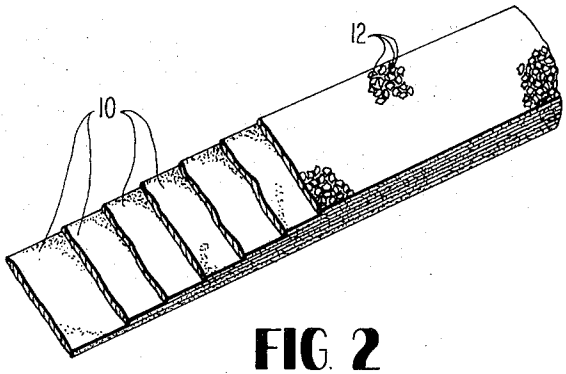
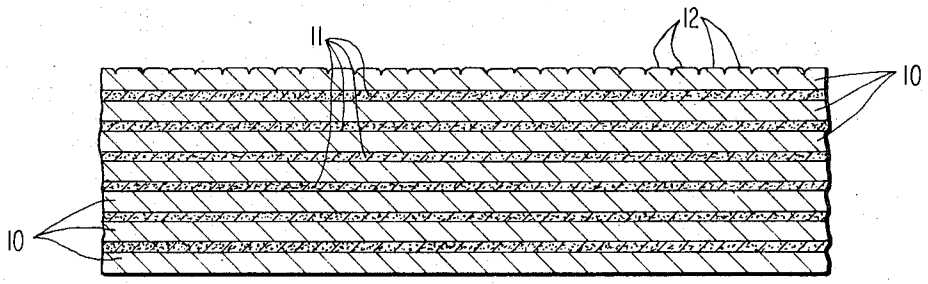


FIG. 2

FIG. 3



FRICTION COVERING MATERIAL FOR WEAR SURFACES OF SHUTTLE CHECKING DEVICES

BACKGROUND OF THE INVENTION

The working surfaces of loom shuttle boxes and the associated shuttle binder have long been covered with leather in the textile weaving industry because leather is felt to be the most durable material available to resist the shock and impact of the shuttle and the friction wear encountered by repeated shuttle checking operations in the loom. With the coming of higher speed looms, attempts have been made to improve the wear characteristics of leather by employing cushioning material beneath the leather and otherwise providing an air space between a shuttle binder leather and the wooden body of the binder, for example. It has been determined that excessive heat, generated by friction between the shuttle and the leather lining components of the checking mechanism accounts for the greatest part of the wear which requires frequent replacement of the leather lining material, in turn causing the loom to be shut down with resultant economic loss. Generally speaking, the above-noted attempts in the prior art to increase the durability and wear-resistance of leather for this purpose have not been notably successful. With this in mind, the present invention has for its objective to provide a new type of material to be used instead of leather for lining or covering the surfaces of shuttle boxes and binders which come into direct contact with the shuttle on each shuttle checking operation. More particularly, the invention is a non-leather lining material consisting essentially of multiple layers of woven nylon or a blend of nylon with cotton. These layers are impregnated with either a rubber or urethane binder and permanently laminated by the application of heat and pressure. The impregnant preferably contains a heat dissipating or dispersing material, such as fine metallic particles and/or hydrocarbons and flurocarbons. Aluminum particles are suitable for the heat dispersing agent. To further minimize heat build-up due to friction, the exterior face of the laminated lining material is preferably embossed to provide a stippled surface, thereby significantly reducing the total area of contact with the shuttle. Additionally, a surface coating may be applied to the material to aid further in dissipating heat and reducing friction.

The resulting lining or covering material is ideally suited for covering the wooden binder of a shuttle checking mechanism and for lining the appropriate parts of the metal shuttle box including the left and right, front and back box plates and extension plates. The material embodying the invention is extremely tough and possesses high resistance to abrasion or scuffing as well as resistance to tearing. At the same time, it is similar to leather in its softness and flexibility and possesses the feel of genuine leather. It is resistant to permanent indentation caused by the impact of the shuttle and after impact will quickly recover its normal shape. Most importantly, under actual tests in the field on high speed looms, the invention material has been shown to possess an improved wear factor over leather of at least 10 to 1. The field tests in question have involved at least 150 samples of the new material on a variety of working looms for periods of six to eight months, and therefore the results of the tests are very convincing.

Other features and advantages of the invention will become apparent during the course of the following description.

BRIEF DESCRIPTION OF DRAWING FIGURES

FIG. **1** is a fragmentary plan view of a loom shuttle checking mechanism embodying the invention.

FIG. **2** is a fragmentary perspective view of a friction covering or lining material for shuttle box walls and binders embodying the invention.

FIG. **3** is a greatly enlarged cross sectional view through a section of the material embodying the invention.

DETAILED DESCRIPTION

With further reference to the drawings, the friction lining material for the purpose specified comprises multiple thin layers or strips **10** of closely woven fabric, these fabric layers being adhesively bonded in a very secure manner by a flexible rubber-like bonding and impregnating agent **11**. In practice, the bonding agent **11** does not possess the several well-defined layers or regions shown in an exaggerated manner in FIG. **3**. Rather, the low viscosity bonding and laminating agent **11** thoroughly impregnates and saturates the several woven fabric layers **10** of the material throughout the full cross section of the composite laminate, although there is a tendency for the bonding agent to form extremely thin layers or coatings at the opposing faces of the fabric layers **10**. After impregnating the fabric layers with the bonding material, the product is completed by application of sufficient heat and mechanical pressure on the exterior surfaces of the laminate to effect curing of the particular bonding agent.

Preferably, the laminate embodies approximately seven of the fabric layers **10**, and at least the two outer layers consist of pure woven nylon fabric, preferably with a canvas type weave. The remaining interior fabric layers **10** may be a blend of approximately 75 percent nylon and 25 percent cotton. All of the woven fabric layers **10** preferably have a weight of approximately 1 ½ pounds per yard. While the above specifications for the woven layers may be varied somewhat under the invention, they are considered to be in the preferred range in terms of producing a product which is ideally suited for its intended use in connection with a shuttle checking mechanism.

The bonding and impregnating agent **11** is preferably a low viscosity rubber or urethane impregnant, preferably embodying a suitable heat dissipating or dispersing material, such as fine particles of metal and/or hydrocarbons and flurocarbons. Aluminum particles are very suitable for use as the metallizing heat dissipating constituent of the liquid impregnating and bonding agent **11**, although other known additives may be utilized in some cases.

In order to reduce the build-up of heat in the lining material caused by frictional contact with the shuttle, at least one face of the composite laminate is preferably embossed as at **12** to produce a permanent stippled surface and thereby materially reduce the total area of the lining material which frictionally contacts the shuttle. The precise design of this embossing may be varied. In general, the embossings will be from 1/32 to 1/16 inch deep on a simple stipple design. In some cases, a grain design or the like may be employed. The embossing of the product is done with conventional means compris-

ing an embossing plate which directly contacts the surface of the material to be embossed and a heated pressure plate. The embossing plate is arranged between the laminated material and the heated pressure plate while the material is firmly supported on a flat surface.

Additional heat retarding properties may be imparted to the material by coating its exterior working surface with certain substances including hydrocarbons having a known ability to disperse heat and reduce friction. One such commercially available coating material is manufactured and sold by Whitford Corporation, West Chester, Pa., Box 552 under the name ZYLON. This coating material will penetrate into the outer surface of the laminate and may then be cured by baking at approximately 350° F. for approximately 15 minutes. Other similar heat dispersing coatings may be utilized, and in some instances, the exterior coating and even the embossing may be dispensed with entirely without destroying the essential capability of the lining material for its intended use.

Typically, the finished laminated material produced in the manner above-described will be a remarkably flexible extremely tough material possessing a physical nature and feel which is not unlike that of leather. The material is much more highly resistant to abrasion and scuffing than leather, however, and is more resistant to tearing and has a much greater tensile strength than leather. Its composite physical characteristics are ideally suited for its intended usage on textile machinery parts. The use of this material instead of leather for lining the critical working surfaces of shuttle checking mechanisms greatly increases the efficiency of the loom and increases productivity by decreasing the down time of the machine over a period of time. The material may be applied to the metal or wooden parts in question by means of a suitable adhesive or with mechanical fasteners, such as screws or the like. These techniques are known in the art.

With reference to FIG. **1**, a conventional shuttle box **13** is shown receiving a shuttle **14** traveling toward a picker **15** at the outer end of the shuttle box. The metal box front **16**, adjustably connected at **17** to the shuttle box, is covered or lined at **18** with a section of the material embodying the invention, as shown in FIGS. **2** and **3**. A like section **19** of this material is also shown applied to the conventional wooden shuttle binder **20** in FIG. **1**. The material is equally applicable to other known parts of the shuttle checking mechanism which require a friction lining. These parts include the back box plate, right or left hand, and extension plates. The material may undoubtedly be used in a variety of applications outside of textile machinery but has been created particularly for this application or use so as to satisfy a long recognized need in connection with weaving machinery and in particular shuttle checking mechanisms.

The numerous features and advantages of the invention over the known prior art will be readily apparent to those skilled in the art without the necessity for any further description herein.

It is to be understood that the form of the invention herewith shown and described is to be taken as a preferred example of the same, and that various changes in the shape, size and arrangement of parts may be resorted to, without departing from the spirit of the invention or scope of the subjoined claims.

I claim:

1. In a loom, a shuttle checking mechanism including parts which are engaged by the moving shuttle for the purpose of checking the flight of the shuttle and said parts having working faces, and a friction lining for said working faces, said lining consisting of multiple woven fabric layers having a canvas-type weave and having a weight of approximately 1 ½ pounds per yard, said woven fabric layers being bonded together and impregnated with a low viscosity rubber impregnant having heat dissipating material dispersed therethrough in the form of fine aluminum particles, said impregnant saturating and bonding said woven fabric layers into a substantially homogenous mass which is flexible and extremely tough and wear-resistant.

2. The structure of claim **1**, wherein said woven fabric layers are approximately seven in number and are formed at least in part of cotton.

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