

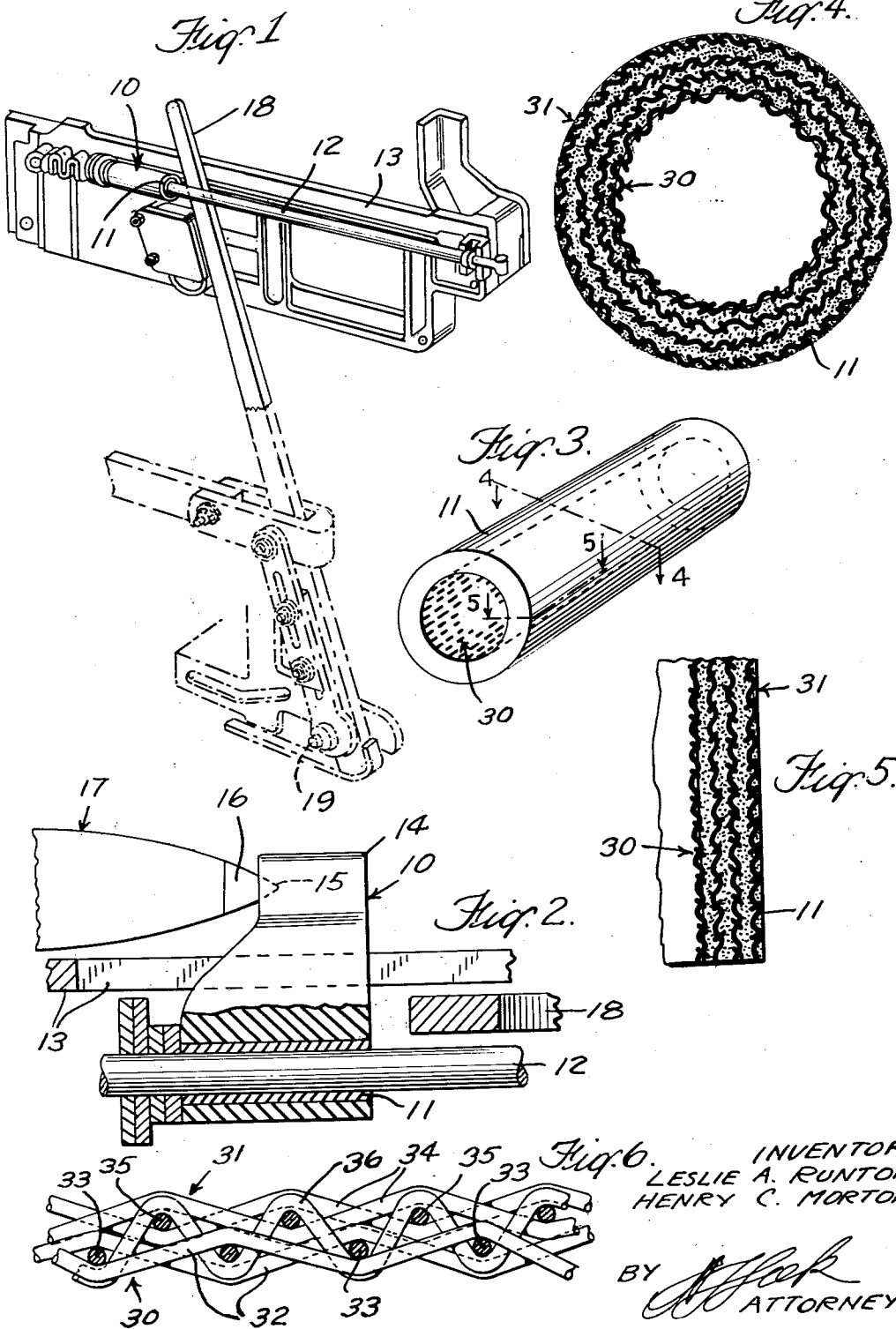
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L. A. RUNTON ET AL
LOOM PICKER AND BEARING

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2 Sheets-Sheet 1



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Fig. 7.

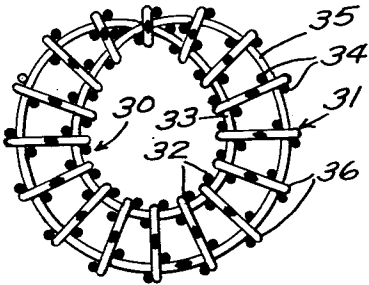


Fig. 8.

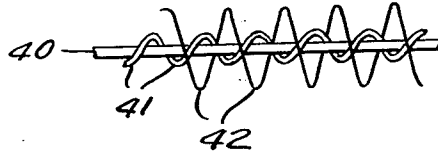


Fig. 9.

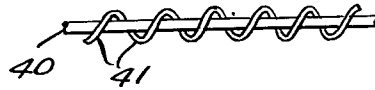


Fig. 10.

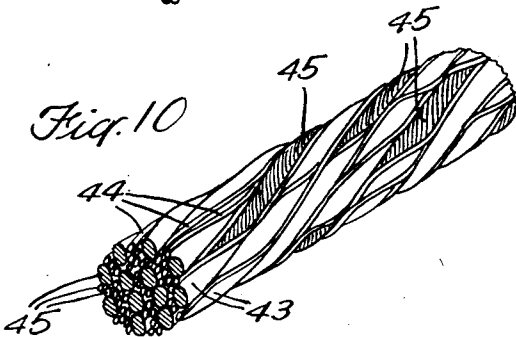


Fig. 11.

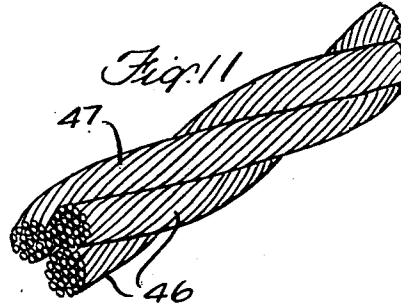


Fig. 12.

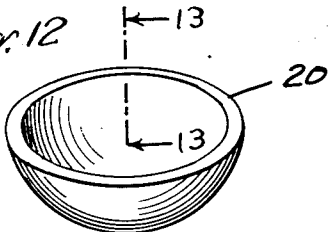
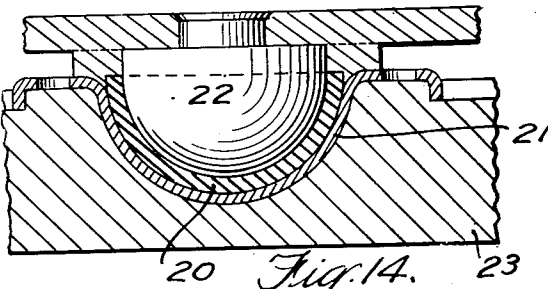
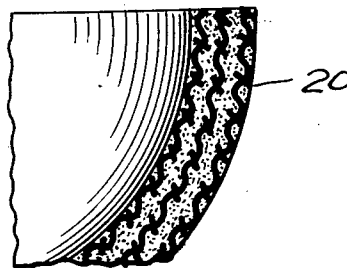


Fig. 13.



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LOOM PICKER AND BEARING

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3 Claims. (Cl. 28—80)

This invention relates to loom pickers which are adapted to slide on a picker rod to strike and impel a shuttle and to a novel and improved bearing therefor.

An object of the invention is to provide a picker having novel and improved characteristics.

Another object is to provide a molded fabric bearing having novel and improved characteristics.

Another object is to provide a processed fabric adapted for use in making such bearings.

The picker on a loom ejects the shuttle from the box and produces the necessary impact to impel the shuttle to the other side of the loom.

The abuse and wear and tear on this picker is very great. These pickers are currently being made of rawhide or various other tough combinations of laminated fibers, plastics, rubber, etc.

The picker slides on a rod which is on the back of the shuttle box, and an extension of the picker contacts the point on the end of the shuttle. The force imparted to the picker comes from the picker stick which is located as closed to the point of use of the picker as possible, that is, where the shuttle touches the picker.

However, it is impossible to get a direct push or pull without a so-called "couple." In other words, the picker, where it slides on the picker rod, has forces exerted upon it that tend to wear the bearing sleeve into an oval shape. When this occurs the point of contact with the shuttle, which wears a recess in the picker, changes, and due to the cup-shaped hole made by the shuttle, the picker then strikes the shuttle in such a way as to deflect its flight and cause trouble. At this point the picker is usually changed for a new one.

A further object of the present invention is to provide a picker construction which is adapted to eliminate the necessity for the frequent changing of the picker with the consequent idle time of the equipment.

In accordance with this invention it is proposed to line the inside of the picker, where it rides on the picker rod, with a fabric phenolic resin bonded liner having a bearing surface consisting essentially of low friction yarn.

The nature of the invention will be better understood from the following description, taken in connection with the accompanying drawings in which a specific embodiment has been set forth for purposes of illustration.

In the drawing:

FIG. 1 is a broken elevation of a loom picker mechanism;

FIG. 2 is a detail on a larger scale of a picker embodying the present invention;

FIG. 3 is a perspective of a molded fabric sleeve bearing for the picker;

FIG. 4 is a transverse section taken on the line 4—4 of FIG. 3 illustrating the construction of the sleeve;

FIG. 5 is a partial longitudinal section taken on the line 5—5 of FIG. 3;

FIG. 6 is a warpwise diagram of the fabric from which the bearing is made;

FIG. 7 is a fillerwise diagram of the fabric;

FIGS. 8, 9, 10 and 11 are detail views of yarns from which the fabric is woven;

FIG. 12 is a perspective view of a spherical bearing embodying the invention;

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FIG. 13 is a section taken on the line 13—13 of FIG. 12 but on a larger scale; and

FIG. 14 is a diagrammatic view of a mold as used for forming a spherical bearing.

Referring to the drawings more in detail, FIGS. 1 and 2 show a picker 10 having a sleeve bearing 11 sliding on a rod 12 which is fixed to the frame 13 of the loom. The picker carries a striker 14 having a surface 15 adapted to strike the pointed end 16 of a shuttle 17 to impel the shuttle through the warp shed in a well-known manner.

The picker 10 is actuated by an oscillating picker stick 18 pivoted at 19 to the loom frame. The parts thus far described operate in a well known manner and only so much of the mechanism as is necessary to an understanding of this invention has been set forth.

In accordance with this invention, the bearing sleeve 11 constitutes a molded fabric member formed by impregnating a fabric having exposed at one surface a yarn having low friction characteristics.

The fabric to be impregnated and molded is woven in the form of a seamless tube as shown in FIGS. 6 and 7. The tube comprises an inner ply 30 and an outer ply 31. The inner ply 30 is composed of warp yarns 32 and filler yarns 33. The outer ply 31 is composed of warp yarns 34 and filler yarns 35 which may form a continuation of filler yarns 33 crossed at suitable intervals between the plies. Binder warps 36 bind the plies together into a unitary structure. Although two plies have been shown, additional plies may be woven in the fabric if greater thickness is desired.

At least the warp yarns 32 of the inner ply 30 are composed of a low friction resin of the polymeric fluorocarbon type including tetrafluoroethylene, monochlorotrifluoroethylene resins and fluorothene. These yarns may be in mono-filament or multi-filament form combined with one or more ends of a material which is capable of bonding to a resin impregnant such as cotton, Dacron, Orlon, rayon or the like. The other yarns may be composed entirely of the latter type of material.

Examples of yarns suitable for the warps 32 are shown in FIGS. 8 to 11. In FIG. 8 a core 40 is composed of a bondable yarn of the type above mentioned. A filament 41 of said low friction material, either in mono-filament or multi-filament form is wound around the core 40 and an outer wrapping 42 of a bondable yarn is disposed over the filament 41 but is wound in the reverse direction for holding the somewhat slippery low friction filament 41 in place.

FIG. 9 illustrates a similar compound yarn from which the outer wrapping is omitted. When these yarns are woven as warps the filler at the various points of crossover enters between adjacent turns of the wrapping 41 or 42 and makes contact with the core 40 to which it becomes bonded by the impregnant to be described for holding the warp yarns in place with the low friction wrapping 41 exposed to form a low friction bearing surface. When the outer wrapping 42 is used the inner wrapping 41 is exposed between the turns of the outer wrapping 42 which wears away to expose the wrapping 41 along its entire length.

Obviously the material of the yarns above described can be reversed with the low friction material forming the core and the bonding material constituting the wrapping. In the latter case the wrapping is more loosely wound so as to expose the low friction core material between turns. The relative arrangement will depend to a large extent upon the relative diameters of the component yarns. The core is preferably formed by the smaller diameter yarn.

In the embodiment of FIG. 10 a plurality of mono-filaments 43 are wound with multi-filaments 44 and with a plurality of ends 45. The filaments 43 and 44 are com-

posed of the low friction material above referred to and the ends 45 are composed of the bonding material.

In the embodiment of FIG. 11, a twisted multi-filament yarn 46 of low friction material is plied with an end 47 of bondable material.

In the forms of FIGS. 10 and 11 the bondable material engages and bonds to the fillers to hold the low friction filaments in place.

The outer ply 31 and any intermediate plies may be composed entirely of bondable yarns for economy. They may, however, be formed of the same type of compound yarns as the inner ply 30 if desired, in which case both the inner and outer surfaces will have low friction characteristics. The binder warp 36 may be composed of the above compound yarn or may be composed of bondable yarn and is preferably composed of a yarn having a high tensile strength such as nylon or Dacron for preventing the plies from separating.

The tubular fabric may be impregnated with a moldable bonding resin and dried but not cured and may be coated on the outside with a cement such as Cycleweld or Permafuse which is capable of bonding the molded fabric bearing to a metal surface such as to the inside of a cylinder or of a spherical socket. The cement such as Cycleweld or Permafuse is also dried but not cured so that the impregnated fabric tube can be shipped, if desired, to a distant point of assembly before molding.

For example, the fabric may be impregnated with a high strength phenolic bonding resin derived from the reaction product of phenol, cresol or a homologue with formaldehyde under controlled conditions. The mixture is preheated to remove the solvent and the resin content polymerized until a residual volatile content of 5% to 7% is attained. The impregnated fabric thus dried may be stored for subsequent use or may be shipped to a distant point for molding.

For forming the bearing the fabric is then molded under heat and pressure into the form of a sleeve 11 as shown in FIG. 3, or into the form of a spherical member 20 illustrated in FIGS. 12 and 13. The conversion of the resin into a thermoset form may be accomplished at a temperature of 300° F. to 350° F. for from thirty to sixty minutes at pressures of 10 tons to 100 tons, depending upon the area of the object being molded.

Other resin compositions may also be used as the impregnant, for example, polyvinyl chloride or the epoxy resins.

In the case of a liquid, such as polyvinylchloride the mold may be heated to the polymerizing temperature for polyvinylchloride, i.e. 350° F. to 360° F. and immediately cooled to set the resin to solid form with the fabric embedded therein.

The epoxy resins are thermosetting and may be applied to the mold in the form of a molding powder. The mixture is cured by heating to the proper temperature to convert the resin into the form of a solid body in which the fabric is embedded.

The picker 10 may be composed of laminated Dacron cloth, resin-impregnated and molded as described above in connection with the sleeve 11.

The molded fabric bearing sleeve above described is self-lubricating, does not become contaminated by dirt or lint, and because of negligible wear retains the striker surface in accurate registration with the shuttle point for long periods of use.

In the above construction the low friction yarn is exposed to form the bearing surface and is mechanically bound to other yarns which are capable of bonding to the resin. If the low friction material is in the form of a multi-filament yarn twisted with one or more ends of bondable yarn the latter ends bond to the resin and serve to bind the low friction yarns in place. In that case the entire fabric may be composed of this compound yarn, or the compound yarn may be used only on the surface

and woven with a backing of bondable yarns as above described.

The molded fabric bearing has been indicated as applied to a loom picker. It may, however, be used for various other purposes where a cylindrical or ring bearing is required, for example as a collet for centering a hub carrying propeller blades on a drive shaft of an airplane variable pitch propeller assembly, as disclosed in copending application Serial No. 674,330, filed July 26, 1957 now Patent No. 2,918,316, or as an oilless cylindrical bearing for conveyor rollers, or the like. The spherical bearing illustrated in FIGS. 12 and 13 may, for example, be used for ball and socket joints as in automobile steering knuckles as set forth in copending application Serial No. 646,911, filed March 18, 1957 now Patent No. 2,906,573, or in ball and socket joints for air foil control linkages as set forth in copending application Serial No. 669,055, filed July 1, 1957 now Patent No. 2,906,569, or as azimuth ball seats for helicopter rotors as set forth in copending application Serial No. 670,733, filed July 9, 1957 now Patent No. 2,908,532.

For making the ball and socket joint of the types above referred to the impregnated fabric may be molded in situ into a spherical socket 21 using the socket as one part of the mold and using a member 22 having a spherical surface as the other portion of the mold as illustrated in FIG. 14. This procedure is particularly effective when the fabric is of sufficient thickness to accommodate itself to minor variations in the contacting surfaces and thereby to eliminate the necessity for accurate machining and finishing operations.

The socket portion of the mold may constitute a steel stamping 21 of hemispherical shape to receive half of a ball joint which may be chemically cleaned and blocked by a block 23 to form one section of a mold into which a piece of the above-mentioned fabric is pressed with the low friction resin away from the metal and the bonding agent in intimate contact with it. The other portion of the mold would be a steel member having a hardened and chrome-plated spherical end surface 22 which is forced into the mold under pressure at the proper temperature required to cure the resin. When these elements are pressed together under high molding pressure as above described, the fabric conforms and bonds to the socket with its exposed inner surface conforming to the surface 22.

It has been found that during use the surface of the ball and socket joint of the ball tends to pick up and become coated with the polyfluorocarbon resin from the exposed multifilament material which constitutes the bearing surface. The ball may be in the form produced on automatic lathes or by a forging operation of the usual type wherein the surface finish may be equal to plus or minus forty micro inches. This semi-rough finish on the surface of the ball facilitates the transfer of the polymeric fluorocarbon resin from the contacting areas of the highly twisted yarn surface of the fabric which has been bonded to the metal stamping. This resin fills any uneven sections of the ball and builds up a surface coating which has a very low adhesion to water, dust and foreign elements. Therefore the ball joint becomes a perfect sphere which requires no dust seals or other complicated mechanisms to keep out water, chemicals, dust, etc., and is self-cleaning because the surface condition will not promote adhesion and the space in which the ball moves has no room for extraneous material, as the shape of the socket and of the ball are identical.

What is claimed is:

1. A multi-ply cylindrical woven fabric impregnated with a moldable bonding resin, said fabric containing yarns capable of bonding to said resin and having at its inner surface multi-filament yarns, at least one filament of which is composed of polymeric fluorocarbon resin and the other filaments of which are composed of a material capable of bonding to an impregnant.
2. A fabric as set forth in claim 1 in which the multi-

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filament yarn is composed of a core of a material bondable to said bonding resin and a filament of said polymeric fluorocarbon resin wound around said core.

3. A woven fabric adapted for use in making anti-friction bearings comprising warpwise and fillerwise yarns, said warpwise yarns being composed of a material capable of bonding to an impregnant, said fillerwise yarns having a core composed of said material and having a filament composed of a polymeric fluorocarbon resin disposed around said core, said core being in contact with said fillerwise yarns at points of crossing and being bonded thereto by a bonding impregnant.

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