March 28, 1939. A. E. BRICKMAN ET AL 2,152,397

HARNESS CORD FOR LOOMS

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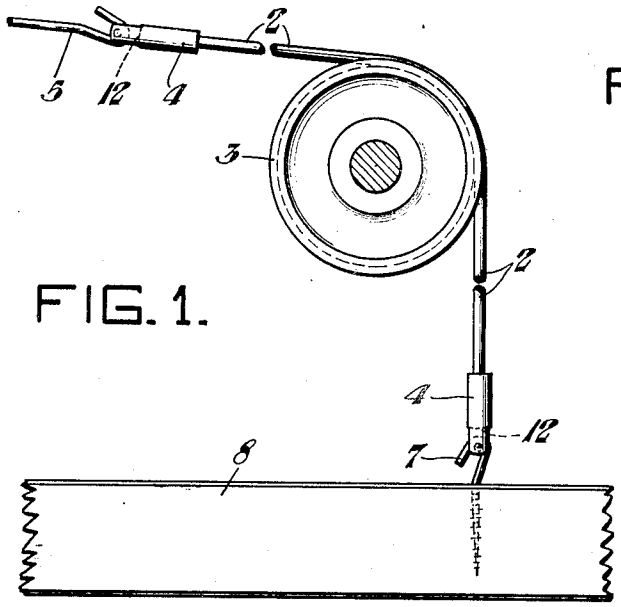


FIG. 1.

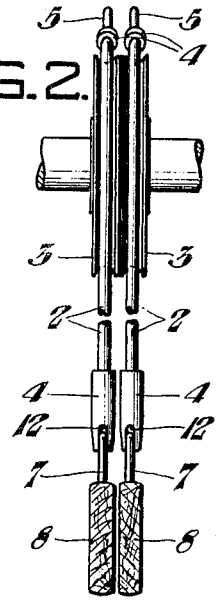


FIG. 2.

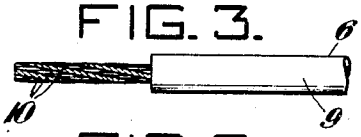


FIG. 3.

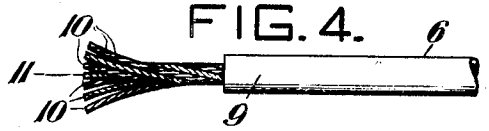


FIG. 4.

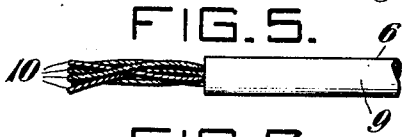


FIG. 5.

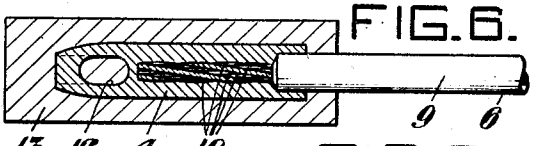


FIG. 6.

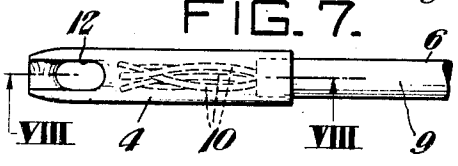


FIG. 7.

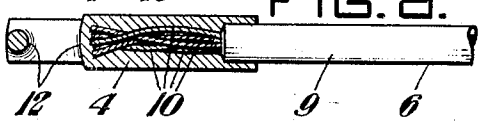


FIG. 8.

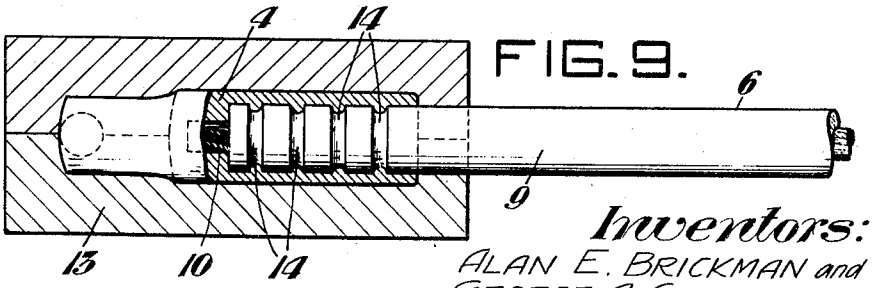


FIG. 9.

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HARNESS CORD FOR LOOMS

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6 Claims. (Cl. 24—123)

This invention relates to harness or dobby cords for use in looms, and particularly to an improved harness cord and method of making the same.

It is well-known that in looms, harness cords, or dobby cords, as they are sometimes called, extend from the horizontally actuated jacks or levers of the looms over sheaves to the harness frames thereof, and are adapted to change the horizontal movement of the jacks or levers to a vertical movement so as to actuate vertically the harness frames that control the warp threads of the looms.

Various types of harness cords have been suggested and used. Among these, probably cotton harness cords have been used most extensively, but they have not been satisfactory, one reason being that they would readily stretch while in use, which necessitated frequent adjustments in their length. It will be understood that, when harness cords stretch or are elongated, they change the shed or the opening in the warp through which the shuttle is thrown in weaving. If the amount of the shed is reduced, which, of course, would happen if the harness cords were stretched or elongated, there would not be adequate clearance for the shuttles to pass between the threads composing the warp, and the shuttle would strike the warp threads and break them, which would result in a delay in the weaving and a loss of production. Also, cotton cords would wear out readily, and, furthermore, it is difficult to securely attach terminal connections to the ends of such cords without cutting them and subjecting the cords to undue wear adjacent the terminal connections.

It has been proposed to use flexible metallic wire harness cords, but if they are used it is necessary to provide a sheathing therearound which will protect the wire from the atmosphere of the weaving room for, as is well-known in the weaving art, it is necessary to maintain the weaving room at a high humidity for the various reasons. If the wire is not sufficiently protected, the moisture will collect thereon resulting in corrosion and finally breakage of the wire.

Heretofore, it has been a problem to provide satisfactory terminal connections on flexible metallic wire harness cords for connecting them to the jacks or levers and to the harness frames for the reason that such terminals not only have to be securely attached to the ends of the wire to prevent them from coming off but they also should be assembled thereon so as to prevent the moisture in the atmosphere from coming in contact with the wire. Also, these terminals should be of such size as to not project beyond the sides of the harness frames, as these frames are rapidly lifted and lowered when the loom is in operation and, if they project beyond the sides of the frames, they will interfere with the movement thereof. Such interference is not only unsatisfactory from the standpoint of weaving, but the projecting portions tend to cut into the harness frames and shorten the usefulness and life thereof, thereby necessitating frequent replacements.

It is an object of the present invention to provide an improved harness or dobby cord in which all of the above disadvantages are eliminated.

It is another object of the invention to provide an improved harness or dobby cord which is flexible and moisture-proof and, at the same time, very serviceable.

It is a further object of the invention to provide an improved method of making a harness or dobby cord which is simple and inexpensive.

It is still another object of the invention to provide an improved terminal connection for harness cords which is relatively small in size and, at the same time, very rugged in construction, and a method of applying the same.

Various other objects and advantages of this invention will be more apparent in the course of the following specification and will be particularly pointed out in the appended claims.

In the accompanying drawing, there is shown, for the purpose of illustration, one embodiment and a modification thereof which our invention may assume in practice.

In the drawing:

Figure 1 is a section through a portion of a loom showing the improved harness or dobby cord of our invention in position therein;

Figure 2 is an end view of Figure 1;

Figure 3 shows an end portion of the wire as used with our invention, with a portion of the rubber covering removed as the first step in preparing the end of the wire cord for attachment of the terminal connection;

Figure 4 shows the strands of the wire untwisted to indicate the reverse lay construction thereof;

Figure 5 shows the strands having been slightly untwisted and the ends of the strands flared as the second step in preparing the end of the wire;

Figure 6 is a longitudinal section through a die and terminal connection, showing the final step of how the end terminal connection may be cast on the end of the wire with the strands of the wire straight;

Figure 7 shows how the terminal connection is preferably die-cast on the end of the wire with the wire slightly untwisted as shown in Figure 5;

Figure 8 is a section taken on line VIII—VIII of Figure 7; and,

Figure 9 is a longitudinal section through a die and part of the terminal connection, showing a modified form of preparing the end of the wire for attachment of the terminal connections.

Referring more particularly to the drawing, there is shown in Figure 1 the improved harness or dobby cord 2 of our invention in position in a loom extending around the sheave 3 and having one terminal connection 4 attached to the hooked end of a jack wire 5, and a like terminal connection on the opposite end attached to a hook 7 positioned on a harness frame 8.

The improved harness cord of our invention comprises a flexible wire 9 of the proper length consisting of a plurality of wire strands 10 laid in a reverse direction about a core strand member 11. These strands are preferably sheathed in a rubber cover 6 but may be sheathed in a moisture-proof braided or woven cotton fabric, fiber, or any other suitable flexible moisture-proof material.

In a reverse lay rope construction, half of the strands are regular, in which the strands of the rope are laid in the opposite direction to that of the wires in the strand, and the other half "Lang" lay, in which the wires in the strand and the strands themselves are twisted in the same direction and the strands are usually laid alternately. A wire having a reverse lay construction is used, in that such a wire will operate satisfactory over small diameter sheaves and withstand the flexing incurred in such use. Also, a wire of a reverse lay construction has the advantage that it is non-spinning, which tends to eliminate the strain on the wire and sheathing at the terminal connections, thereby reducing the wear thereon. Furthermore, a wire of reverse lay construction will elongate at a minimum under load, and, at the same time, it has high flexing qualities. It is proposed to use a wire of reverse lay construction and of such size and strength in excess of the requirements of a dobby cord so that little or no elongation takes place.

The moisture-proof sheath with which we propose to surround the stranded wire core permits the use of inexpensive wire in the stranded core. In the conventional practice the wires in the strand must be galvanized because the fibrous cotton covering which has been employed on such cords does not exclude atmospheric moisture. A rubber composition sheath is recommended as it possesses a greater ability to withstand flexing for a much longer period of service than is obtained with the customary type of fibrous covering. However, the multi-stranded wire may be covered or coated with any suitable corrosive resistant material, if desired, such as plastic composition or a non-corroding metallic coating without the use of any other sheathing, or a suitable moisture-proof flexible fibrous covering may be used.

There is arranged on each end of the wire 9, and over the end of the rubber sheathing 6, a die-cast metallic terminal connection, preferably of zinc or any other suitable non-corroding metal, of a diameter preferably slightly larger than the outer diameter of the rubber sheathing and having an eye or aperture 12 formed in the end thereof for connecting purposes.

Harness cords actuated over harness sheaves set up torsional twist in the cords which in turn tends to set up a reversal action at the point of connection of the jack wire 5 and cord terminal 4 and also at the point of connection of the harness hook 7 and the other cord terminal 4, thus causing excessive wear at these points. In order to eliminate this torsional twisting movement and consequent wear, the eye or aperture 12 in the cord terminals 4 is constructed with flat parallel side walls extending across the full width of the terminal 4 at the eye portion and with these side walls placed close enough together to form a narrow passage with the parallel walls only far enough apart to closely fit the sides of the hooks 5 and 7.

A die-cast terminal connection on harness cords instead of wire or pressed metal terminals, as usually employed, permits the use of a smaller terminal connection and one of better proportions. Also, die-cast terminals can be applied so as to entirely cover the ends of the wire, thereby preventing any moisture from reaching the ends thereof and corrosion which results therefrom.

The overlap of the die-cast terminal onto the rubber sheath of the strand also serves to retard vibration and tends to reduce tendency of breakage of the stranded wire core at a point where such breakage usually occurs, due to the fact that vibration stresses tend to concentrate at this point and the wires break due to crystallization of the metal. In case a wire strand is used having a thin coating of a non-corroding metal or other material only thereon, it may be desirable to provide a few wrappings of fine wire or a split sleeve of fiber, rubber or any other suitable flexible material around the strands of the wire at the inner end of the die-cast terminal connections as a dampener, so as to eliminate the vibration stresses at these points.

The terminal connection member is cast on preferably as follows:

A portion of the rubber sheathing is first removed from the end of the wire strands as shown in Figure 3. The wire strands are then slightly untwisted so as to form a bulge intermediate the ends of the strand and the termination of the rubber sheathing, and the ends of the strands flared outwardly, as shown in Figure 5. The end of the wire thus prepared is then placed in a suitable die 13, preferably a two-part die such as shown in Figures 6 and 9, and the metal cast around the wire strands and over the end of the rubber sheathing, as shown in Figures 7 and 8. It will be seen that, as the metal is cast around the wire strands, it enters between the lays of the strand and is securely bonded thereto, and the flared and bulged portions of the wire tend further to hold the terminal connection more securely in position and tend to keep it from being pulled off the end thereof during the course of use.

In Figure 9, there is shown a terminal connection of modified construction of the improved dobby cord of our invention. This modified construction consists of a plurality of circumferential grooves 14 formed in the rubber sheathing 6 adjacent the end thereof. These grooves may be cut, vulcanized or formed in the rubber in any convenient manner prior to the casting of the terminal connection thereon. The terminal connection is then cast on the end of the wire so as to extend up over the end of the rubber cover so that the metal will flow into the circumferential grooves in the rubber to keep the end terminal in position on the end of the wire

and to keep the rubber cover from pulling out from under and away from the metal.

As a result of our invention, it will be seen that we have provided an improved harness or dobby cord having terminal connections which are small and contain a minimum amount of metal and yet, at the same time, a cord which is strong and more serviceable than any heretofore suggested or used.

While we have shown and specifically described for the one embodiment and a modification thereof which our invention may assume in practice, it will be understood that these embodiments are merely for the purpose of illustration and description and that various other forms may be devised within the scope of our invention, as defined in the appended claims.

We claim:

1. A harness cord for looms comprising a flexible member of a predetermined length consisting of a multi-strand flexible wire of a reverse lay construction sheathed in a flexible moisture-proof material having a portion of said sheathing removed from each end thereof, and a die-cast terminal member having an eye arranged therein disposed on each end of said flexible member, each of said terminal members enveloping the ends of said multi-strand wire and overlapping the ends of said sheathing, sealing the ends thereof so as to prevent moisture from entering thereunder and attacking the wire strands and to retard vibration of said strands adjacent the ends of the sheathing at the terminal members, thereby eliminating the danger of breakage of the wire strands at this point.

2. A harness cord for looms comprising a flexible member of a predetermined length consisting of a multi-strand flexible wire of a reverse lay construction sheathed in a flexible moisture-proof material having a portion of said sheathing removed from each end thereof, a die-cast portion disposed on each end of said flexible member, each of said die-cast portions enveloping the ends of said wire strands and overlapping the ends of said sheathing, sealing the ends thereof so as to prevent moisture from entering thereunder and attacking the wire strands and to retard vibration of said strands adjacent the ends of the sheathing at these portions, thereby eliminating the danger of breakage of the wire strands at this point, and means associated with each of said die-cast portions for connecting purposes.

3. A harness cord for looms comprising a flexible cord member of a predetermined length, and a die-cast terminal member disposed on each end thereof enveloping the ends of the flexible member, each of said terminal members having a slotted eye portion arranged therein for receiving a hook, said eye portions having oppositely disposed flat parallel side walls spaced apart a distance just slightly more than the width of the hook it is adapted to receive with the width of said side walls being substantially equal to that of said terminal members.

4. A harness cord for looms comprising a flexible member of a predetermined length consisting of a multi-strand flexible wire of a reverse lay construction sheathed in a flexible moisture-proof material having a portion of said sheathing removed from each end thereof, and a die-cast terminal member disposed on each end of said flexible member, each of said terminal members having a slotted eye portion arranged therein for receiving a hook, said eye portions having oppositely disposed flat parallel side walls spaced apart a distance just slightly more than the width of the hook it is adapted to receive, with the width of said side walls being substantially equal to that of said terminal members, each of said die-cast terminal members enveloping the ends of said wire strands and overlapping the ends of said sheathing, sealing the ends thereof so as to prevent moisture from entering thereunder and attacking the wire strands and to retard vibration of said strands adjacent the ends of the sheathing at the end terminals, thereby eliminating the danger of breakage of the wire strands at this point.

5. A harness cord for looms comprising a flexible member of a predetermined length consisting of multi-strand flexible wire sheathed in a moisture-proof flexible material with a portion of the said material removed from each end thereof, and a connecting terminal member disposed on each end of said flexible member, each of said terminal members having a slotted eye portion arranged therein for receiving a hook, said eye portions having oppositely disposed flat parallel side walls spaced apart a distance just slightly more than the width of the hook it is adapted to receive with the width of said side walls being sufficiently wide so as to prevent any twisting action of the hook therein, each of said terminal members enveloping the ends of said wire strands and overlapping the ends of said sheathing, sealing the ends thereof so as to prevent moisture from entering thereunder and attacking the wire strands and to retard vibration of said strands adjacent the ends of said sheathing at the end terminals, thereby eliminating the danger of breakage of the wire strands at this point.

6. A harness cord for looms comprising a flexible member of a predetermined length consisting of multi-strand flexible wire sheathed in a moisture-proof flexible material with a portion of the said material removed from each end thereof with the ends of the wire strands slightly untwisted, and a cylindrical longitudinally extending die-cast metallic terminal member having an eye arranged therein disposed on each end of said flexible member, each of said terminal members enveloping the untwisted portion of the ends of the metallic wire strands and overlapping a portion of said flexible sheathing material, sealing the ends thereof so as to prevent moisture from entering thereunder and attacking the metallic wire strands and to retard vibration of said wire strand adjacent the ends of the sheathing at the end terminals, thereby eliminating the danger of breakage of the wire strands at this point.

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