United States Patent

[11] 3,537,487

[72] Inventor Gabriel Servillat
Saint-Cyr-au-Mont D'or(Rhone), France
[21] Appl. No. 750,275
[22] Filed Aug. 5, 1968
[45] Patented Nov. 3, 1970
[73] Assignee Societe Des Mecaniques Verdol
Lyon, Rhone, France
a French Limited Liability Company
[32] Priority Aug. 4, 1967
[33] France
[31] 49018

[54] **LOOMS OPERATING WITH A JACQUARD**
9 Claims, 7 Drawing Figs.

[52] U.S. Cl. 139/90
[51] Int. Cl. D03c 13/00, D03c 3/44
[50] Field of Search 139/85, 90, 59, 93

[56] **References Cited**

UNITED STATES PATENTS

3,364,953	1/1968	Servillat	139/90

FOREIGN PATENTS

828,074	2/1960	Great Britain	139/85
850,138	9/1960	Great Britain	139/90
991,051	5/1965	Great Britain	139/90
618,189	2/1961	Italy	139/90

Primary Examiner—James Kee Chi
Attorney—Alexander and Dowell

ABSTRACT: In a loom operating with a Jacquard and wherein the healds are individually biased downwardly by resilient cords, each cord is attached to the lower end of a heald by a mass of plastics wherein the end of the cord, preferably doubled on itself, is enclosed under such a pressure that it cannot slide under the action of the tractive forces to which the cord is submitted under normal operating of the loom. The mass of plastics may be obtained by means of sheath of a thermoplastic material disposed around the end of the cord and the lower end of the heald (or the upper end of a retaining hook), this sheath being treated by a solvent. The subsequent evaporation of the solvent causes a strong contraction of the sheath transformed into a tubular mass of plastics.

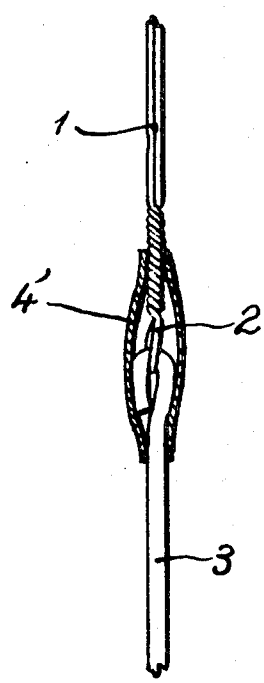


Fig. 1

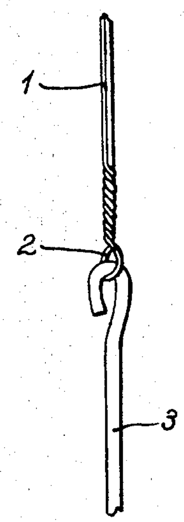


Fig. 2

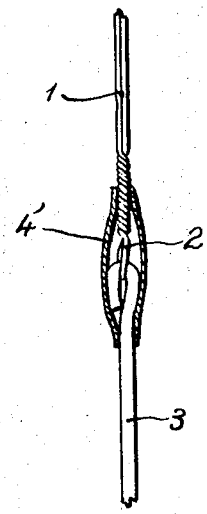


Fig. 3

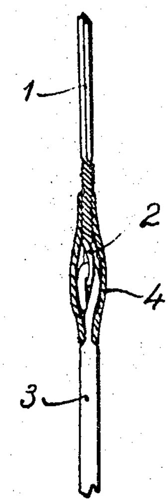


Fig. 4

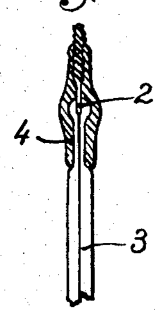


Fig. 6

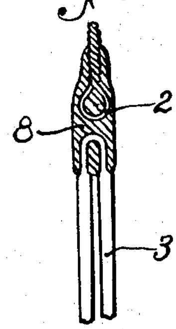


Fig. 7

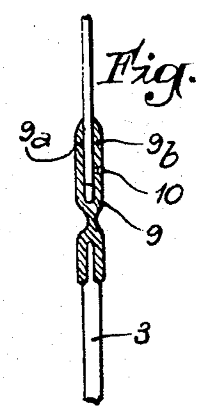
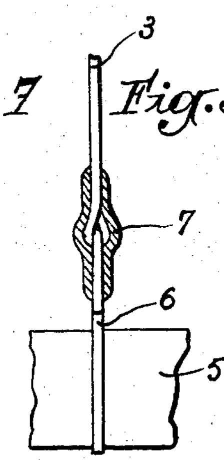


Fig. 5



INVENTOR.
Gabriel Scivillat
BY
Alexander [illegible]
Attorney

LOOMS OPERATING WITH A JACQUARD

In conventional looms for fancy articles operating with a Jacquard the individual healds are generally biassed downwardly by vertically elongated counterweights or lingos which owing to their small horizontal cross-sectional area, may be easily disposed in the space available below the Jacquard. These lingos or weights are fully satisfactory in looms operating at a slow or moderate speed. They rise and sink vertically without any lateral movement. But with modern high-speed looms their operation becomes defective; they have a tendency to rock laterally and to strike each other. This defect is a consequence of the fact that a counterweight can only return a heald downwardly with an acceleration at most equal to the gravitational acceleration g. When therefore the acceleration imparted by the Jacquard to the hooks to which the healds are attached is not quite far from g, the counterweight behaves as a body submitted to a force of small value with respect to its own mass, which causes a marked instability. It is besides clear that for accelerations higher than g any operation would be quite impossible.

In high-speed looms the lingos are often replaced by helicoidal springs, the reaction of which is not limited by g. But conventional helicoidal springs disposed in the lower part of a loom retain the fibrous dust which falls from the latter together with the oil or grease particles escaping from the moving parts under the action of vibrations. Their successive coils are rapidly covered with an oily fibrous layer of increasing thickness which constitutes an intermediate abutment preventing the springs from fully returning to their normal positions of rest. When this occurs, the healds are no more returned downwardly to their lowermost position and the springs must be thoroughly cleaned in order to restore correct operation of the loom.

In order to avoid this inconvenience it has been proposed to replace the helicoidal springs by resilient cords, for instance rubber cords, which of course comprise no intermediate space where dust and oil may collect. But this attempt has met with another problem, namely that after a more or less long time of service, the resilient cords break at their junctions with the healds, or sometimes with the lower stationary spring frame of the loom. This solution has therefore been abandoned in actual practice.

It is an object of the present invention to eliminate the above-mentioned disadvantage and to provide means whereby the healds of a loom, and more particularly of a high-speed loom, may be returned downwardly by resilient cords without any risk of breakage of the latter at their point of junction either with the individual healds or with the lower spring frame of the loom.

The invention is based on the discovery that the breakages which occur where a resilient cord is attached either to the lower eyelet of a heald or to a hook of the lower spring frame of a loom, are a consequence of the wear or erosion caused by repeated friction of the resilient cord against the lower part of the eyelet or against the upper portion of the hook. In order to attach the cord to the eyelet or to the hook, the said cord must be passed through the eyelet or hook and returned or folded on itself so as to form a loop which must be fixed by a knot or by means of a binding thread. In both cases the successive tensionings and detensionings determine a slight displacement or creeping of the constitutive material of the cord on the metallic surface of the eyelet or hook either longitudinally or transversely, and this relative displacement entails frictional phenomena and a progressive erosion of the aforesaid material by the metal of the eyelet or hook. This problem of friction must therefore be solved if it desired to eliminate ruptures of resilient cords used for biassing the healds in a loom.

According to the present invention in a device for connecting one end of a resilient cord with the lower end of a heald or with the upper end of a hook of the lower spring frame in a loom for fancy articles operating with a Jacquard, the said end of the resilient cord is enclosed in a mass of plastics under such a pressure that it cannot slide under the action of the

tractive forces to which it is submitted in normal operation of the loom, the said mass of plastics being in turn secured to the lower end of the said heald, or to the upper end of the said hook.

In the accompanying drawing:

FIG. 1 illustrates the lower end of a heald with its eyelet through which a rubber cord has been passed.

FIG. 2 shows the parts with a sleeve of thermoplastic material disposed around the eyelet and the folded end of the rubber cord, this sleeve being shown in section.

FIG. 3 shows the parts after contraction of the thermoplastic sleeve.

FIG. 4 illustrates a modification wherein the rubber cord is under endless form.

FIG. 5 shows how the cord may be secured to a hook of the lower spring frame of the loom.

FIG. 6 illustrates in section an embodiment wherein the mass of thermoplastic material which connects the upper end of the cord with the lower end of the heald is obtained by a moulding operation.

FIG. 7 shows a modification in which the lower end of the heald is removable from the moulded mass of thermoplastic material.

Referring to FIG. 1, reference numeral 1 designates the metallic wire which constitutes a heald. This wire is doubled and twisted on itself in the usual manner in order to form a central eyelet (not shown) for passage of a warp thread, and two end eyelets, the lower one being illustrated at 2.

A resilient cord 3, as for instance of rubber, has been passed through the lower eyelet 2 and has been folded on itself at about 180°. It is obvious that if the folded end of cord 3 is properly retained, the said cord will operate as a biassing spring of quite limited horizontal cross-sectional area and having no intermediate space where dust may collect. But, as above indicated, all attempts to use such cords in high-speed looms have met with a failure owing to the progressive erosion of the cords by the metallic eyelets.

In the embodiment of FIG. 3, the connection between the lower eyelet 2 of the heald and the upper end of the resilient cord 3 is effected by means of a tubular mass of thermoplastic material which surrounds tightly both the eyelet and the folded end of the cord. This mass may be obtained by disposing around the parts a short sleeve 4 (FIG. 2) of an appropriate thermoplastic material (as for instance cut from a tubular braid of thermoplastic), then by impregnating this sleeve by a solvent such as acetone or chloroform, and by letting the solvent evaporate. This evaporation causes a strong contraction of the sleeve which fits tightly on the eyelet and on the cord as shown in FIG. 3. It will be understood that the upper end of cord 3 is thus positively clamped within the tubular mass 4 and is thus prevented from sliding against the metal of eyelet 2. The progressive erosion of the cord by the eyelet is thus fully eliminated.

In fact the pressure exerted by the thermoplastic material on the cord end is such that in the compressed zone of the latter the cross-sectional area is reduced to a lower value than that which may result from the highest tractive force applied to the cord in normal operation. In other words, considering FIG. 3, when cord 3 will be tensioned in operation in the loom, its diameter will decrease, but it will never become smaller than the diameter in the zone maintained under compression by the annular mass 4.

It may be remarked that this reduction of the cord diameter in the zone submitted to the contraction of the sleeve or tubular mass may be facilitated by maintaining the cord under tension until the solvent is evaporated, the loop being made of greater length so that its end may protrude downwardly from the sleeve 4' of FIG. 2 in order to be caught and retained against sliding.

FIG. 4 discloses a modification wherein the resilient cord 3 is doubled on itself under endless form. Here again by proceeding as above explained there is obtained a tubular mass 4 in which the ends to be connected (eyelet 2 and corresponding terminal loop of cord 3) are wholly embedded while being pressed so tightly that any relative displacement is quite impossible.

As already mentioned the invention may also be applied with advantage to the connection between the resilient cord and the lower frame member, or spring frame, normally provided in high-speed looms for the coil springs used as biassing means for the healds. This spring frame is generally formed of a number of crossbars (FIG. 5) on which a number of hooks 6 are threaded, each comprising a lower annular portion through which a crossbar 5 is passed, and an upper portion which forms the hook proper. In the example illustrated in FIG. 5 the annular thermoplastic mass 7 in which the upper end of hook 6 and the lower end of cord 3 are embedded has been obtained as explained with reference to FIGS. 2 and 3, that is by means of a braided sleeve treated by a solvent, the evaporation of the latter causing a strong contraction of the sleeve, now transformed into a tubular mass. As to the resilient cord, it may be folded on itself, as in FIG. 1, or doubled, as in FIG. 4.

In the embodiment of FIG. 6, the lower eyelet 2 of the heald and the upper loop of the resilient cord 3, here under endless form, are connected with each other by a mass 8 of plastics which is moulded in position, as for instance by means of a small mould in which the upper end of the cord and the lower end of the heald are appropriately disposed and retained in position, the moulding material being thereafter injected into the mould under pressure. The cord does not pass through the eyelet of the heald, which eliminates any possibility of erosion. Furthermore the injection pressure may be sufficiently high to compress the resilient cord to such an extent that it cannot slide in normal operation as above explained. In this respect it is to be noted that the embodiment of FIG. 6 may also be applied with a nondoubled cord, *i.e.* with a cord only having a terminal open loop, as in the case of FIG. 1.

The embodiment of FIG. 6 may also be used for the connection between the lower end of the resilient cord and the corresponding hook of the spring frame.

FIG. 7 illustrates an embodiment wherein the mass of plastics, here referenced 9, has a bifurcated upper portion with two branches 9*a*, 9*b*, the lower eyelet 2 of the heald being disposed in the slit-like intermediate space. Branch 9*a* carries a button 10 adapted to snap into a corresponding orifice of branch 9*b*. The connection finally obtained is similar to the connection illustrated in FIG. 6 concerning the resilient cord 3 which is tightly retained in the plastics mass, but the heald may be separated from the cord, if required. It will be noted that if the button 10 is made as a separate metallic part, it cannot damage the resilient cord from which it remains spaced.

I claim:

1. The method of attaching to a nonresilient element a terminal portion of a resilient cord used to downwardly bias a heald in a loom operating with a Jacquard, which consists in attaching a mass of plastic material to said element and in enclosing said portion in said mass under such conditions that the cross-sectional area of the resilient cord in said portion is reduced to a greater extent that it would be under the effect of the highest tension to which said cord may be submitted during operation of the loom.

2. In a method as claimed in claim 1, reducing the cross-sectional area of said portion to said greater extent before enclosing said portion in said mass of plastic material and maintaining this reduction until said portion is fully enclosed in said mass.

3. In a method as claimed in claim 2, reducing the cross-sectional area of said portion by submitting same to a greater traction than that to which it will be submitted during operation of the loom.

4. In a method as claimed in claim 1, attaching said mass of plastic material to said element and enclosing said portion in said mass by disposing a sheath of thermoplastic material around said portion and said element, by applying to said sheath a solvent of said thermoplastic material, and by permitting said solvent to evaporate to cause contraction of said sheath on said element and on said portion in the form of a tubular mass.

5. In a loom for fancy articles operating with a Jacquard which selectively raises healds, each of said healds being biassed downwardly by a resilient cord having an upper end portion and a lower end portion, said resilient cord being interposed between a first element formed of the lower end of said each heald and a second element formed of the upper end of a hook retained by a stationary frame of said loom, the improvement comprising a mass of plastic material attached to one of said elements, said mass enclosing one end portion of said resilient cord, with said one end portion being maintained by said mass in a state in which the cross-sectional area of said cord in said one end portion is reduced to a greater extent that it may be under the effect of the highest tension to which said cord may be submitted during operation of said loom.

6. In a loom as claimed in claim 3, said one end of said resilient cord being folded on itself at substantially 180° within said mass of plastic material.

7. In a loom as claimed in claim 5, said mass of plastic material being removably attached to said one of said elements.

8. In a loom as claimed in claim 5, said mass of plastic being attached to said one end of said one of said elements by enclosing same together with said one end portion of said resilient cord.

9. In a loom as claimed in claim 8, said one of said elements being annular, and said one end portion of said resilient cord being passed through said one of said elements and being folded on itself at substantially 180° within said mass of plastic material.