NEEDLE OF WEAVING LOOMS

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The invention concerns needle weaving looms in which the holding member of the pulling needle consists of a clamp with two branches which are springy contact the one with the other and cooperating with a releasing blade which does away with the contact between the said branches when the needle emerges from the shed after having inserted the shoot in it.

It has been noted that with holding members of this type, as the result of an abnormal over-tension on the thread unwinding from a bobbin or coming from any other source of supply, it happens that the end of this thread, caught between the two branches of the springy clamp, slides between the contacting surfaces of the said branches and escapes from them, which produces objectionable results, such for example, as irregularities in the selvages or in the fabrics themselves.

To overcome these objections the strength of the grip of the holding member of the said pulling needles may be increased, but in this case other difficulties appear.

The object of the invention is to obviate these objections and it is based on the idea of causing the strength of the grip exerted on the end of the thread caught between the branches of the springy clamp to increase automatically each time that an abnormal increase occurs in the tension of the said thread as it unwinds, and that, as function of the said increase, by employing for this purpose the action itself of the abnormal increase in the tension of the thread, for operating on the springy branch of the said clamp in such a way as thereby to increase the pressure proportionately against the other branch.

For this purpose the invention consists in providing means on one or on the two branches of the said springy clamp, which allow the thread coming from the bobbin and seized in the clamp to come into contact with the outer surface of the springy branch, the said means further being such that they do not prevent the passage of the releasing blade.

In order to make the invention clearly understood and by way of examples of realization, forms of execution are described below and shown diagrammatically in the attached drawings.

These forms of execution consist in an application of the invention to pulling needles of the kind described in the U.S. patent application of the applicant Ser. No. 19,576 of May 3, 1935, Needles, the holding member of which consists of a springy clamp with two branches between which the end of the thread presented in the centre of the shed by the conveying needle, is seized when the exchange is made.

Figs. 1 to 7 show one form of execution of a pulling needle effecting the exchange of the thread when the two needles meet, the application of the invention offering, in this case, the advantage of assisting this exchange of the thread between the said needles.

Fig. 1 is a plan view from above of the clamp which terminates the pulling needle;

Fig. 2 being an elevation;

Fig. 3 is a view in cross section on the line 3—3 of Fig. 2 showing the position of the releasing blade, and

Fig. 4 is an elevation of the face of the needle on the opposite side to that shown in Fig. 2;

Fig. 5 is a plan view from above showing three successive positions of the thread after its exchange, the pulling needle withdrawing at this moment towards the selvage of the fabric;

Fig. 6 is an elevation showing certain of the positions indicated in Figs. 5 and 6;

Figs. 8 to 12 show a similar form of execution in the case of a pulling needle effecting the exchange of the thread with the conveying needle, after the said pulling needle has begun its return movement towards the selvage.

Fig. 8 is a plan view from above similar to Fig. 5;

Fig. 9 a view similar to Fig. 6;

Fig. 10 an elevation similar to Fig. 7;

Fig. 11 an elevation of the face opposite to that shown in Fig. 10, and

Fig. 12 a view in cross section on the line 12—12 of Fig. 9.

The pulling needle (Figs. 1 to 4) is of the kind described in the above mentioned patent application and is devised with a view to the realization of the invention; the holding member for the thread or springy clamp being composed of two branches, the one rigid and the other flexible.

2 is the springy clamp of the conveying needle (Fig. 5) in which is caught the end of the said thread unwinding from a fixed bobbin and passing over a supporting point 3 integral with the said conveying needle, which allows a stretched part a of the thread a to be presented to the pulling needle which seizes it at the mo-
ment of exchange, in passing between the springy clamp 2 and the supporting point 3.

1. A metal part forming the base of the holding member of the pulling needle, on the end of which it is fixed by any appropriate means, for example by screws which, when there is a guard of the kind shown at 20 (Fig. 10), pass through and hold the said guard by entering the threaded holes 5 provided in the thicker portion 8 of the part 7, the said thicker portion being fitted in one of the sides of the tube or of the L-shaped body in cross section usually forming the arm of the needle and in the guard, so that this part of the tube or L-shaped body is held tightly between the said part 7 and the base of the guard 20.

This part 7 is prolonged, being L-shaped in cross-section, one wing 4 constituting the rigid branch of the clamp, while the other object of the wing 10 will be described below.

On this part 7 is fixed by screws 1 one end of the flexible branch 5, the opposite end of which is shaped in such a way as to come into contact over a certain distance, with the end of the rigid branch 4, this branch 5 having a notch 6 close to its end on the side facing the wing 10. Further the said part 7 has a slot 15 at the side to allow of the passage of the releasing blade 16 mounted on a support 17 situated outside the shed, near to the selvage, the object of this blade being to separate the two branches 4 and 5 and thus to release the end of the weft thread when the pulling needle moves out of the shed.

In order to compel the thread to enter the notch 6, the ends of the branches are arranged as follows:

In plan the end 5' of the flexible branch 5 is slightly raised and straightened (as shown in Fig. 2) and has, on the side facing the wing 10, a projection 11 cut in the shape of a hook 12, directed (as shown in Fig. 4) towards the rigid branch 4, in such a way that, when pulling takes place, the thread places itself easily on the end 5' of the rigid branch 4 is bevelled across the whole of its thickness as shown in Fig. 2.

The end of the wing 10 also is bevelled and is notched at 16 to receive the end of the hook 12 of the flexible branch 5, which extends in the plane of the said wing.

Finally the ends 4' and 5' of the branches are cut obliquely as shown in Fig. 1.

In order to ensure a better gripping of the thread, either at the moment of exchange (Fig. 5) or at the moment of pulling (Fig. 6), bosses 13 and 14, formed integral with or attached, are provided on each side of the notch 6, on the outer face of the flexible branch 5. The thread, on leaving the notch 6, from the gripping point b between the two branches 4 and 5, bears successively on the one and the other of the bosses 14 and 13.

Thus arranged, the holding member functions as follows:

It will be seen in Fig. 5 that the portion a of the thread, stretched between the clamp 2 and the supporting point 3 of the conveying needle, approaches the pulling needle as the two needles continue to advance the one towards the other. It is then presented in the plane of contact of the ends of the branches 4 and 5, between which it enters.

This portion a of the thread then slides under the hook 12 of the flexible branch 5 and along the edge of the wing 10, arriving eventually by this means at the position a-15.

The thread, continuing to slide between the branches 4 and 5, reaches the level of the notch 6, and as the result of being raised on the edge of wing 10, enters the notch 6 and passes above the point b in order to take up the position a'-15. At this moment the pressure on the boss 14, thus increasing the gripping of the part 5', which, in combination with the advantage which the notch 6 affords of limiting the advance of the thread between the branches 4 and 5 facilitates the removal of the thread outside the conveying clamp 2.

The needles then stop, afterwards receding towards their respective selvages, so that the thread a coming from the bobbin and continuing to be raised by the edge of wing 10, passes above the point b of the notch, and is finally stretched as shown at a in Figs. 6 and 7, the final point of gripping being at b'. The portion a of the said thread coming from the bobbin, normally presses on the boss 13 of the springy branch 5 and eventually on branch 4 after a while as the tension of the thread remains normal, that is to say so long as the unwinding of the thread from its bobbin does not offer any abnormal resistance.

If during the return of the needles over-tension occurs, the portion a of the thread presses more upon the boss 13 and eventually on branch 3 (Fig. 11), as the tension of the thread remains normal, that is to say so long as the unwinding of the thread from its bobbin does not offer any abnormal resistance.

With a view to giving the rigid branch 4 the advantages of the flexible branch, a springy blade may be fixed on the inner face of the said rigid branch 4, so as to come in contact with the inner face of the springy branch.

To increase the adherence of the thread gripped between the inner surfaces of the branches and thus to enable the said surfaces to offer a greater resistance to slipping, these surfaces may be formed with cavities or notches or the said branches may be pierced, for example as shown at 18 (Fig. 6); these means however having to be selected in such a way as not to hinder the free passage of the releasing blade.

With regard to Figs. 10 to 12, they show a pulling needle of the type described in the application for patent mentioned above also, the exchange of the thread with the conveying needle taking place, in this case, when the needles recede towards their respective selvages.

On the rigid branch 4, the wing 10 is decreased in height at a certain distance from the end, in such a way as to be flush with the level of the springy branch 5. This wing, towards the end, is done away with in such a way as to assist in the formation of a wide lateral notch 10 in which lodges loosely an enlarged and right-angle turned up part 19, which ends the side projection 11 of the end 5' cut obliquely of the flexible branch 5, this part 19 assuming approximately the shape of a trapezium (Fig. 11).

On the opposite side of the flexible branch 5 and near its raised end 5', the side notch 6 is provided which is prolonged by a slot 6, the edge of this notch ending in the form of a tooth 12, the point of which, directed to the rear, is slightly raised (Fig. 10), the boss 13 being provided on the outer face at the end of the slot 6 of the notch 6.

With regard to Figs. 8 to 11, the holding member, thus arranged, of the pulling needle, operates as follows:

The portion a of the weft thread, stretched between the clamp 2 and the supporting point 3 of the conveying needle, approaches the pulling needles (Fig. 8).

It slides on the bevelled end 4' of the rigid
branch and then meets the sloping side of the trapezoidal part 19 of the springy branch 5 which compels it to pass above its raised end 5' cut obliquely, so as to permit the passage of the west thread, and arrives at the moment at which the needles stop in the position shown at a, above the branch 5 (Fig. 8). When this occurs, the portion of the thread at a passes under the raised tooth 12' and is lodged at the bottom of the slot 6'.

As the needles continue to recede, the end of the thread slides out of the thumb 2 of the conveying needle and the thread a, coming from the bobbin, passes over the boss 13 and also—owing to the sloping side of the trapezoidal part 19—over the raised end 5'.

As the result of the withdrawal of the pulling needle and of the supporting point 3, the definite point of gripping is to be found at b (Figs. 9 and 10), the portion a of the west thread a exercising a pressure on the boss 13 and the end 5'. If, until the arrival of the drawing needle outside of its slot c, the portion a of the thread presses proportionately more upon the boss 13 and eventually on the end 5' of the springy branch, which proportionately increases the gripping at the point b', it is necessary to prevent the floating warp threads from entering, on the return of the conveying needle, under the point 12', a guard of the known kind being used, as shown at 20 (Fig. 10).

With the same object it would be possible to give the branches themselves of the pulling needles of the types above described, the shapes of head which are the subject of the U. S. patents of the applicant, No. 2,683,657 granted September 3, 1938 and No. 2,659,726, granted November 3, 1953.

It is to be understood that, without departing from the spirit of the invention, alterations, improvements or additions may be made and in the same way the employment of equivalent means may be envisaged; for example, in the first form of execution, the wing 10 could be eliminated and, in this event, the points of the notch 6 would be lowered on the side on the rigid branch or in cavities, so that the thread could enter the said notch; or an equivalent for the wing 10 could be supported by the elastic branch itself.

I claim:

1. In looms of the type having a shed and a pair of reciprocating needles moving toward and away from each other for laying the pick in the shed, a pulling mechanism carried by one of said needles and a conveyor mechanism carried by said other needle, said pulling mechanism comprising a rigid member and a resilient member for gripping the thread therebetween, the gripping end of said flexible member being so constructed and arranged with respect to said rigid member and to said conveyor mechanism that the thread will ride on the exterior surface of said flexible member and exert pressure thereon during the receding movement of said gripping means whereby the gripping force of said gripping means will be increased by the resistance of the thread during the unwinding operation.

2. In looms of the type having a shed and a pair of reciprocating needles moving toward and away from each other for laying the pick in the shed, a pulling mechanism carried by one of said needles and a conveyor mechanism carried by said other needle, said pulling mechanism comprising a rigid member and a resilient member for gripping the thread therebetween, the gripping end of said flexible member for at least a portion of said length being in resilient contact with said rigid member, gripping means on one of said flexible members for gripping and retaining the thread between said members during the reciprocating movement and cooperating means carried by the gripping end of said two members for introducing the thread into said gripping means during the approaching movement of the two needles, the gripping end of said flexible member being so constructed and arranged with respect to said rigid member and to said conveyor mechanism that the thread will ride on the exterior surface of said flexible member and exert pressure thereon during the receding movement of said needle whereby the gripping force of said gripping means will be increased by the resistance of the thread during the unwinding operation.

3. In looms of the type having a shed and a pair of reciprocating needles moving toward and away from each other for laying the pick in the shed, a pulling mechanism carried by one of said needles and a conveyor mechanism carried by said other needle, said pulling mechanism comprising a rigid member and a resilient member for gripping the thread therebetween, the gripping end of said flexible member being in resilient contact with said rigid member at least for a portion of its length, gripping means carried by said flexible member for gripping and retaining the thread between said two members and cooperating means carried by the gripping ends of said two members for introducing the thread into said gripping means during the receding movement of the two needles, the gripping end of said flexible member being so constructed and arranged with respect to said rigid member and to said conveyor mechanism that the thread will ride on the exterior surface of said flexible member and exert pressure thereon during the receding movement whereby the gripping force of said gripping means will be increased by the resistance of the thread during the unwinding operation.

4. In looms of the type having a shed and a pair of reciprocating needles moving toward and away from each other for laying the pick in the shed, a pulling mechanism carried by one of said needles and a conveyor mechanism carried by said other needle, said pulling mechanism comprising a rigid member having an L-shaped cross section forming a wing and a flexible member, said flexible member for at least a portion of its length being in resilient contact with said rigid member and notched to receive and retain the thread between said members, the gripping end of said flexible member being slightly raised and straightened and provided with a hook facing said rigid member, and the gripping end of said rigid member being adjacent to said wing being bevelled and the said wing being notched to accommodate the hook of said flexible member whereby the thread will be intro-
duced into and retained in said notch during the approaching movement of the needle, said pulling mechanism being so arranged with respect to said conveyor mechanism that the thread will ride on the exterior surface of said flexible member and exert pressure thereon during the receding movement of said needles and said flexible member being embossed on each side of said notch whereby the gripping force of said gripping means will be increased by the resistance of the thread during the unwinding operation.

5. In looms of the type having a shed and a pair of reciprocating needles moving toward and away from each other for laying the pick in the shed, a pulling mechanism carried by one of said needles and a conveyor mechanism carried by said other needle, said pulling mechanism comprising a rigid member and a resilient member, said resilient member being in resilient contact for at least a portion of its length with said rigid member and notched and provided with a hook facing away from the gripping end to receive the thread during the receding movement of said needles, the extremity of the gripping end of said flexible member being bent outward and provided with a lateral trapezoidal projection facing said rigid member and said rigid member being notched to receive said projection, the end of said rigid member facing the conveyor mechanism being bevelled whereby the thread will slide over the exterior surface of said flexible member during the approaching movement and will be received in said notch during the receding movement, and ride over the exterior surface of said flexible member and exert pressure on said projection whereby the gripping force of said gripping means will be increased by the resistance of the thread during the unwinding operation.

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