March 2, 1937. R. DEWAS 2,072,161

THREAD CARRYING APPARATUS FOR WEAVING LOOMS AND THE LIKE

Filed May 16, 1934

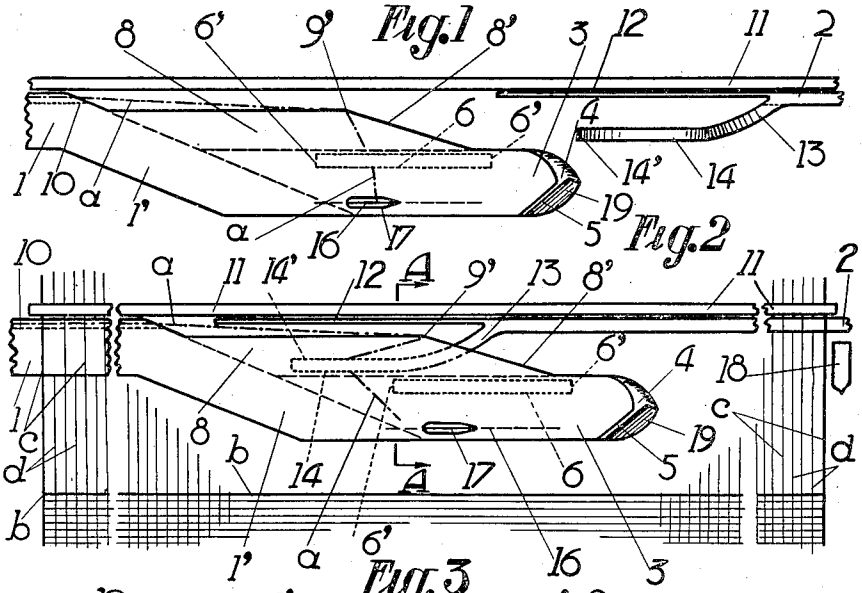


Fig. 1

Fig. 2

Fig. 3

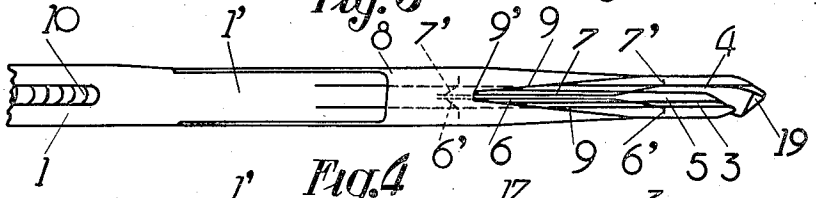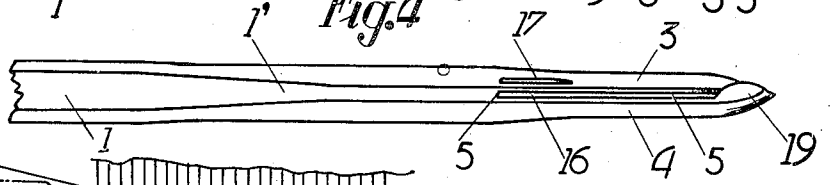


Fig. 4



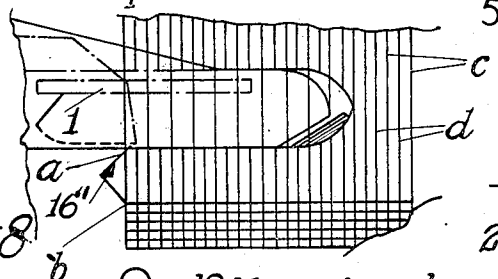


Fig. 8

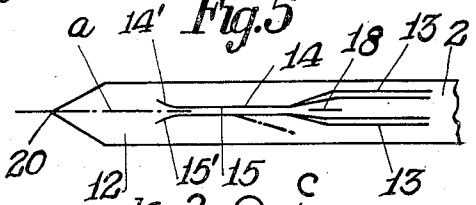


Fig. 5

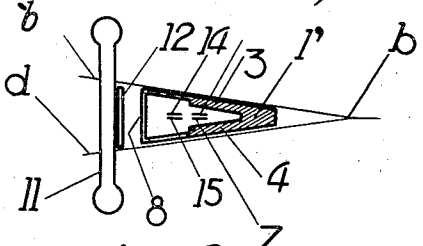


Fig. 6

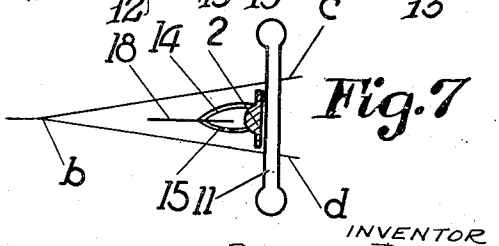


Fig. 7

INVENTOR
RAYMOND DEWAS
BY
Richards & Geier
ATTORNEYS

Patented Mar. 2, 1937 2,072,161

UNITED STATES PATENT OFFICE

2,072,161

THREAD CARRYING APPARATUS FOR WEAVING LOOMS AND THE LIKE

Raymond Dewas, Amiens, France

Application May 16, 1934, Serial No. 725,885
In France June 2, 1933

13 Claims. (Cl. 139—127)

This invention relates to a method for the insertion of weft threads in single shoot for needle weaving looms and to a thread carrying device for such looms.

The present invention is chiefly concerned with the insertion of weft threads in single shoot in weaving looms having rigid or flexible needles with a feeding of the weft by means of large stationary bobbins, for the production of fabrics of all kinds.

Needle looms for the insertion of weft threads in single shoots, and devices for the obtaining of fast selvages are known in prior art. These looms and devices are complicated, delicate, noisy and most of their parts are usually driven mechanically so as to be able to operate by the moving parts of the looms themselves or by other means.

The object of the present invention is to effect the insertion of weft threads in single shoot, in weaving looms having rigid or flexible needles by a simple, certain and rapid method without noise or wear. The invention comprises a method for the insertion of weft threads in single shoot which permits the weaving with fast or ordinary selvages and also devices for carrying out the said method.

According to the invention, the method for the insertion of the weft into the shed, in single shoot, coming from a stationary bobbin, is characterized in that: The weft thread is stretched in front of the opening and across the shed between the fell of the cloth and an eyelet; the conducting needle, on penetrating into the shed, seizes the stretched thread and commences to draw it into this shed, bending it over; due to the advancing of the needle and the dragging on the thread which follows, the latter is brought into contact with a severing device which is either integral with the needle or independent thereof and is situated in front of the entry of the shed, said device being arranged and constructed to receive the thread so that it may be stretched and severed by it automatically; due to the severing, the part of the weft thread which lay between the conveying needle and the fell of the cloth remains folded over in the shed when the severing member is integral with the needle, so as to form a fast selvage, or this part of the thread remains loose outside the selvage when the severing member is placed in front of the shed, to form an ordinary selvage; due to this severing, the other part of the weft thread which lies always between the needle and the bobbin, from which the weft thread can uncoil or unwind, is drawn in a single shoot, by the conveying needle, to the center of the shed to be transferred to the pulling needle which then conducts the thread outside the shed where the said thread is then released from the pulling needle by means of a releasing member placed at the exit of the shed.

As an example of how this method can be carried into effect when applied to a needle weaving loom of known type, such for example as the Dornan loom described in U. S. Patent No. 159,653, of February 9, 1875, or the Gabler loom, an embodiment of a thread carrier device, which may be used alone or in any number, and which allows of weaving in single shoots with a fast selvage, is described hereinafter and shown in the attached drawing, the drive for the alternating movement of the needles being ensured by arrangements already used in such looms or by any other suitable means.

In the drawing:

Fig. 1 is a plan view from above of the conveying and pulling elements of a thread carrier at the end of the needles of the loom, a little before the moment when these elements meet one another to exchange the thread.

Fig. 2 is a similar view, the elements being engaged the one in the other for the purpose of exchanging the thread.

Fig. 3 is a view of the conveying element showing the side which slides along the reed.

Fig. 4 is a view of the same member showing the opposite side relatively to the fell of the woven material.

Fig. 5 is a side view of the pulling element for the thread, at the moment when, after having removed and led the thread along, the latter is on the point of being disengaged from the clamp by the releasing member.

Fig. 6 is a cross section taken on the line A—A of Fig. 2.

Fig. 7 is an end view of the side of the selvage of the woven material where the releasing blade for the thread is placed.

Fig. 8 is a plan view of the cutting knife mounted on a fixed or movable support.

According to these figures, and with reference to the conveying and pulling elements for the thread, 1 is the conveying needle and 2 the pulling needle.

The end of the conveying needle 1 is in the form of an oblique part 1' which extends, parallelly with the axis of the needle, as two prongs 3 and 4, formed integrally or attached, between which a space or slot 5 is left within which is accommodated, parallelly or approximately so, with

the axis of the needle and in its median plane, a springy clamp for seizing, holding and conveying the thread which has to be led along.

This clamp consists of two springy blades 6 and 7, arranged parallel to one another and in contact one against the other, over the greater part of their length and of which the ends 6' and 7' are bent in an outward direction in such a way that they are embedded in the wall of the slot 5 thus ensuring the holding of the clamp and at the same time facilitating the introduction of the thread between the said blades 6 and 7 which are in contact, after it has entered the slot 5, at the moment of the entry of the needle into the shed.

A piece of metal sheet 8 is arranged behind the two prongs 3 and 4 and is connected with the latter as well as with the oblique part 1' of the end of the needle 1. The piece of metal sheet 8 has the shape of a hood and covers the whole device; the end of the sheet 8 has an inclined surface 8' in which is provided a bell mouthed opening 9, the end portion 9' of which is situated at a certain distance behind the prongs 3 and 4 and therefore also behind the slot 5 in which is accommodated the clamp 6—7. A central groove 10 is also provided on the surface of the needle 1 and extends substantially up to the oblique part 1' for accommodating the thread. The object of the groove 10 is to avoid the rubbing of the thread against the reed 11 of the loom along which the needle 1 slides.

The end of the pulling needle 2 is in the form of a fork, with two prongs situated in the plane passing through the slot 5 between the prongs 3 and 4 and the opening 9 of the metal sheet 8 of the conveying needle 1.

One of these prongs 12 prolongs the face of the needle 2 which slides along the reed 11.

The other prong, which can be formed integrally or attached, forms an elbow at 13, is straightened again parallelly with the extension 12, and divides into two springy blades 14 and 15 which come into contact with one another for the greater part of their length, although, at their end they are bent outwards at 14' and 15' in order to facilitate the introduction of the thread which has to be gripped.

That explained, when the conveying needle 1 is introduced into the shed the weft thread *a* to be led along, stretched across the said shed, penetrates into the slot 5 between the prongs 3 and 4 and between the blades 6 and 7 of the springy clamp, where it is gripped and held. The weft thread which is cut at this moment in a way hereinafter to be described at a point situated between the springy clamp and the fell *b* of the cloth, is thus transported towards the middle of the shed (Fig. 1).

At this moment it is stretched between the springy clamp 6—7 and the portion 9' of the triangular opening 9 of the sheet metal cover 8, passing afterwards into the groove 10 of the needle as far as the supply bobbin.

The pulling needle 2, arriving at the same time towards the middle of the shed (Figure 1), the two needles will continue their course one towards the other, as far as the middle of the shed penetrating the one into the other (Figure 2) in such a way that the forked prong with the springy blades 14—15 of the pulling needle 2 penetrates into the triangular opening 9 of the the metal sheet 8 in the plane of the slot 5 and the springy clamp 6—7 which is in it, catching the weft thread *a*, which is stretched in this plane, between the prongs 6—7 of the clamp and the end portion 9' of the opening 9.

The force of the clamp with springy blades 14—15 of the pulling needle 2 being greater than that of the springy blades 6—7 of the clamp of the conveying needle 1, disengages the thread from the latter and pulls it along in its return movement towards the opposite selvedge of the cloth, so that the complete passage of the weft thread, in single shoot, along the whole of the shed formed by the subdivided sheets *c* and *d* of the warp is ensured.

In order that, at the moment of its entry into the shed the conveying needle 1 may be able to pull the end of the weft and pass it through in a single shoot, a cutting device is provided for this purpose.

This consists of a cutting blade 16 arranged perpendicularly to the plane of the slot 5 in the bottom of the latter and beneath the springy clamp 6—7. The blade may also be arranged on a fixed or movable support in the manner shown in Figure 9 of my co-pending application, Serial No. 673,672, filed May 31, 1933.

In order that waste, fluff and the like shall not clog the bottom of this slot 5 above the blade 16, a lunette or cleaning orifice 17 is provided level with the blade 16 and through the prong 3.

As a result of the arrangement of the knife 16 in the slot 5 when the needle 1 enters into the shed and seizes the weft thread stretched across the shed between the fell of the cloth and the supply bobbin, on account of the advancing of the needle through the shed, the thread, seized and held by the clamp 6—7 will, with its part lying between the said clamp and the fell *b* of the cloth, come into contact at a certain place with the blade 16, where, owing to the pull on it, and the progressive movement produced by the blade in combination with the cleaning orifice 17, it is cut, the end of the cut thread, between the blade and the fell of the cloth, being thus automatically held back or turned into the shed in order to form the selvedge.

In order that the pulling needle 2, on returning out of the shed and having passed the shoot through, may be released from the end of the weft thread which has been seized by and held between the prongs 14—15 of the prong 13, a release blade 18 is arranged at the exit end of the shed in the plane passing between the two prongs 14—15 and held by any suitable supports, on any suitable part of the loom.

As a result of this arrangement, when the needle 2 executes its return movement (Figures 5 and 7), the blade 18 passes between the two springy blades 14—15 of the prong 13, thus releasing the end of the weft thread.

The said blade 18 of course can be arranged also in such a way that the release of the weft thread takes place only after the shed of the warp has changed.

Finally, in order to prevent, in certain cases, when penetrating the shed, the loose threads of the warp from penetrating into the slot 5 of the conveying needle 1, or between the springy blades 14—15 of the pulling needle, special means can be provided for this purpose.

To this effect, the end of one of the prongs of the conveying needle 1, for example, the prong 4, will be provided with an enlarged part 19 which masks the entrance of the slot 5, the penetration of the weft thread into the slot, stretched across the shed, being nevertheless made possible by any

suitable means which give the thread stretched across the shed a slope which corresponds to the enlarged part 19. Such means are described, for instance, in my copending patent application, Serial No. 695,996, filed October 31, 1933. The metal sheet 8 may be used, if desired, for this purpose and may be shaped in any suitable way.

In the same way the end of the prong 12 of the pulling needle 2 can be arranged in the form of a point 20, so that it will divide the loose threads and keep them away from the opening 14'—15'.

It is understood that without going outside the spirit of the present invention, alterations, improvements or additions can be made, in the same way the employment of equivalent means can be contemplated.

Thus, for example, the exchange of the thread between the two needles 1 and 2 can take place at the moment when the needles separate, the position and the shape of the members being modified accordingly.

In the same way, in certain cases, in order to give the cloth two turn-back or fast selvedges, it will be sufficient to eliminate the release blade 18, the clamp 14—15 of the pulling needle 2 holding the end of the shoot which has passed until the shed has changed, whereupon the thread will be turned back and released in a bent-back position in the new shed, while it advances towards the conveying needle 1 in order to grip the next shoot.

Finally, if no turn-back selvedge is desired on the side of the conveying clamp, the cutting blade 16, instead of being arranged in the slot of the conveying needle, will be mounted on a fixed or movable support arranged near the selvage as shown at 16' in Fig. 8.

It is understood clearly that, in cases where, after a thread has passed in one direction, another thread has to be passed in the opposite direction, each of the elements of the thread carrier will have to be so designed, according to the present invention, that they constitute, in combination, the conveying parts and those which pull or remove in each of the two units constituting the thread carrier.

In addition to this, the invention has a further aim, namely to secure the insertion or the running of a thread, in accordance with the method and/or by means of the device as described above, wherever it may be applicable in all other weaving machines, looms for the manufacture of knotted carpets, looms for making net, knitting machines, Philly looms described in French Patents 589,428 and 532,884, in fact wherever the end of the thread to be run has to be brought to a predetermined point from which it must then be removed or drawn in order to be brought to another point, whether or not it passes across the sheet or the groups of threads, across textures formed by threads or other materials which are intercrossed or interlaced in any way.

I claim:

1. Thread carrying apparatus comprising a conveyor member and a pulling member, one end of said conveyor member extending to a pair of prongs forming an intermediate slot, a clamping member in said slot, said clamping member comprising a pair of parallel flexible blades normally in resilient contact with each other at least over a portion of their length, the free ends of said blades being bent outwardly and embedded in the walls of said slot, and means for supporting the thread held by said clamp, at least a portion of said means being mounted on the face of said conveyor member facing the reed between said clamp and said reeds.

2. Thread carrying apparatus as claimed in claim 1 characterized in that the end of the pulling element is in the form of a fork with two prongs, one of which is divided into two springy blades which are in contact with one another, the free ends of said blades being bent outwards to allow them to seize the thread which is stretched between the clamp and the thread supporting means of the conveyor member.

3. Thread carrying apparatus as claimed in claim 1 characterized in that a cutting blade is arranged at the bottom of the slot between the two prongs of the conveying element and between the springy clamp and the side of the conveying element facing the fell of the cloth for cutting the thread when the conveying movement commences.

4. Thread carrying apparatus as claimed in claim 1 characterized in that a blade for releasing the thread from the pulling element is mounted on the loom and arranged in the plane passing between the two blades of the prong to push said blades apart at the end of the pulling movement.

5. Thread carrying device for the insertion of weft threads in single shoot with the object of weaving with a fast selvage, said device comprising in combination with means for stretching the weft thread in front of and across the opening of the shed going from the fell of the cloth to the stationary weft bobbin, a conveying needle to seize the weft thread which is stretched at its entry into the shed, a cutting device integral with the needle so arranged and constituted that the weft thread drawn into the entry of the shed by the advance of the needle comes into contact therewith and is severed automatically as a result of the tensile stress, whereby the part of the weft thread which lay between the needle and the fell of the cloth, folded over in the entry of the shed by the arrival of the needle, remains folded there to form a fast selvage and in such a way that the part of the thread which goes from the conveying needle to the stationary supply bobbin, from which the thread can uncoil or unwind, can be led as a single shoot into the center of the shed, a pulling needle to take the thread from the conveying needle and pull it out of the shed, and a releasing device to free the thread from the pulling needle when the latter leaves the shed.

6. Thread carrying device for the insertion of weft threads in single shoot for the purpose of weaving with an ordinary selvage, said device comprising in combination with means for stretching the weft thread in front of and across the opening of the shed, going from the fell of the cloth to the stationary supply bobbin, a conveying needle to seize the weft thread stretched at its entry into the shed, a cutting device to cut the weft thread adjacent the selvedge edge whereby the weft thread is severed automatically under the tensile stress, and whereby the part of the weft thread which lay between the cutting blade and the fell of the cloth remains loose outside the selvage to form an ordinary selvage, and whereby the part of the weft thread which goes from the conveying needle to the stationary supply bobbin, from which the thread can un-

coil or unwind, can be led with single shoot into the center of the shed, a pulling needle to take the thread from the conveying needle and pull it outside the shed and a releasing device to free the thread from the pulling needle when the latter leaves the shed.

7. Thread carrying device comprising a conveyor needle one end of which extends to a pair of prongs forming an intermediate slot, an elastic clamp fitted in said slot, said clamp comprising a pair of parallel flexible blades normally in resilient contact with each other at least over a portion of their length, the free ends of said blades being bent outwardly and embedded in the walls of said slot, and means for supporting the thread held by said clamp, at least a portion of said means being mounted on the face of said conveyor needle facing the reed and between said clamp and said reed.

8. Thread carrying device comprising a conveying needle and a pulling needle adapted to operate from opposite edges of the shed, said pulling needle having an extremity ending in the form of a fork with two prongs, one of which slides along the reed and the other comprises two elastic blades in contact with each other, the ends of said prongs being separated for seizing the thread stretched between the clamp and the point of support of the conveying needle and to remove it from the said needle without contact between the two needles.

9. The arrangement, in the conveying needle according to claim 7 of a severing device, comprising a cutting blade which is arranged at the bottom of the slot which separates the two prongs and between the elastic clamp and the side which faces the weaving so as to cut the weft thread at the beginning of the conveying path, when a fast selvage is desired.

10. The arrangement in one of the prongs of the conveying needle according to claim 7 of a restriction and clearing aperture which is level with the cutting blade.

11. In combination with the pulling needle according to claim 8, a releasing device comprising a blade for releasing the thread arranged at the exit of the shed for the purpose of separating the two blades of the prong which holds the thread for the purpose of releasing it.

12. The thread carrying apparatus of claim 1 characterized in that a cutting means is arranged to cut said thread adjacent the selvedge of the cloth.

13. A process for weaving fabrics with a fast selvedge edge comprising the steps of stretching the weft from the selvedge to the weft bobbin in front of the opening to the shed, gripping the weft thread by an inserter and moving said inserter part way through the shed, cutting the doubled shoot after insertion in the shed, said cutting being accomplished adjacent the selvedge and from tension developed by said inserter while the weft thread is being inserted, folding the portion attached to the selvedge into the shed by engagement with the inserter whereby a fast selvedge is formed, inserting a gripping element from the other side of the shed to grasp the other portion of said weft thread and remove it from said inserter and then pulling said other portion through the shed as a single weft thread.

RAYMOND DEWAS.