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WEAVING FRAME HAVING IMPROVED WEFT HANDLING MEANS

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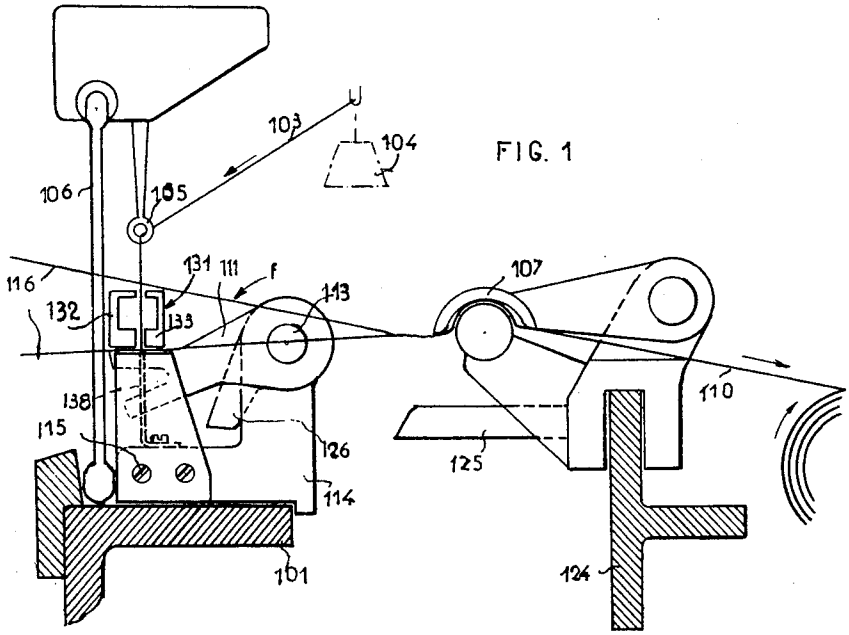


FIG. 1

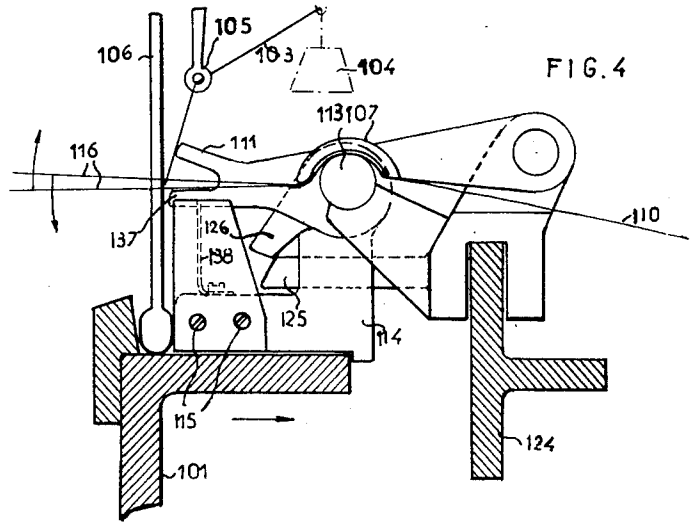
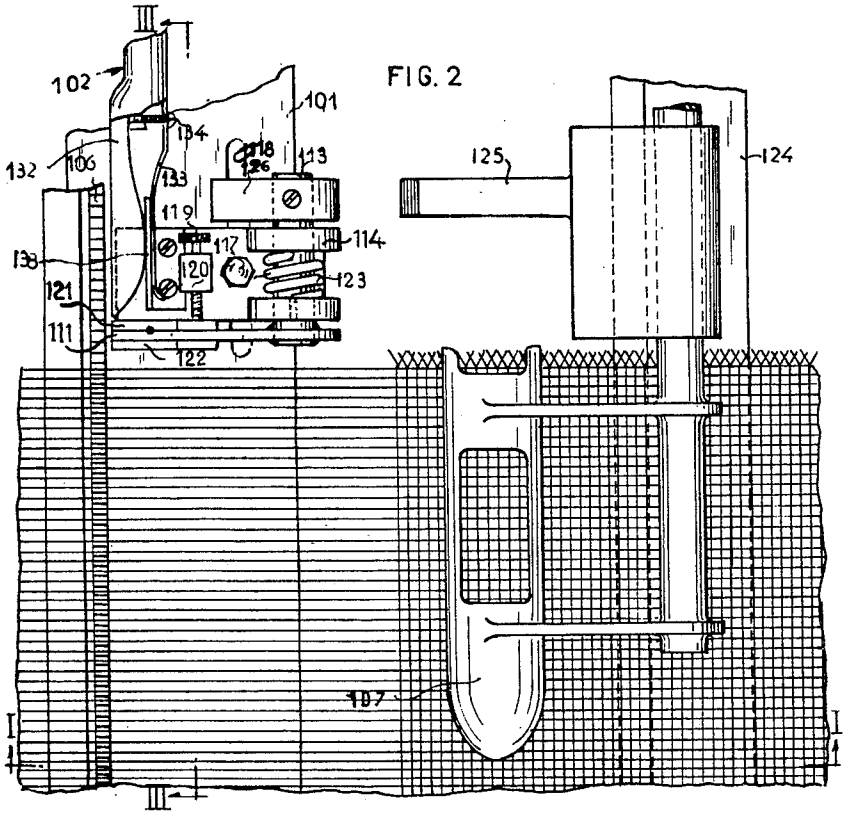


FIG. 4

WEAVING FRAME HAVING IMPROVED WEFT HANDLING MEANS

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FIG. 2



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FIG.3

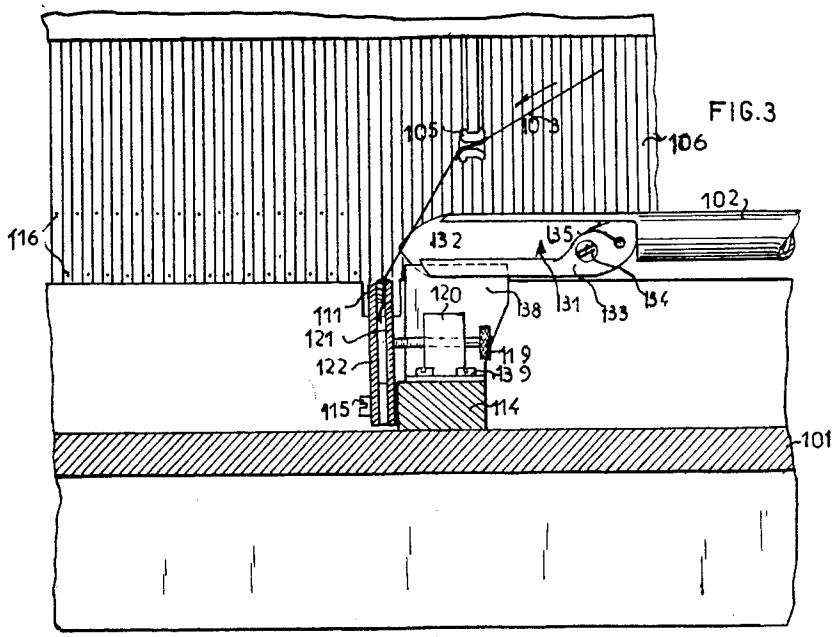
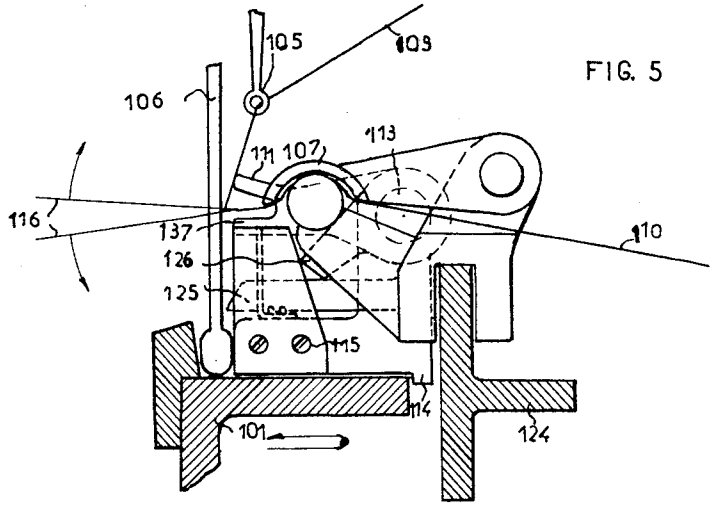


FIG. 5



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FIG. 7

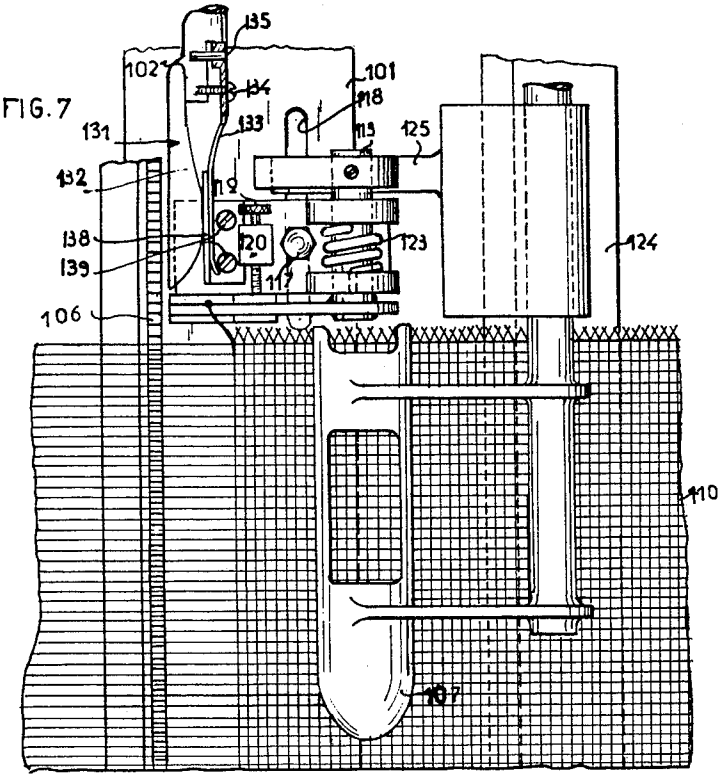
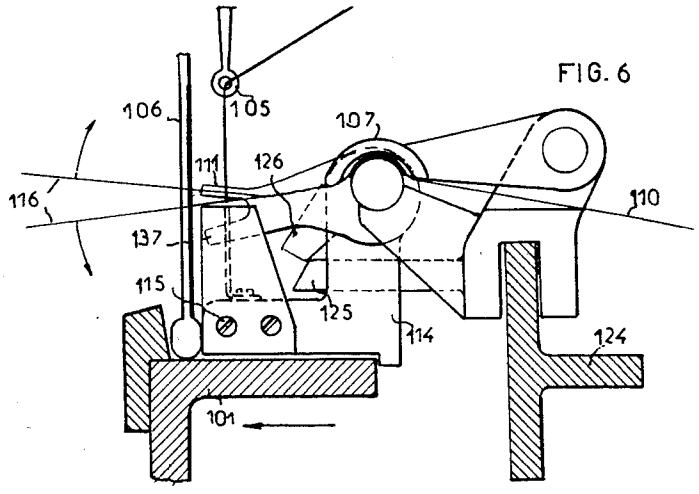


FIG. 6



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WEAVING FRAME HAVING IMPROVED WEFT HANDLING MEANS

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4 Claims. (Cl. 139—127)

This invention relates to weaving frames or looms, more especially to looms of the shuttle-less type in which the weft is shot across the yarn by means of weft shooting members which are continually supplied with weft from a source of yarn such as a bobbin or pirn. The weft shooting members usually take the form of a pair of needles which are reciprocated towards and away from each other across the warp, i.e. into and out of the shed formed between the alternate threads of warp, the weft yarn being delivered from the supply to one of these needles, the so-called delivery needle, and being transferred from this to the opposite needle at the instant in the reciprocating cycle when both needles have met each other halfway across the width of the web. The two needles or similar weft shooting members are generally supported on the weft presser structure of the loom, such as a batten and reed, so as to accompany said presser structure as the latter is reciprocated longitudinally of the frame for pressing and settling the successive picks of weft in place against the weft previously positioned in the fabric being woven.

The invention is concerned with the problem, present in looms of the class referred to, of cutting off the weft thread at the selvedge of the fabric after each successive pick of weft has been pressed into place, and thereafter supplying the weft shooting member, such as the delivery needle, with a fresh length of weft from the source. It is the general object of the invention to provide improved means for performing this function.

In prior-art construction, the weft cutting means are frequently carried on the fixed frame of the loom. This arrangement is conducive to substantial loss of weft yarn, since the weft-engaging means provided on the delivery needle (or equivalent weft-shooting member) is reciprocating with the weft presser member (such as the batten) and can only enter the shed in the warp after the said presser member has receded a certain minimum distance, so that a non-negligible length of weft thread remains hanging from the delivery needle at the instant of cutting. A similar condition occurs at the opposite selvedge, so that in the finished fabric the weft yarn projects beyond the warp at both selvedges. If it is attempted to release the weft thread from the needle at an earlier point in the cycle in an attempt to overcome this difficulty, the released length of weft tends to untwist thereby impairing the quality of the selvedge in the woven fabric.

In other types of conventional weaving frames of the class referred to, the weft cutting device is carried by the delivery needle (or equivalent shooting member). With such an arrangement, in order that the weft shall be cut very close to the selvedge as is clearly desirable to avoid loss of weft stock, the delivery needle must be inserted into the shed at a period in the cycle when the shed is not sufficiently open. Moreover the stresses developed in the cutting operations are transferred to the marginal selvedge yarn so that a poor selvedge results. Furthermore, the end of the weft yarn connected with the selvedge is carried back into the shed at the next cycle, so that there results a characteristic thick selvedge which is undesirable in many applications.

Objects of this invention include the avoidance of the above listed difficulties and defects, with accompanying

improvements in the constructions and operation of the loom and in the quality of the fabrics woven therewith.

In accordance with the invention, in one aspect, there is provided a weaving frame including a weft presser member reciprocable longitudinally of the frame, a weft shooting member reciprocable transversely of the frame, means delivering weft yarn from a supply to the weft shooting member, weft cutting and holding means carried by the weft presser member, and means cyclically operating said last-mentioned means to cut off the weft yarn and hold the weft yarn between the cut and the supply for subsequent engagement of said weft yarn by the weft shooting member.

In another aspect, there is provided a weaving frame including a weft presser member reciprocable longitudinally of the frame, a weft shooting member reciprocable transversely of the frame along the presser member, means delivering weft yarn from a supply to the shooting member, weft-engaging means carried by the shooting member, weft cutting and holding means carried by the weft presser member, means operating said cutting and holding means once per longitudinal reciprocation of the presser member to cut off the weft yarn and hold the yarn between the cut and the supply in a position to be engaged by the weft engaging means of the shooting member, and means operating said engaging means once per transverse reciprocation of the shooting member along the presser member for engaging the weft yarn between said holding means and said supply, said holding means being arranged to release the weft yarn after the yarn has been engaged by said engaging means.

An exemplary embodiment of the invention will now be described for purposes of illustration but not of limitation with reference to the accompanying drawings, wherein:

FIG. 1 is a view in transverse vertical section on line I—I of FIG. 2 illustrating a weft cutting and holding device according to the invention installed upon the batten of a loom of the type using a pair of weft-shooting needles;

FIG. 2 is a corresponding view in overhead plan;

FIG. 3 is a longitudinal vertical section on line III—III of FIG. 2;

FIGS. 4 to 6 are similar to FIG. 1 and illustrate the relative positions of the parts at different points of the weaving cycle; and

FIG. 7 is a plan view similar to FIG. 2, but with the parts being positioned at the same point in the cycle as that shown in FIG. 6.

Referring first to FIGS. 1–3, the batten of a shuttle-less weaving frame is shown at 101, and has a conventional reed 106 upstanding from its upper surface, with the warp threads 116 extending through the spaces between the teeth of the reed in the usual way. It will be understood that the warp threads 116 may issue from a conventional warp beam or roll, not shown, positioned at the rear of the loom (to the left of the drawing), and are cyclically separated into an upper and a lower sheet of alternate warp threads by the usual heddle harness or equivalent means. Beyond (i.e. to the right of) the reed 106 the two sheets of warp threads (with which the weft threads are now interwoven) converge and pass through a tensioning device 107 called a temple or tenter and thence the woven web of fabric 110 is taken up on a cloth roll or the like as shown at the extreme right hand end of FIG. 1.

For shooting weft yarn across the warp through the space between the upper and lower sheets of warp, which space is called the shed, looms of the category here referred to generally use a pair of reciprocating needles reciprocated towards and away from each other into and out of the shed from opposite sides of the frame. Only one of the needles is shown in the figures, the needle

102 shown is the delivery needle, i.e. the needle receiving the weft yarn from a supply thereof indicated as a bobbin or pirn 104. The weft yarn 103 from the supply is passed through a thread guide 105 and thence to weft-engaging means (later described) in delivery needle 102. It will further be recalled that delivery needle 102 carries this weft yarn into the shed on the ingoing stroke of the needle reciprocation as far as the midpoint of the frame width, at which point it meets the other needle (not shown) and transfers the weft yarn to the latter. On the outgoing stroke of both needles the second needle carries the weft yarn transferred to it over the remaining half of the width of the web to complete the weft shooting operation.

The weft engaging means provided in the needle 102 according to the invention are generally designated 131 and will be described in detail later. First, means will be described according to the invention for cutting off a section of the weft thread engaged in needle 102 adjacent the selvedge of the fabric being woven after this weft thread has been pressed home by the reed 106, and for then holding the remaining weft thread, i.e. that connected with the supply pirn, in position to be engaged by the needle 102 at the start of the next weaving cycle.

The weft cutting and holding means of the invention comprise a pair of stationary blades 121 and 122 and a movable cutter blade 111. Blades 121 and 122 are secured in upstanding, parallel spaced relation by means of screws 115 upon a bracket 114 secured to the upper surface of batten 101 near one end of the latter. The stationary position of bracket 114 is adjustable along the batten by altering the position of a bolt 117 in a slot 118 formed in the batten. Movable cutting and clamping blade 11 is positioned in the space between fixed blades 121 and 122 and is pivoted by means of a pivot pin 113 secured to it and rotatably mounted in bracket 114, about an axis of rotation parallel to the direction of the weft yarn (the transverse direction of the frame). Of the two stationary blades, blade 121 cooperates with movable blade 111 to clamp or grip the weft yarn while blade 122 cooperates with movable blade 111 to cut the yarn. The upper edge of stationary cutter blade 122 and the lower edge of movable blade 111 are accordingly bevelled and sharpened to provide the cooperating scissors-like cutting means, whereas the upper edge of stationary blade 121 and the corresponding upper edge of movable blade are both rounded to provide the cooperating yarn clamping or holding means. Furthermore, while the stationary cutter blade 122 is comparatively thick and rigid, the stationary holder blade 121 is relatively thin and flexible. A screw 119 threaded into a block 120 secured to supporting bracket 114 engages blade 121 to permit adjustment of its pressure of application against stationary blade 122.

Blade 111 is urged to rotate about its pivot 113 in the direction indicated by arrow *f* in FIG. 1 by a coil spring 123 (FIG. 2) which surrounds pivot 113 and has one of its ends anchored to the pivot and its other end anchored to bracket 114. Blade 111 can be rotated in the opposite or clockwise direction in opposition to spring 123 by a stationary camming abutment 125 projecting from the fixed frame structure 124 and positioned in general alignment longitudinally of the frame (i.e. parallel to the warp direction) with a camming finger 126 projecting from pivot 113 and secured to said pivot and to cutting and clamping blade 111. It will be understood that in operation of the loom the batten 101 and reed 106 are reciprocated in the longitudinal direction for cyclically pressing or settling the weft yarn and as the batten and reed approaches the end of its pressing stroke (the rightward end as shown in FIGS. 1 and 2), the finger 126 engages abutment 125 so that the finger and with it the blade 111 are rotated clockwise to lift the movable blade 111 out of holding and cutting engagement with the blades 121 and 122. Thereafter the batten reverses its movement and as it starts receding (leftward in the figures) camming finger 126 disengages abutment 125 and allows the blade 111 to be rotated counter clockwise by spring 123 (aided by gravity) into its gripping and cutting position relatively to the fixed blades 121 and 122.

It will be noted that in the operation of the camming arrangement 126–125, the finger 126 is arranged first to strike the end of abutment 125 and then to slide over the upper surface of the abutment during the final stage of the forward stroke of the batten, so that the amplitude of the rotation of the blade 111 can be determined with high accuracy, even through the amplitude of the bodily movement of the batten may, and usually does, vary somewhat from one weaving cycle to another.

The delivery needle 102 further includes weft engaging means as earlier explained, and such means, generally designated 131, includes a rigid channel-shaped jaw member 132 secured to the needle and a cooperating, resiliently flexible jaw member 133 of opposite channel shape, which is resiliently applied into engagement with jaw member 132 by the pressure of a screw 134 extending through the member 133 and engaging the member 132. Rotation of screw 134 will adjust the weft engaging pressure. Resilient jaw member 133 is held in proper alignment by means of a locator pin 135 (FIGS. 3 and 7) projecting into a recess of member 132. The inwardly directed surfaces of the jaw members 132 and 133 constituting the weft engaging means are convex as shown e.g. in FIG. 2.

Means are provided for actuating the weft engaging means 131 to engaging and releasing positions in time with the reciprocation of the needles. These means comprise a flange 138 secured upstanding on bracket 114 by means of screws 139 and in a vertical plane parallel to the transverse (weft) direction such that as the needle 102 approaches the outermost point of its outgoing reciprocatory stroke (shown in FIG. 2) the flange 138 engages in between the two jaws 132, 133 and forces movable jaw 133 away from the rigid jaw 132. Shortly after the start of the ingoing stroke of needle 102 separator flange 138 disengages the jaws and allows jaw 133 to be restored to its weft engaging position relative to jaw 132 by its own resiliency. It will be observed from FIG. 3 that the weft-engaging assembly 131 is positioned somewhat lower than is the main body of needle 102 so as to allow flange 138 to effect its separating action upon the jaws without interfering with the movement of the needle.

As shown in FIG. 4, the movable blade 111 has an auxiliary portion 137 projecting from pivot 113 below and at an angle to the main blade portion, so as to remain continually positioned between stationary blades 121 and 122 in all of the rotated positions of the blades 111, thereby maintaining the correct spacing between blades 121–122 and permanently cleaning the space between them of any obstructions such as shreds of weft yarn that would otherwise tend to clog it.

The system described operates as follows:

Assume a pick of weft has been shot through the shed. Needle 102 has carried the weft thread as far as the midpoint of the web and the thread has been transferred to the other needle (not shown) which then draws it out of the shed over the other half of the web. The batten 101 is advancing towards the fixed frame structure 124 (FIG. 4) while both needles are moving away from each other out of the shed. Reed 106 secured to the batten is pressing the newly shot weft against the previously settled weft in the web. During this movement the pick of weft remains applied against the front side of the reed owing to the friction exerted by the warp threads 116 which are closing in owing to the action of the heddles (not shown) as indicated by the arcuate arrows in FIG. 4. As the batten and reed approach the end of their forward movement finger 126 strikes abutment 125 and blade 111 is raised. In this movement blade 111 does not engage the weft yarn 103 since the latter is applied against the reed

clear of the circular path of motion of the tip of blade **111**. Finger **126** continues to slide over the upper surface of abutment **125** while the reed presses the weft thread home (FIG. 5). The batten then commences to recede and the pick of weft just settled remains trapped by the yarn threads interwoven with it, while blade **111** is rotated downward as finger **126** disengages abutment **125**. In this downward movement however blade **111** engages the weft (FIG. 6) since it is positioned between the thread guide **105** carried by the batten and the end of the weft yarn trapped in the selvedge of the fabric between the intertwined selvedge threads. Hence the blade **111**, as it moves down, carries the weft thread connected to supply bobbin **104** with it, into the space between the stationary blades **121** and **122**. The weft is therefore cut off by the scissors formed by cutting and clamping blades **111** and **122**, at a point immediately adjacent to the selvedge of the fabric, while the portion of the weft connected to the supply bobbin is gripped between blade **111** and **121** as earlier explained.

The portion of weft thread stretched between the cutting-and-gripping device on one side and the thread guide **105** is positioned exactly on the path of movement of the engaging device **131** of needle **102** in the plane of the separator flange **138**, so that the device **131** as it disengages the separator flange **138** and resumes its closed condition traps the portion of weft thread and carries it with the needle **102** into the shed. The spring pressure of holding device **111–121** is provided weaker than the spring pressure of engaging device **131** so that the former device releases the weft thread at this time.

Thereafter the extremity of the weft thread held in the weft-engaging means **131** of delivery needle **102** is transferred to the weft-engaging means of the opposite needle at the midpoint of the web and is carried over the remaining part of the width of the web as earlier explained to complete the weaving cycle.

It will be apparent from the foregoing that the improved weft cutting and holding means provided by the invention procure various advantages and cure the defects of present constructions as earlier enumerated. The loss of weft yarn is insignificantly small, since each pick of weft is cut immediately adjacent the selvedge, and since the delivery needle (or equivalent weft shooting member that may be used) grips the end of tthe next pick of weft at a point extremely close to the cutting device, i.e. very close to the end of the weft thread connected to the supply bobbin or pirn.

Various modifications and variations may be made in the structure of the weft-handling means of the invention, and the latter could be applied to looms differing from that shown and described herein by way of example.

What is claimed is:

1. In a weaving frame the combination comprising a weft presser member reciprocable longitudinally of the frame; a weft shooting member reciprocable transversely of the frame along the presser member; means delivering weft yarn from a supply to the shooting member, displaceable spring-pressed-weft-engaging means carried by the shooting member; a weft-cutting and holding device carried by the presser member; first camming means cyclically operable once per longitudinal reciprocation of the presser member for operating said device to cut the yarn and simultaneously hold the yarn between the cut and the supply for subsequent engagement of said yarn by the engaging means; and second camming means cyclically operable once per transverse reciprocation of the shooting member for displacing the weft-engaging means to engage the weft yarn between said device and the supply, said cutting and holding device comprising a blade pivoted to the presser member and having a cutting edge and a holding edge and a pair of spaced parts carried by the presser member and cooperating with said respective edges to cut the weft yarn and hold said yarn ahead of the point of cut, and a first part projecting from said blade for movement within the space between said parts for clearing shreds of cut-off yarn therefrom, and said first camming means comprises a second part projecting from said blade and a cooperating part carried on the frame for camming interengagement with said projecting part as the weft presser member reaches the end of its longitudinal reciprocation for pressing the weft, said blade being spring-pressed toward a cutting and holding position relative to said spaced parts and said first camming means displacing the blade in opposition to said spring pressure.

2. In a shuttleless loom having a frame beam, a batten reciprocable relative to the frame beam, means for shedding warp threads, means for engaging a weft thread and inserting the latter through the shed formed by said warp threads, and a guide member for guiding a weft thread from an outside source of supply to said weft engaging means, the improvement comprising a device between the guide member and adjacent the selvedge of the fabric for cutting and holding said weft thread, said device including a horizontally arranged cutting blade, a horizontally arranged holding blade parallel to and spaced from the cutting blade, said blades underlying the weft thread and being substantially perpendicular thereto, a cutting and clamping movable blade having one end free and its other end pivotally mounted on the batten to pivot in the plane between the cutting and holding blades, the free end of said movable blade having a cutting edge to the side of the cutting blade and a rounded edge to the side of the holding blade, and means operable upon reciprocation of the batten to pivot the free end of the movable blade between the cutting and holding blades.

3. The device set forth in claim 2 including co-operating camming means on the batten and frame member for pivoting the movable cutting and clamping blade out from between the cutting and holding blades, and spring means for pivoting the movable blade into position between the blades.

4. The device set forth in claim 2 wherein said cutting blade is relatively thick and rigid and said holding blade is relatively thin and flexible, said blades being carried in parallel spaced relationship by the latter, means being provided to adjust the spacing between said blades.

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