Oct. 4, 1966 W. LIEBCHEN 3,276,482

WEB THREAD CHANGING DEVICE FOR WEB-LOOM

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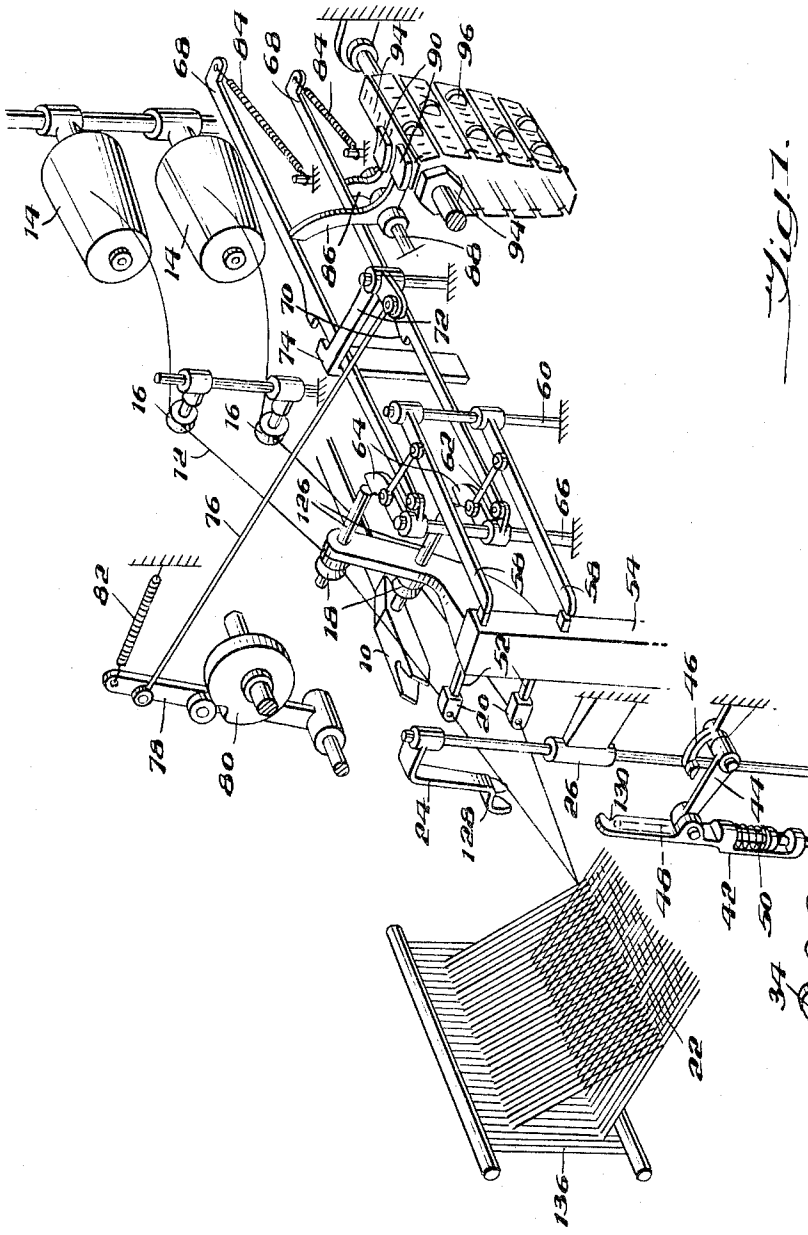


Fig. 1.

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WEB THREAD CHANGING DEVICE FOR WEB-LOOM

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Fig. 2

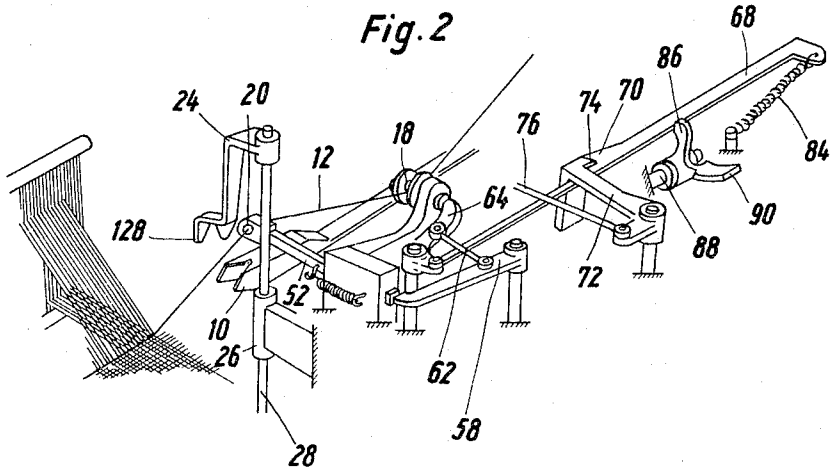
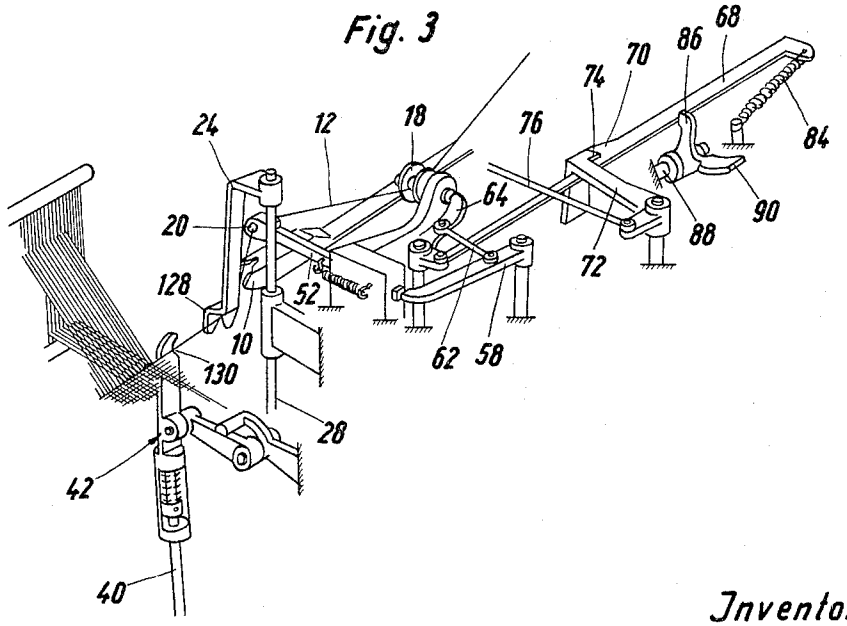


Fig. 3



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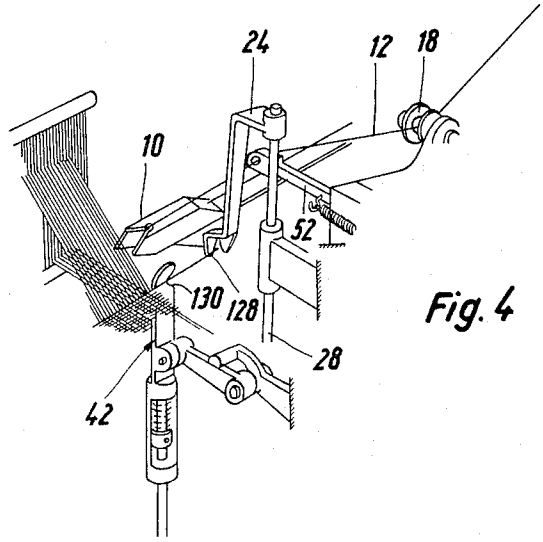


Fig. 4

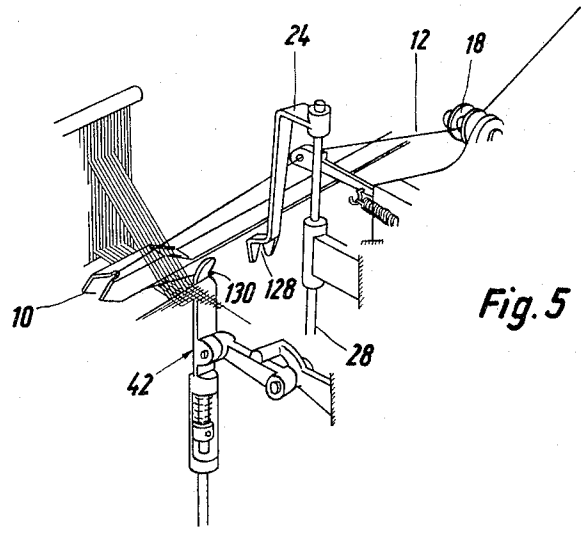


Fig. 5

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Fig. 6

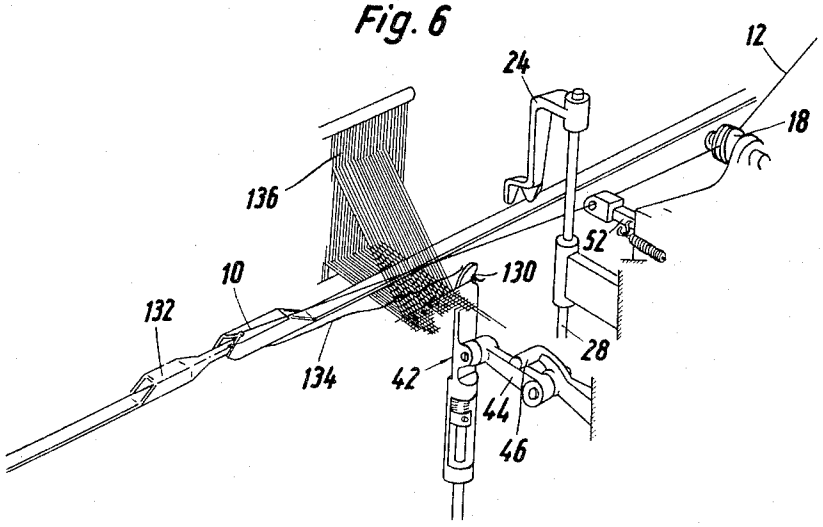
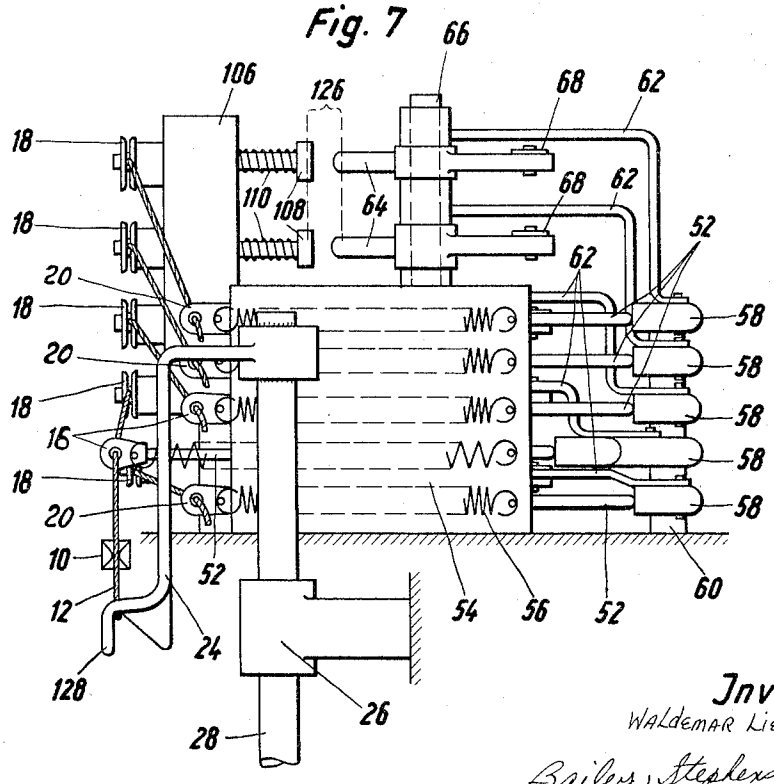


Fig. 7



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Fig. 8

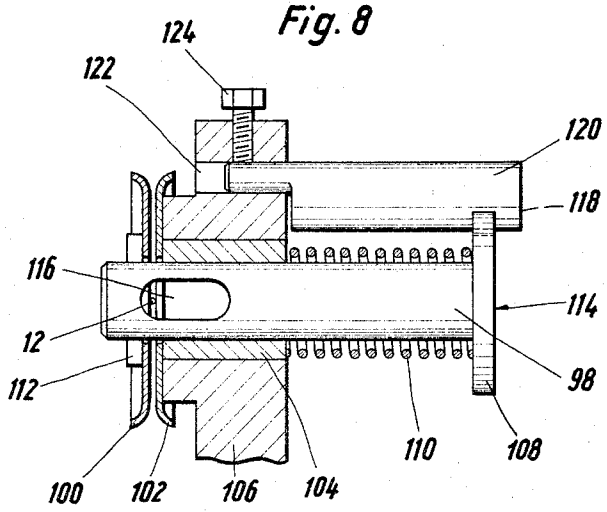
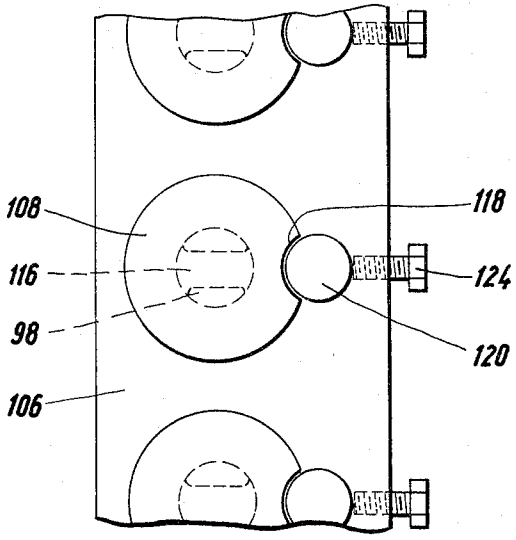


Fig. 9



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WEB THREAD CHANGING DEVICE FOR WEB-LOOM

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Filed Apr. 9, 1964, Ser. No. 358,488
Claims priority, application Germany, Apr. 10, 1963, G 37,488
12 Claims. (Cl. 139—122)

The invention relates to an arrangement for supplying and changing weft threads in gripper web-looms, in which the weft threads extending from the stationary spools to the point where the weft is laid in run over independently movable thread guides, by means of which the particular weft thread to be laid into the shed of the web is controlled by a pattern arrangement, and a thread presser movable perpendicularly to the thread guides is provided which brings the thread into the path of the feeding gripper. The introduction of the weft thread into the web shed is produced in known types of gripper web-looms by inserting the weft thread extending from an already laid weft by means of the feed gripper up to the center of the shed in the form of a loop (while simultaneously drawing it off the stationary spool), where the loop is gripped by the receiving gripper and the loop part is simultaneously separated from the laid-in weft by a weft thread cutter and is then drawn completely through the shed.

In order to prevent the weft thread after the travel of the receiving gripper from being further drawn off from the stationary spool, it is known, in single gripper web-looms without changeable weft threads, to provide a thread clamp which is operable from the cam shaft of the machine, which releases the weft thread only during the first half of the inward laying movement and then clamps it up to the beginning of the next inward movement.

The application of this expedient to a gripper web-loom with several weft threads which are laid selectively in the shed presents the difficulty that a common weft thread clamps does not hold all the weft threads securely and that during the withdrawal of the cut-off weft thread through the shed further lengths of weft thread will be drawn off by the receiving gripper from the stationary spool.

The basic purpose of the invention is to avoid this difficulty, and to provide a weft thread laying and changing arrangement which, while simple in construction, makes possible a secure control of the change of the weft thread.

According to the invention this purpose is accomplished by laying each weft thread to its engagement in the thread guide over its own thread clamp, and by providing means by which the thread clamp of the particular thread being drawn off during the laying by the feeding gripper is operated, along with the thread guide, to open position by the pattern arrangement.

In a preferred arrangement according to the invention, the thread guides are constructed as guide rods arranged to move perpendicular to the direction of the feed of the weft threads and are movable against the action of springs. In the ends of the rods, guiding eyes for the weft threads are arranged, which, upon the operation of the guide rods, move the weft threads across the path of movement of the feeding gripper under the action of the downwardly movable thread guide. It is an advantageous characteristic of the invention in this preferred form that each thread rod is cordinated with a lever system operating on the corresponding thread clamp through longitudinally movable driving part and that the

pattern arrangement is constructed of periodically advancing cards with projecting bodies by which the longitudinally movable driving parts having nose-shaped projections thereon through individual card-controlled levers are movable against the action of springs into the path of movement of a common, periodically oscillated actuating lever. Advantageously in this arrangement the longitudinally movable driving part is mounted with its center of rotation on one arm of a bell-crank lever mounted on a fixed pivot, the other arm of this bell-crank lever operating upon the thread clamp in a direction to open it. From the arm of the bell-crank lever which operates the thread clamp, a one armed lever mounted on a stationary pivot is moved by a link connection, the free end of this lever engaging the rear end of the thread guide rod.

In order to prevent too early a release of the thread guide and to insure a rapid clamping of the thread upon the operation of the feeding gripper, it is advantageous to provide between the bell-crank lever and the thread clamp a lost motion, which limits the operation of the thread guide to the last part of the swinging movement of the operating lever.

According to a special feature of the invention the thread clamp is constructed as a disc brake, in which the weft threads run between disc brakes movably mounted on a through-bolt, which engages the brake discs on one side with a shoulder and presses them together under the operation of a spring against a stationary abutment, the means for opening the thread clamp engaging the other end of the through-bolt. It is also advantageous to provide the through-bolt in the area between the clamping discs with a transverse bore through which the weft threads pass and to hold it against turning about its longitudinal axis.

Further objects and advantages of the invention will appear more fully from the following description, particularly when taken in conjunction with the accompanying drawings which form a part thereof.

In the drawings:

FIG. 1 is a perspective view of a part of a gripper web-loom with an arrangement on the entrance side of the web shed for introducing the weft threads in accordance with the invention, with the gripper completely withdrawn.

FIGS. 2 to 6 show successive stages in the operation of the device to draw a weft thread through the shed.

FIG. 7 is a plan view of the thread guide arrangement, looked at from the direction of the shed.

FIG. 8 is a longitudinal section through a thread clamp; and

FIG. 9 is a plan view of several of the thread clamps.

The feed gripper **10** is shown in FIG. 1 in its fully withdrawn position. A weft thread **12** runs from a stationary spool **14** through a thread brake **16**, a thread clamp **18** and a guide eye **20** to a previously laid weft in the woven material **22**. A thread presser **24** is carried at the end of a rod **28** which is movably guided in a guide **26** fixed on the machine frame, and is moved up and down by a double-armed lever **30** which in turn is operated by a cam **34** mounted on a shaft **32** driven synchronously with the feed of the web. A second cam **36** mounted on the shaft **32** moves, through a double-armed lever **38** and a rod **40**, moves a weft thread cutter **42**, which is mounted on a stationarily journaled lever **44**, periodically into the neighborhood of the edge of the material, where the arm **44** abuts against a stationary abutment **46** carried by the machine frame and the rod **40**, when it is lifted further, operates the cutting knife **48** mounted inside the thread guide cutter against the operation of the compression spring **50**.

What has been heretofore described is known in principle in conventional gripper web-looms without weft thread interchange.

In order to be able to introduce into the shed, during the consecutive insertions, different weft threads, especially those with different colors for achieving a color pattern, the guide eyes **20** are positioned on the ends of movable guide rods **52**, which are all arranged as shown in FIG. 7 to be movable longitudinally in a bearing block **54** stationary with the machine frame. Through the guide eye **20** of each guide rod **52** there runs, coming from the corresponding stationary spool, one of the different weft threads, to the last weft laid with this thread in the fabric **22**. The guide rods **52** are held by tension springs **56** in a position in which the guide eyes **20** hold the weft threads **12** out of the range of movement of the thread presser **24**. In order to lay the desired weft thread in the web shed, the corresponding thread guide rod **52** is pushed in the guide block **54** against the operation of the spring **56**, in a manner to be explained below, so that the weft thread is engaged by the thread presser **24** in its downward movement and moved to a position where it is engageable by the feed gripper **10** which takes it into the shed.

Such an arrangement is also known.

According to the invention, each weft thread **12** before its insertion in the guide eye **20** is led through a thread clamp **18**, and each thread clamp **18** is, by special mechanism, operated together with the corresponding thread guide from a common pattern arrangement. Because the mechanism of each weft thread is the same and likewise the guide rods **52** are arranged generally one above the other, and insofar as the construction and operation are concerned they constitute a single constructive group, the disclosure in FIGS. 1 to 6 is restricted to the showing of the necessary parts for the laying of one weft thread.

The free ends of each thread guide rod **52** extend on the side remote from the weft threads **12** out of bearing block **54** and constitute at their rear ends engaging surfaces facing a single-armed lever **58**, which, along with the corresponding single-armed levers of the remainder of the guide rods, are journalled on a common vertical axis **60** mounted in the machine frame. A link **62** connects the one-armed lever **58** operatively with a bell-crank lever **64**, which in common with the corresponding bell-crank levers of the whole group are journalled on an axis **66** mounted in the machine frame. The link **62** connects to one arm of the bell crank lever **64**, the free end of which in a manner described below, operates the thread clamp **18**.

A bar **68** is pivoted on the other arm of bell-crank lever **64**, which constitutes a longitudinally movable drive member for the leverage unit composed of the bell-crank lever **64**, the link **62** and the one-armed lever **58**. The bar **68** is provided on one of its longer edges with a nose-like projection **70**, which forms a part for engagement by a shifting lever or member **72** common to all the bars of the group. The two-armed shifting lever **72** is pivoted on the machine frame. One arm of lever **72** has an edge **74** engageable with any of the bar projections **70**. The other arm is connected by a connecting rod **76** to a lever **78** carrying a roller which engages cam disc **80** and is moved, against the action of spring **82** connected to the frame, periodically back and forth synchronously with the stroke of the sley. A tension spring **84** holds the bar **68** normally in a position in which the nose-shaped projection **70** lies outside the path of swinging of the edge **74** of the shifting lever **72**.

With each bar **68** is associated a two-armed card-engaging lever **86**, all of these being mounted on a common axis **88** carried by the frame. One arm of lever **86** engages bar **68**, while the other end carries a feeler **90**, which is located close to the uppermost card **92** of a pattern arrangement **94**. The cards **92**, which are advanced periodically in synchronism with the stroke of the sley, are provided, in accordance with the desired pattern program, with lifting bodies **96**, by engagement of which with the feelers **90** the card-engaging levers are operated.

The thread clamp, as shown in FIGS. 8 and 9, comprises a disc brake clamp. On one end of a through-bolt **98** are arranged two brake discs **100** and **102**, between which the weft thread **12** runs from the spool **14** to the guide eye **20**. Bolt **98** is longitudinally slidable through bushing **104** mounted in block **106**. The end of bolt **98** remote from the brake discs **100**, **102** is provided with an annular flange **108**, between which and the block **106** is arranged a compression spring **110**. Spring **110** urges bolt **98** to the right (FIG. 8), which through a key **112** extending through the other end of the bolt and engaging the outer brake disc **100** presses it against the inner disc **102** which rests against the block **106**, so that the thread is clamped between the brake discs. The rear end **114**, enlarged by the flange **108**, constitutes an engaging surface for one arm of the lever **64**, so as to move the bolt **98** to the left (FIG. 8) and open the thread clamp, as will be explained below.

In order to prevent the thread, when the thread clamp is opened, from falling out from between the discs, the bolt **98** is provided with a transverse slot **116** through which the thread is led. To make sure that slot **116** points in the right direction for the thread, flange **100** is provided at one point of its periphery with a segmental recess **118** (FIG. 9). In this engages a guide bolt **120** which extends parallel to bolt **98**, which has a cut-away end extending into hole **122** in block **106**, where it is held by set-screw **124**.

The device operates as follows:

When the pattern device **94** moves a new card to the uppermost position (the feed gripper **10** and the cutter **42** being withdrawn, as shown in FIG. 1), the lifting member **96** engages and lifts the feeler **90** of one of the card-engaging levers **86** (for example, the one shown in FIGS. 1 to 6), and swings the lever around its axis. The other arm of lever **86** then presses against bar **68**, swinging it against the resistance of spring **84**, so that projection **70** moves into the path of the swinging movement of lever edge **74**. As the lever **72** oscillates, the projection **70** is engaged by edge **74** and moved along with it, moving the bar **68** and thereby turning bell-crank lever **64** and, through link **62**, one-armed lever **58**. Lever **58** pushes the end of guide rod **52** which carries eye **20** out of the block **54**, against spring **56**, and bring the weft thread **12** into the path of thread presser **24** (FIG. 2). The end of bell-crank lever **64** directed towards thread clamp **18** goes through a lost motion, until, after closing the gap **126** it engages the enlarged rear face **114** of bolt **98**. Upon a further swinging of lever **64**, bolt **98** is pushed to the left (FIG. 8), against the action of spring **110**, so that the pressure on brake discs **100**, **102** is removed and the thread **12** is released.

When the guide rod **52** with the eye **20** and the weft thread **12** running through it has reached its outermost position away from block **54** and thread clamp **18** is completely open, the downwardly moving thread presser **24** engages the weft thread **12** with its hook-shaped end and by further downward movement positions it in front of the feeding gripper **10**, which carries it in the form of a loop to the center of the web shed. This causes the weft thread to loop around a point **128** of the forked end of the thread presser **24** (FIG. 4). Further movement of the weft thread **12** causes it to slip off the point **128** and to enter the cutting space **130** of the thread cutter **42** (FIG. 5) which, by means of the cutter blade **48**, cuts off the thread from the previously laid weft almost simultaneously with its transfer to the cutting device (FIG. 6). The cut-off loop part **134** of the weft thread **12** is then drawn in the usual way completely through the web shed by the hook-shaped receiving member **132** and beaten up to the web.

Because of the opening of the thread clamp **18** at the

end of the forward movement of the guiding rod **52**, the weft thread, while it is being carried by feeding gripper **10** into the web shed **136** in the form of a loop, is drawn off as needed from the spool **14**, so that the separate thread brake **16** provided for each weft thread makes it possible to maintain a desirable low thread tension.

The cam disc **80** is so constructed and arranged that the common lever **72** begins its return movement shortly before the transfer of the weft thread from the feed gripper **10** to the receiving member **132**, or shortly before the cutting action of the shear **42**. The thread clamp **18** is thus closed simultaneously with the transfer of the weft thread to the cutter **42** and any further withdrawal of the weft thread from the spool **14** is prevented.

While I have described herein one embodiment of my invention, I wish it to be understood that I do not intend to limit myself thereby except within the scope of the claims hereto or hereinafter appended.

I claim:

1. A device for inserting and changing weft threads in the shed of a web loom, comprising a plurality of holders for supplies of weft threads, a plurality of thread guides, means mounting the thread guides for movement independently of each other between first and second positions, means normally holding the thread guides in the first position, a thread presser movable transversely with respect to the path of the weft threads, each of said thread guides in its second position holding a weft thread in the path of movement of said thread presser, a feeder mounted for movement into and out of the shed, movement of the thread presser carrying a weft thread engaged thereby into the path of the feeder to be carried into the shed, independently releasable, normally operative thread clamps in the paths of the weft threads between the holders and the guides, means for selectively moving any one of the thread guides to the second position comprising a shifting member, means for periodically moving said shifting member in synchronism with the movements of the feeder, independent means operatively connected to each thread guide and clamp for moving the thread guide to the second position and releasing the clamp, and pattern means operatively connected to each such independent means for selectively operably connecting one of such independent means to the shifting member for operation thereby to move the thread guide to the second position and release the corresponding clamp.

2. In a device as claimed in claim **1**, in which the thread guides comprise rods mounted for longitudinal movement in a direction transverse to the path of the weft thread with eyes thereon for receiving the weft threads, and the independent means for moving the guides and releasing the clamps comprises for each weft thread a lever system operatively engageable with the thread guide and clamp and a longitudinally slidable member operatively connected to said lever system, said pattern means selectively shifting one of said members.

3. In a device as claimed in claim **1**, the shifting member comprising a lever oscillated in synchronism with the operation of said feeder, said independent means comprising a longitudinally movable member for each weft thread and a lever system for each weft thread operatively engageable with the corresponding thread guide and clamp, said longitudinally movable members each being swingable between a normal position and a second position, said lever having a part which swings in a path adjacent the second positions of said members, said lever and members having cooperating means engageable in the second positions of the members to move them longitudinally, said pattern means selectively moving said members to said second position.

4. In a device as claimed in claim **1**, the independent means for moving the guides and releasing the clamps comprising a lever having one end adjacent to and engageable with the thread clamp to open the clamp, an elongated member pivoted on said lever, pattern means operatively engageable with said member to move it in a direction to swing said lever, and means connected to said lever and operatively engageable with the thread guide.

5. A device as claimed in claim **4** in which said last means comprises a second lever and a link connecting said levers.

6. In a device as claimed in claim **4**, said lever having the part engageable with the thread guide normally spaced from the clamp to provide a lost motion therebetween.

7. In a device as claimed in claim **4**, each thread clamp comprising a bolt, a pair of adjacent discs slidably mounted on the bolt, a frame, said bolt being slidably mounted in the frame with one disc engaged against the frame, means carried by the bolt engaging the other disc, and means resiliently urging the bolt in a direction to clamp the discs against the frame.

8. In a device as claimed in claim **7**, said lever engaging the end of the bolt remote from the discs.

9. In a device as claimed in claim **8**, the bolt having a transverse opening therethrough in the area of the discs, and means carried by the frame and engaging the bolt to prevent rotation thereof.

10. In a device as claimed in claim **9**, said lever having the part engageable with the thread guide normally spaced from the clamp to provide a lost motion therebetween.

11. In a device as claimed in claim **1**, each thread clamp comprising a bolt, a pair of adjacent discs slidably mounted on the bolt, a frame, said bolt being slidably mounted in the frame with one disc engaged against the frame, means carried by the bolt engaging the other disc, and means resiliently urging the bolt in a direction to clamp the discs against the frame.

12. In a device as claimed in claim **11**, the bolt having a transverse opening therethrough in the area of the discs, and means carried by the frame and engaging the bolt to prevent rotation thereof.

References Cited by the Examiner

UNITED STATES PATENTS

1,943,012	1/1934	Gabler	139—122
2,407,773	9/1946	Fletcher	139—123
2,429,394	10/1947	Clairmont	139—123
2,462,812	2/1949	Parry et al.	242—150
2,629,561	2/1953	Heizer	242—150 X
2,814,315	11/1957	Lyle et al.	139—123
2,837,124	6/1958	Ancet et al.	139—123
2,912,185	11/1959	Vossen	242—150
3,092,150	6/1963	Birmans et al.	139—122
3,158,182	11/1964	Dewas	139—122 X
3,181,569	5/1965	Carroll	139—122

FOREIGN PATENTS

1,132,916	11/1956	France.
1,302,217	7/1962	France.
1,309,084	10/1962	France.
396,961	8/1933	Great Britain.
443,251	2/1936	Great Britain.

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