

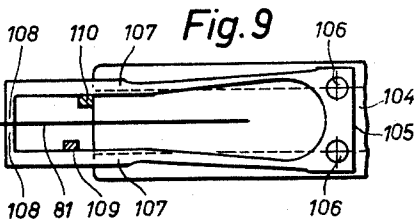
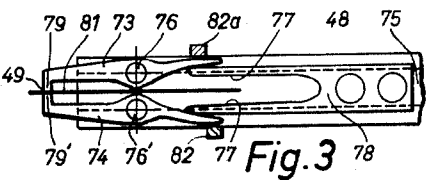
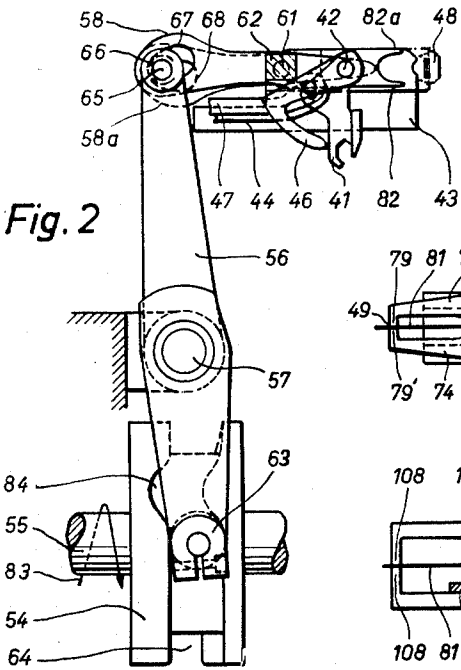
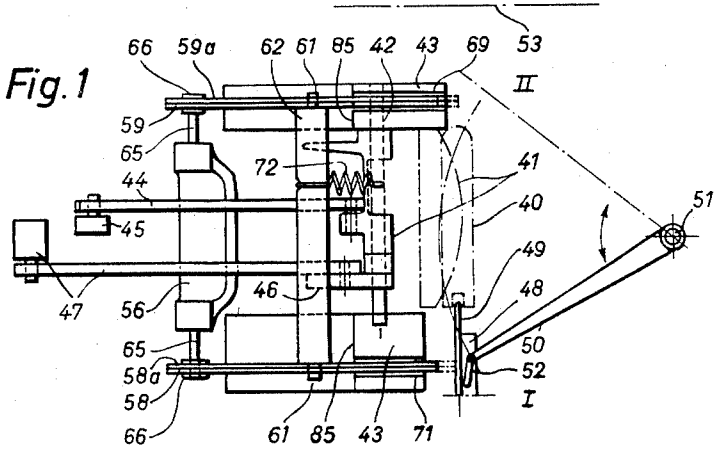
Dec. 23, 1958

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METHOD AND MEANS FOR ACTUATING A THREAD
CLAMP IN TEXTILE MACHINERY

2,865,405

Filed Feb. 14, 1957

3 Sheets-Sheet 1



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Fig. 4.

Fig. 5.

Fig. 6.

Fig. 7.

Fig. 8.

Fig. 10.

Fig. 11.

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3 Sheets-Sheet 3

Fig. 12.

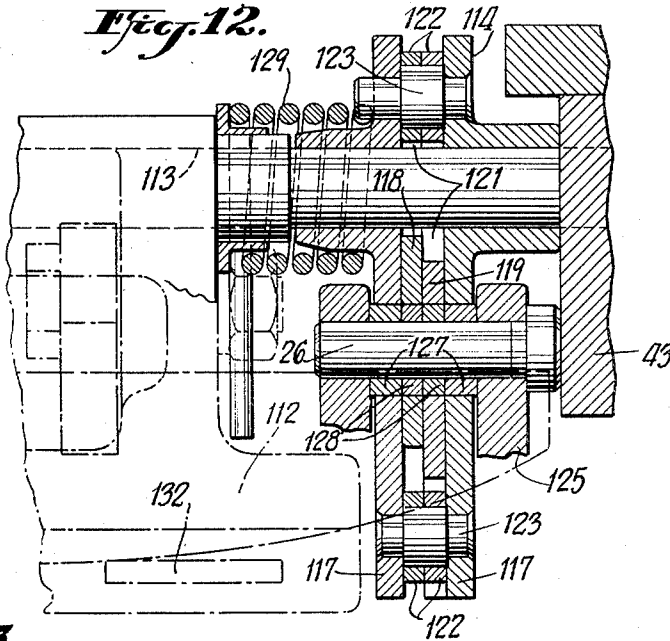


Fig. 13.

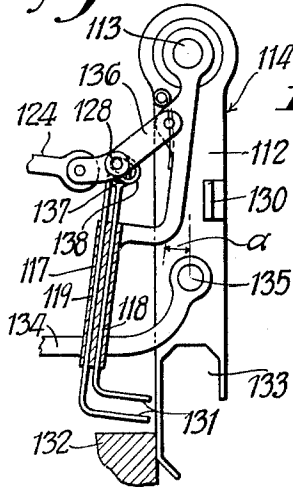


Fig. 14.

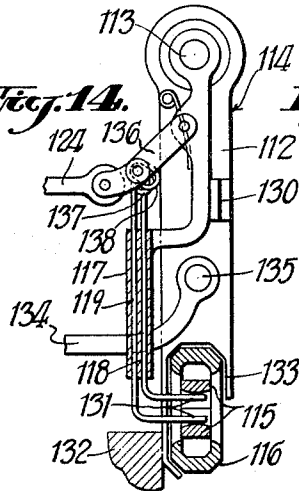


Fig. 15.

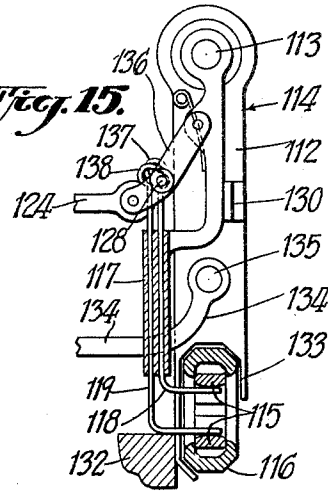
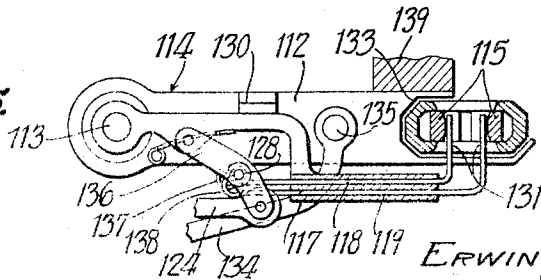


Fig. 16.



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METHOD AND MEANS FOR ACTUATING A THREAD CLAMP IN TEXTILE MACHINERY

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Application February 14, 1957, Serial No. 640,181

Claims priority, application Switzerland February 18, 1956

13 Claims. (Cl. 139—126)

The present invention relates to a method and means for actuating thread clamps as they are used, for example, in weaving machines.

In looms for weaving having gripper shuttles, the weft thread is unwound from large cheeses and presented to the shuttles by means of a thread feeder. The shuttles as well as the feeders are provided with thread clamps which are actuated by devices which are driven by an element which is operatively connected with the main drive shaft of the loom for opening and closing the thread clamps at predetermined angular positions of the loom shaft during each picking period.

The conventional thread clamp actuating devices usually have wedge- or thorn-shaped elements, unless the devices are mounted on the thread feeders or on the gripper shuttles. The wedge- or thorn-shaped elements are inserted between the jaws of the thread clamp for spreading the jaws. Due to the sliding friction between the wedge- or thorn-shaped elements and the jaws of the clamp the engaging surfaces of the elements as well as of the jaws are worn. This causes a reduction of the opening of the clamp necessitating frequent replacement. The rubbings may also foul the thread.

If the thorn is inserted from the side into the thread clamp, the moving parts of the latter must be laterally supported, which is a disadvantage and may interfere with the proper functioning of the clamp.

It is an object of the present invention to provide a method and means for actuating a thread clamp whereby the aforementioned disadvantages are overcome. With the method according to the invention a special clamp opening mechanism is provided which is moved as a whole toward the thread clamp into an active position which is adjacent to the thread clamp, whereupon the mechanism is stopped while the means which have moved the mechanism into the active position continue to operate for causing abutting engagement of the jaws of the thread clamp by the opening mechanism for opening the clamp.

The device according to the invention includes a clamp actuating mechanism, drive means for moving the mechanism towards and from the thread clamp, a stop for arresting the movement of the actuating mechanism in an active position which is adjacent to the thread clamp, the mechanism including means adapted to abuttingly engage the jaws of the thread clamp and to be moved to this engagement by continued action of the drive means after the actuating mechanism has arrived in the active position.

The novel features which are considered characteristic of the invention are set forth with particularity in the appended claims. The invention itself, however, and additional objects and advantages thereof will best be understood from the following description of embodiments thereof when read in connection with the accompanying drawing in which:

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Fig. 1 is a diagrammatic top view of a thread clamp actuating device according to the invention;

Fig. 2 is a diagrammatic side elevation of the device shown in Fig. 1;

Fig. 3 is an elevation of the portion of a thread feeder which carries a thread clamp;

Figs. 4 to 6 are large scale diagrammatic elevations of the clamp actuating means of the device shown in Figs. 1 and 2, in three different positions;

Fig. 7 is a top view of a modified clamp actuating device according to the invention;

Figs. 8, 10, and 11 are side elevations of the device according to Fig. 7, in three different operating positions;

Fig. 9 is a side elevation of a portion of a thread feeder provided with a modified thread clamp which is adapted to be opened by the device shown in Figs. 7, 8, 10, and 11;

Fig. 12 is a diagrammatic part sectional elevation of another modification of a clamp actuating device according to the invention;

Figs. 13 to 16 more schematically show the device according to Fig. 12 in different operating positions.

Like parts are designated by like numerals in different figures of the drawing.

The thread feeders in weaving machines having gripper shuttles serve for presenting weft threads to gripper shuttles. Depending on the type of gripper shuttle used in the loom, thread transfer stations and thread feeders may be provided on one side or on either side of the shed.

In looms in which the gripper shuttles are circulated and are picked through the shed in one direction only, the thread feeders are usually moved towards the shed after each pick for gripping the thread which has just been laid in the shed whereupon the thread is severed between the clamp of the thread feeder and the shed. The end of the thread gripped by the clamp of the thread feeder is then moved away from the shed by the thread feeder into a position in which it can be transferred to the shuttle which is next to be picked. In such an arrangement actuating means for opening and closing the thread clamps must be provided at the station where the thread is taken over by the thread feeder as well as at the station where the thread is transferred to a shuttle.

Fig. 1 illustrates an arrangement of the type described above. A shuttle 40 is lifted into picking position by a shuttle lifter 41, as shown, for example, in my copending application Serial No. 376,780, filed August 27, 1953, now Patent No. 2,783,778, the shuttle lifter swinging on a pin 42 which is supported in stationary parts 43 which are connected with the loom frame. The shuttle lifter 41 is actuated in the conventional manner by means of a link 44 which is pivoted to a drive member 45. An opener 46 for opening the thread clamp on the shuttle 40 is also swingable on the pin 42 and is actuated by a rod and lever mechanism 47. A weft thread feeder 48 provided with a thread clamp 49 is shown in the position I in which it presents a weft thread to a shuttle 40. The feeder 48 is connected with a lever 50 by means of a link 52. The lever 50 is mounted on an oscillating shaft 51. Clockwise movement of the shaft 51 causes movement of the feeder 48 from the thread transfer station I to the thread receiving station II which is adjacent to the shed 53.

The actuating means for the thread clamp 49 on the feeder 48 include a drive shaft 55 (Fig. 2) carrying a disk 54 having a circumferential cam groove 64. The latter receives a follower roller 63 at one end of a lever 56 which swings on a pin 57. Opener elements 58, 58a and 59, 59a are swingable, like scissors, on fulcrums 61 which are supported by a carrier 62 which is slidably movable transversely to its longitudinal axis on the top of the parts 43.

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The shaft 55 operatively connected with the main shaft of the weaving machine, not shown.

The upper end of the lever 56 carries pins 65 individually supporting rollers 66 which are received in slots 67, 68 of the opener elements 58, 58a, respectively. The same arrangement is made in connection with the clamp actuating members 59 and 59a.

The elements 58, 58a actuate the thread clamp 49 when it is at the thread transfer station I and the elements 59, 59a actuate the clamp 49 when it is on the thread receiving station II. The elements 58, 58a and 59, 59a are longitudinally guided in suitable recesses 71 and 69, respectively, in the parts 43. The carrier 62 is urged to the right by a spring 72 which is connected with the pin 42.

Fig. 3 shows the portion of a thread feeder 48 which carries a thread clamp 49 formed by two rigid levers 73, 74 which are pivoted by means of pins 76, 76', respectively, to a bar 75. The right arms of the levers 73, 74 are spread apart with a predetermined force by legs 77 of a U-shaped spring 78 for pressing the left arms of the levers 73, 74 which form the clamp jaws 79, 79' against a weft thread 81. The right ends 82, 82a of the elements 58, 58a or 59, 59a (Fig. 2) which are adapted to abuttingly engage the right arms of the levers 73, 74 are shown in Fig. 3.

Fig. 4 shows the thread clamp actuating elements 58, 58a in rest position, i. e., in the same position in which they are shown in Fig. 2, whereby the points 82, 82a are to the left and outside of the path of the shuttle 40 and of the thread feeder 48. If the thread clamp 49 is in the position I (Fig. 1) and if the shuttle 40 has been lifted by the lifter 41 to be in line with the feeder 48 and rotation of the shaft 55 in the direction of the arrow 83 continues, the roller 63 enters the curved part 84 of the groove 64, causing a clockwise movement of the lever 56. The pins 65 with the rollers 66 are thereby moved to the right and the spring 72 can pull the carrier 62 to the right for moving the elements 58, 58a and 59, 59a from a rest position into an active position which is shown in Fig. 5.

In this position the carrier element 62 to which the pairs of actuating members 59, 59a and 58, 58a are coaxially fulcrumed abuts against surfaces 85 provided on the parts 43. The surfaces 85 are so located that when they are abutted by the element 62 the points or end portions 82, 82a at the extreme right ends of the actuating members 58, 58a, respectively, are below and above the levers 74 and 73, respectively, of the thread clamp 49. In this position the points 82 and 82a are spaced from the levers 74 and 73, respectively, as seen in Fig. 5, so that the actuating members are not worn during their movement into the active position.

Upon continued revolution of the shaft 55 and of the groove cam 54 mounted thereon the lever 56 continues to swing clockwise. Since the carrier 62 and the actuating members 58, 58a, and 59, 59a swingable thereon cannot move further to the right because of the surfaces 85 the rollers 66 must move through the slots 67 and 68. These slots are arranged at a certain inclination, for example, to the arc of a circle whose center coincides with the longitudinal axis of the pin 57 so that when the roller 66 moves through the slots 67 and 68 the left ends of the members 58 and 59 are moved downward and the left ends of the members 58a and 59a are moved upward. Due to the oscillation of the members on the pins 61 the points 82 and 82a are moved towards each other and impart the same movement to the right arms of the levers 73 and 74 against the action of the legs 77 of the spring 78. This causes spreading of the jaws 79 and 79' so that the weft thread 81 is disengaged by the clamp, after it has been seized by the clamp of the shuttle 40.

If the portion 84 of the cam groove 64 is so shaped that the lever 56 is retained in the position described in the

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paragraph next above the weft thread 81 can run through the shed unhindered by the clamp 49.

For closing the clamp 49 the drive lever 56 is oscillated counterclockwise. Thereby the rollers 66 move in the slots 67, 68 because the carrier element 62 is pulled firmly by the spring 72 against the surface 85. This causes oscillation of the actuating members 58, 58a and 59, 59a in opposite direction. Thereby the points 82, 82a are spread apart so that the levers 73, 74 are swung by the legs 77 of the spring 78 for closing the clamp 49.

When the rollers 66 abut the left side of the slots 67 and 68 the actuating members are pulled against the action of the spring 72 from the active position shown in Fig. 5 to the rest position shown in Fig. 4, due to continued counterclockwise oscillation of the lever 56.

When the clamp actuating device is in the rest position the lever 50 is swung clockwise for moving the thread feeder 48 from the thread transfer position I to the thread seizing position II near the shed 53. This motion occurs before the next shuttle 40 is moved to the picking position. The weft thread 81 has been moved to the left in the conventional manner outside of the area through which the thread clamp 49 moves. This lateral movement of the weft thread is preferably effected immediately after picking the shuttle so that the thread feeder 48 can be moved from the position I in the position II already during laying of a weft thread in the shed 53.

In the position II the clamp 49 must again be opened to be ready to grip the weft thread which has just been laid in the shed. This opening is effected by the aforedescribed oscillation of the lever 56 and the displacement and subsequent oscillation of the actuating members 59, 59a. If the clamp 49 is open the weft thread 81 enters between the jaws 79 and 79' whereupon the clamp is closed in the aforedescribed manner.

The modified clamp actuating device shown in Figs. 7 and 8 comprises a carrier 86 which is guided in guides 88 connected with a portion 87 of the loom frame. The carrier 86 is reciprocated by a drive lever 89 corresponding to the lever 56 in the modification shown in Fig. 2. The guides 88 are provided with noses 90 which extend into grooves 91 of the carrier 86. To the latter a bracket 92 is connected which carries a removable cover plate 93. The bracket 92 guides the actuating members 95 and 96 which are swingable on a pin 94. The hubs of the members 95 and 96 are pressed by means of a spring 97 against abutments 98 which are provided at the right end of the inside of the bracket 92. One end of the spring 97 rests on an element 99 which is mounted on the carrier 86. The element 99 as well as the carrier 86 are provided with slots 100, 101 receiving pins 102, 103, respectively, at the left ends of the actuating members 95, 96, respectively.

The right side of Fig. 8 shows a cross section of the thread feeder. The latter includes a bar 104 on which a thread clamp 105 is mounted by means of rivets 106, as shown in Fig. 9. The clamp 105 has two resilient leg portions 107 forming jaws 108 which are adapted to grip the weft thread 81. The end portions 109 and 110 of the actuating members 95 and 96, respectively, extend between the legs 107 of the clamp 105.

Fig. 8 shows the drive means 86 to 103 in rest position which is the extreme left position. Here, the ends 109 and 110 of the actuating means 95 and 96 are removed from the range in which the thread feeder 104 to 108 and the shuttle 40 move. If the carrier 86 is moved to the right by the drive lever 89 into the position shown in Fig. 10, the ends 109 and 110 of the actuating means 95 and 96 are placed between the legs 107 of the thread clamp but do not touch the legs, a small clearance being provided between the end portions 109 and 110 and the inside of the resilient legs 107. The actuating members 95 and 96 abut against a stationary abutment 111 which is mounted on the frame portion 87.

If the upper end of the lever 89 moves to the right, the carrier 86 is also moved to the right. While the members 95 and 96 are arrested by the abutment 111, the element 99 is moved towards the members 95 and 96 so that the spring 97 is compressed. Movement of the carrier 86 relatively to the members 95 and 96 causes movement of the pins 102 and 103 in the slots 100 and 101. The latter are so shaped that this movement causes oscillation of the members 95 and 96 on the axis 94. Thereby the end portions 109 and 110 of the members 95 and 96 are spread apart and spread also the resilient legs 107 so that the jaws 108 are opened and the weft thread 81 is disengaged. This position is shown in Fig. 11. The drive lever 89 is in its right end position and if it remains there, the jaws 108 remain in open clamp position.

If the upper end of the lever 89 is moved to the left, the carrier 86 is also moved to the left without displacement of the members 95 and 96 until the abutments 98 engage the hub portions of the members 95 and 96 which, until this movement, are pressed by the spring 97 against the stationary abutment 111. The slots 100 and 101 are moved relatively to the pins 102 and 103 and are so shaped that the pins move towards each other. This causes oscillation of the members 95 and 96 on the axis 94. The end portions 109 and 110 are thereby moved toward each other so that the legs 107 can follow and the jaws 108 will be closed.

The members 95, 96 are not pushed to the left by the carrier 86 before the abutments 98 reach the hub portions of the members 95 and 96. Thereupon continued counterclockwise oscillation of the lever 89 causes movement of the mechanism 86 to 103 from the active position, shown in Fig. 10, to the rest position, shown in Fig. 8.

Fig. 12 shows a shuttle lifter 112 which swings on a shaft 113. An actuating device for opening a thread clamp 115 of a shuttle 116 is also swingably supported by the shaft 113. The clamp actuating device includes carrier plates 117 which are provided with bushings surrounding the shaft 113. Clamp actuating members 118 and 119 are placed between the carrier plates 117. The upper and lower ends of each of the members 118 and 119 are provided with a recess 121. The recesses 121 receive rollers 122 mounted on a pin 123 for guiding the members 118 and 119 when the carrier plates 117 are displaced. The upper end of a drive member 124 has the shape of a fork straddling the members 118, 119 and the carrier plates 117. A bolt 126 inserted in the fork 125 carries rollers 127 and 128 which are movable in slots of the carrier plates 117 and of the members 118 and 119. A spring 129 tends to press the clamp actuating device 114 against an abutment 130 on the shuttle lifter 112.

The clamp actuating device 114 is diagrammatically illustrated in a simplified manner in different operating positions in Figs. 13 to 16.

Fig. 13 shows the several parts in rest position. The device 114 is swung relatively to the shuttle lifter 112 through an angle α so that the end portions 131 of the actuating members 118 and 119 are outside of the space through which the shuttle 116 enters the shuttle lifter. The latter rests on an abutment 132. No shuttle is in the shuttle receiving space 133 of the shuttle lifter 112. In weaving machines in which gripper shuttles are returned outside of the shed to a shuttle picking mechanism the shuttle receiving space 133 is located in an extension of the shuttle return track when the shuttle lifter 112 is in the position shown in Figs. 12 to 15 so that the shuttle return conveyor can push a shuttle into the space 133.

After the lifter has received a shuttle the drive member 124 is moved to the right in Fig. 13, permitting swinging of the device 114 in counterclockwise direction until the device abuts against the abutment 130.

The device 114 is pressed to the right by the spring 129. When the device 114 has reached the abutment 130 the end portions 131 of the members 118 and 119 are inserted between the jaws of the thread clamp 115 of the shuttle 116. This position is shown in Fig. 14.

A rod 134 serves for swinging the shuttle lifter on the shaft 113. The right end of the rod 134 is pivoted to the shuttle lifter 112 by means of a pin 135. The left ends of the members 134 and 124 are provided, for example, with cam follower levers which swing on a stationary axis and which are provided with rollers which move in suitable control grooves. These mechanisms are of the type shown in connection with the lever 56 in Fig. 2 and are not illustrated. The control grooves are provided in a drum which is either directly or indirectly rotated by means of the main shaft of the loom. The grooves are so shaped that when the parts of the device move from the positions shown in Fig. 13 to the positions shown in Fig. 14 the rod 134 is not moved while the rod 124 moves to the right. The right end of the rod 124 is pivoted to a lever 136 carrying the rollers 128 which move in the slots 137 and 138 of the members 118 and 119, respectively. Since the spring 129 acts on the device 114 the left ends of the slots 137 and 138 abut against the rollers 128.

Upon continued movement of the rod 124 to the right while the rod 134 is stationary and the shuttle lifter 112 rests on the abutment 132 the device 114 cannot continue to swing to the right because it rests on the abutment 130. The rollers 128 must, therefore, move to the right in the slots 137 and 138 which are so shaped that, upon such movement, the member 118 is lifted and the member 119 is lowered. The end portions 131 are, therefore, spread apart, opening the clamp 115, as shown in Fig. 15.

As soon as the rod 134 begins to move to the right while the rod 124 continues its movement to the right the shuttle lifter 112 and the clamp control device 114 swing on the shaft 113 in counterclockwise direction until the shuttle lifter 112 is in the horizontal position, shown in Fig. 16, and abuts against the abutment 139. During this time the clamp 115 remains opened.

The weft thread is now carried towards the shuttle by a thread feeder or is already in this position. The clamp 115 must be closed in order to grip the weft thread. This is done by withdrawing the rod 124 to the left while the rod 134 stands still. The lever 136 is thereby moved clockwise so that the rollers 128 move to the left in the slots 137 and 138. This causes movement of the member 118 to the right and of the member 119 to the left so that the end portions 131 move towards each other permitting the clamp 115 to close.

Upon continued movement of the rod 124 to the left in Fig. 16, the device 114 is swung clockwise on the shaft 113 and the end portions 131 of the members 118 and 119 are withdrawn from the shuttle 116 so that the latter can be picked. Since the rod 134 remains in its right end position the shuttle lifter 112 remains in the horizontal position from which the shuttle 116 is picked into the shed. Thereupon the rod 134 is moved to the left while the rod 124 continues its movement to the left until the device is returned to the position shown in Fig. 13.

Since the end portions of the clamp actuating members move either parallel to each other for opening and closing the thread clamp or they are relatively oscillated because the drive members rotate on a common axis, it is recommended that the engaging or working surfaces of the end portions of the actuating members and/or the engaging or working surfaces of the respective parts of the thread clamp are so shaped that the surfaces which cooperate during the opening and closing of the thread clamp roll one upon the other.

What is claimed is:

1. A method for actuating a thread clamp, particu-

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larly in weaving machines, including the steps of moving clamp actuating means by drive means from a rest position toward the thread clamp into an active position which is adjacent to the thread clamp, arresting the actuating means in the active position, and thereupon operating the actuating means by continued action of said drive means for abuttingly engaging and actuating the thread clamp.

2. A method for opening a normally closed thread clamp, particularly in a weaving machine, including the steps of moving a clamp opening mechanism by means of drive means from a rest position toward the thread clamp into an active position which is adjacent to the thread clamp, arresting the clamp opening mechanism in the active position, and operating said opening mechanism by continued action of said drive means for abuttingly engaging and opening the thread clamp.

3. A method for actuating a self-closing thread clamp, particularly in a weaving machine, including the steps of moving a clamp opening mechanism by means of drive means from a rest position toward the thread clamp into an active position which is adjacent to the thread clamp, arresting the clamp opening mechanism in the active position, operating said opening mechanism by continued action of said drive means for abuttingly engaging and opening the thread clamp, thereupon disengaging said opening mechanism from the thread clamp and permitting closing of the latter by operating said drive means in reverse, and removing the opening mechanism from the thread clamp into rest position by continued action of said drive means.

4. A device for actuating a thread clamp, particularly in a weaving machine, including drive means, clamp actuating means adapted to abuttingly engage the thread clamp, means operatively associated with said drive means and with said actuating means for moving said actuating means by said drive means from a rest position to an active position and thereupon moving said actuating means by said drive means for abutting engagement of and actuating the thread clamp.

5. A device as defined in claim 4, including an abutment adapted to be engaged by said actuating means for halting the latter in active position while said drive means move said actuating means to engage and actuate the thread clamp.

6. A device as defined in claim 4 in which said actuating means include two elements, and a member coaxially pivotally supporting said elements.

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7. A device as defined in claim 4, said actuating means including two adjacent swingable elements individually having an end portion adapted to engage the thread clamp, and guide means for guiding said elements for movement of said end portions in parallel planes.

8. A device as defined in claim 4, said actuating means including two adjacent swingably supported elements individually having an end portion adapted to engage the thread clamp, said means operatively associated with said drive means and with said actuating means including means for maintaining said end portions in spaced relation to the thread clamp when said actuating means are moved into the active position.

9. A device as defined in claim 4 in which said actuating means are adapted to rollingly engage the thread clamp.

10. A device as defined in claim 4, including a displaceable member supporting said actuating means, and a stationary abutment adapted to be engaged by said displaceable member for arresting the latter when said actuating means are in the active position.

11. A device as defined in claim 4, including a carrier element connected with said drive means, said actuating means being displaceably connected with said carrier element, and a stationary abutment adapted to be engaged by said actuating means when the latter are in the active position.

12. In a loom for weaving a shuttle, a thread clamp mounted on said shuttle, a shuttle lifter swingable on a stationary fulcrum for lifting said shuttle from an idle position into a position in which a weft thread is presented to the shuttle, actuating means for actuating said thread clamp, an element movably supporting said actuating means and being swingably on the same fulcrum as said shuttle lifter, and drive means operatively associated with said element and with said actuating means for moving the former and said actuating means from a rest position to an active position and thereupon moving said actuating means for abutting engagement of and actuating said thread clamp.

13. In a loom as defined in claim 12, said drive means having a forked end portion straddling said element and said actuating means, slots in said actuating means, and a pin traversing said forked end portion and extending through said slots.

No references cited.