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2,728,359

THREAD CLAMP FOR LOOMS FOR WEAVING

Filed Oct. 25, 1954

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Fig. 1

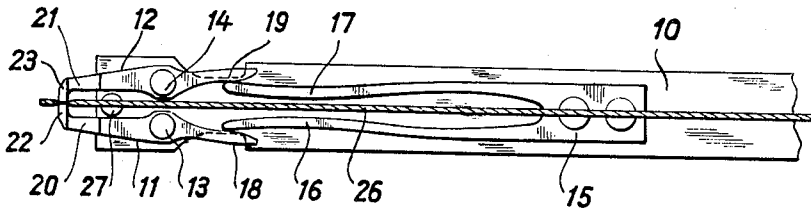


Fig. 2

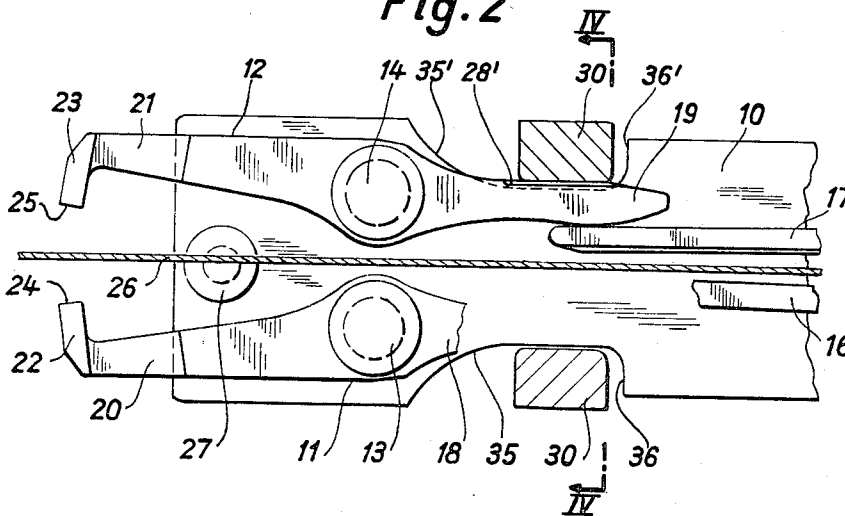
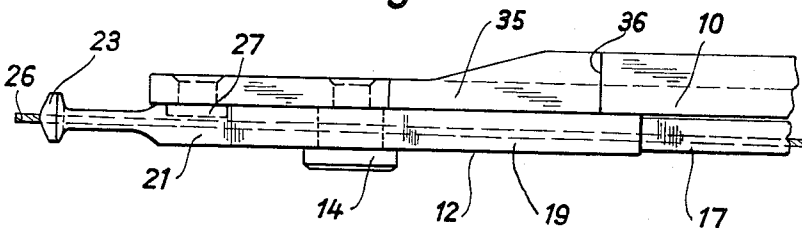


Fig. 3



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Fig. 4

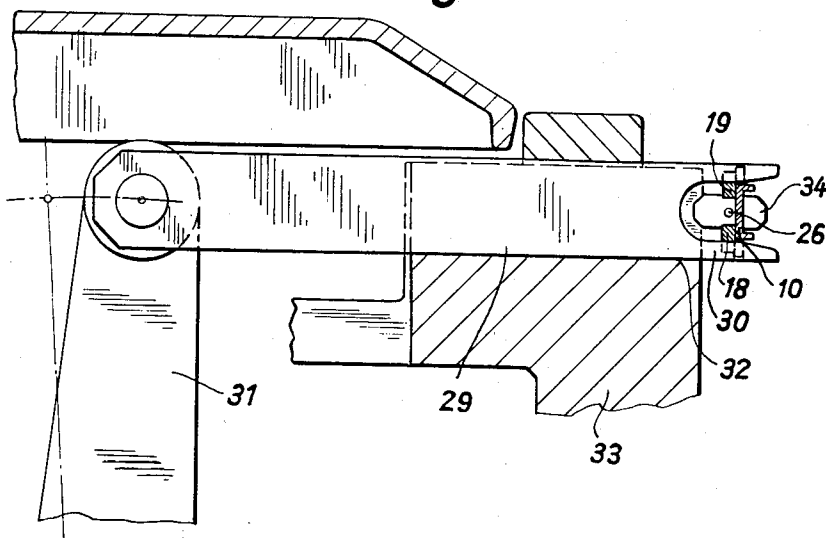
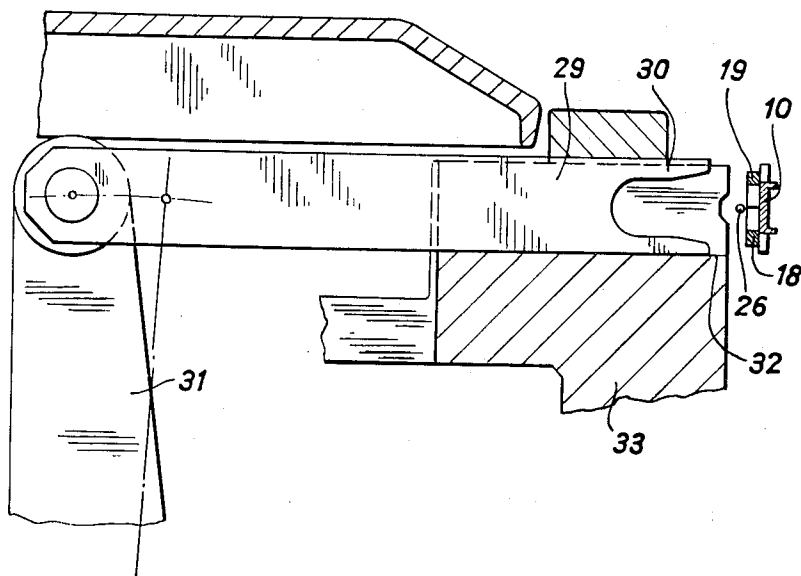


Fig. 5



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THREAD CLAMP FOR LOOMS FOR WEAVING

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Claims priority, application Switzerland July 19, 1954

9 Claims. (Cl. 139—127)

The present invention relates to clamping devices for temporarily gripping threads in looms for weaving.

In looms for weaving, clamping devices are used for bringing weft threads close to the shed and for inserting the threads into the shed. Clamping devices have been proposed which include resilient jaw members. The jaw portions at the end of the members have clamping faces which are pressed against each other due to the resiliency of the stems of the jaw members, the thread placed between the jaw faces being compressed and squeezed flat.

Thread clamps of the aforescribed type are opened by driving a thorn-shaped opener between the stems of the jaw members. The clamp opener must have a wedge-shaped portion. The surfaces of the jaw members engaged by the opener are correspondingly inclined. These surfaces are subject to wear, and if the wedge angle of the opener does not exactly correspond with the inclination of the surfaces of the resilient jaw members engaged by the opener, the jaw members will be twisted and the clamping faces will not be exactly parallel. As a result, the thread which is compressed to a thickness of only a few hundredths of a millimeter will not be held equally throughout its section and can easily be pulled out of the closed thread clamp.

It is an object of the present invention to provide a thread clamp which avoids the aforementioned disadvantages by providing two two-arm levers fulcrumed to a carrier or holder, one arm of each lever being provided with a jaw portion having a face adapted to engage one or more threads, the other arm being actuated by a spring, and both arms of each lever being placed alongside and at one side only of the thread or threads.

Instead of the helical springs shown in the application Serial No. 461,625, filed October 11, 1954, of which the present application is a continuation-in-part, a fork-like member is provided having resilient prongs individually engaging one arm of the two-arm levers which form the jaw members of the thread clamp.

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 conjunction with the accompanying drawing, in which

Fig. 1 is an elevation of a thread clamp according to the invention;

Fig. 2 is a portion of Fig. 1 drawn on a larger scale;

Fig. 3 is a top view of the portion of a thread clamp shown in Fig. 2;

Fig. 4 is a side view of an actuator for opening a thread clamp according to Figs. 1 to 3 shown in section along line IV—IV of Fig. 2, the actuator being in position for opening the clamp;

Fig. 5 shows the actuator illustrated in Fig. 4 in rest position;

Fig. 6 is a side elevation of the clamp shown in Fig. 2,

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in closed position, the open position being indicated by dash-dot lines;

Fig. 7 is an enlarged side elevation of a portion of a jaw member illustrating in detail the surface of the member which is engaged by a rod spring;

Fig. 8 is a part-sectional side elevation of a modified clamping device according to the invention;

Fig. 9 is a transverse section through the clamping device shown in Fig. 8, the section being made on line IX—IX in Fig. 8.

The same numerals designate the same parts in all figures.

Referring particularly to Fig. 1 of the drawing, numeral 10 designates a clamp holder which may be a thread return element for a loom for weaving having gripper shuttles, as disclosed, for example, in Patent Nos. 2,163,760 and 2,221,384, and in my copending application Serial No. 376,780, filed August 27, 1953. On the left end of the carrier 10, two two-arm levers 11 and 12 are individually fulcrumed by means of pins 13 and 14, respectively. A fork-shaped member 15 having resilient prongs 16 and 17 is riveted to the carrier 10. The free ends of the prongs 16 and 17 individually abut against the right arms 18 and 19, respectively, of the levers 11 and 12, respectively, so that the left arms 20 and 21 of the levers 11 and 12 whose ends form clamp portions 22 and 23, respectively, having clamping faces 24 and 25, respectively (Fig. 2), are pressed together for gripping a thread 26.

When the arm 20 of the two-arm lever 11 is in clamping position, the arm abuts against an abutment 27. This defines the elevation of the clamp face 24 and consequently of the clamp face 25, if the clamping device is closed, so that the end of the thread 26 is always at the same elevation whenever the clamp is closed. The prong 16 of the fork spring 15 has a greater resistance to bending, i. e. is more pretensioned than the prong 17. This can be effected by making the cross-section of the prong 16 larger than that of the prong 17, or by spreading the prong 16 in rest position farther from the longitudinal center line of the fork 15 than the prong 17. The distal sides of the arms 18 and 19 are provided with inclined surfaces 28 and 28', respectively, which surfaces are adapted to be engaged by the prongs of a fork-shaped end 30 of a clamp-actuating element 29 (Fig. 4). The clamp opening element 29 which is shown in Figs. 4 and 5, is pivoted to a lever 31 and guided in a groove 32 of a frame part 33 of the loom. The lever 31 may be actuated by a cam drive in accordance with the rotation of the main shaft of the loom. This actuating mechanism is not illustrated as it does not form part of the present invention.

The operation of the device is as follows:

In the position shown in Fig. 4, a shuttle 34 is in picking position. The thread presenting element 10, 11, 12 holds the end of a weft thread unwinding from a bobbin which is outside the shuttle, the weft thread having been cut adjacent the shed, and the thread presenting element having returned to the position in which the thread 26 is presented to the shuttle 34. At this operating phase, the clamp actuator 29 is moved to the right in Fig. 4 by the lever 31, and the forked end 30 of the actuator embraces the right arms 18 and 19 of the clamp levers 11 and 12, moving the arms 18 and 19 towards each other, so that the clamp portions 22 and 23 are spread apart into the open position shown in dash-dot lines in Fig. 6. The thread clamp of the gripper shuttle 34 has been closed at the same time, thereby gripping the thread 26. Thereupon, the shuttle 34 is picked through the shed for inserting the weft thread 26 which moves through guides, not shown, and disposed at the left side of the clamp 11, 12, so that the clamp actuator 29 can

be moved to the left by the lever 31, whereby the clamp 11, 12 is closed.

The carrier 10 has two recesses 35 and 35' (Fig. 2), so that the opening of the fork portion 30 can be smaller than the width of the web of the carrier 10. This makes it possible to arrange the arms 18 and 19 so that they do not extend beyond the carrier 10 when the clamp is closed. The arms 18 and 19 are so long that they extend beyond the right ends 36 and 36' of the recesses 35 and 35', respectively. The arms 18 and 19 rest on the web of the carrier 10 when the clamp is opened due to the movement of the element 29 to the right, as shown in Fig. 4. Because of this additional guide, the members 11 and 12 and the diameters of the fulcrum pins 13 and 14 can be made small.

The arms 20, 21 with the jaw portions 22, 23 and the arms 18, 19 together with a portion, for example one-third, of the resilient prongs 16 and 17, are so designed that the centers of gravity of the levers 11 and 12 together with the aforementioned portion of the prongs 16 and 17 are located on the longitudinal axes of the pins 13 and 14. This prevents mass forces causing opening of the clamping device when the latter and/or the carrier 10 is vibrated in the direction of movement of the thread as well as transversely thereto. The resultant of such mass forces extends through the axis of the pins 13 and 14, so that the resulting mass forces act on a radius zero and cannot produce a moment for opening or closing the clamp.

In the modification of the clamping device shown in Fig. 6, an abutment 37 is provided between the arms 18 and 19 in addition to the abutment 27. When the clamp 11, 12 is opened, a small clearance s exists between the abutment 37 and the inner surface of the arms 18 and 19, so that opening of the clamp by means of the forked end 30 of the opener 29 is not impaired. The abutment 37 prevents excessive movement beyond the open position of the levers 11 and 12, for example, if one of the prongs 16, 17 of the fork spring 15 breaks or becomes lame, i. e. loses its resiliency. Due to the abutment 37, the arms 20 and 21 cannot move much further apart than normal open position which is shown in dash-dot lines in Fig. 6. The outer surfaces of the arms 20 and 21 remain within the carrier 10, i. e. within the space which is provided for the normal operating movements of the carrier 10 when the clamp is open.

If the abutment 37 is missing, the clamp portions 22 and 23 can move considerably beyond the carrier 10, if one or both prongs of the fork spring 15 is or are broken. In this case, the portions 22 and 23 would knock against the guides for the carrier 10 or against other parts of the loom, and would be damaged or cause damage. For the same reason, a small clearance s_1 is provided between the arm 21 and the abutment 27 when the clamp is closed, so that the arm 19 of the lever 12 cannot move beyond the width of the carrier 10.

The contacting surface portions 38 and 39 of the levers 18 and 19 and of the prongs 16 and 17 are so shaped that the surface portions 38 and 39 rollingly engage each other upon rotation of the levers 11 and 12, and a sliding engagement and undesirable wear are prevented. This is shown in Fig. 7, in which the engaging surfaces 38 and 39 of the arm 19 and the prong 17, respectively, are indicated by heavy interrupted black lines.

The clamping devices according to the invention which include rigid levers can be used not only for the weft thread return and presenting elements, but also for weft thread inserting elements, such as rods, needles, or steel ribbons which are wound on drums, and also for gripper shuttles. Figs. 8 and 9 illustrate the application of the invention to gripper shuttles.

Fig. 8 shows the end of a shuttle 40 to which a thread 52 must be attached. For this purpose, two levers 41 and 42 are placed in the interior of the shuttle 40, which levers swing about a common fulcrum pin 43. The arms 44

and 45 of the levers 41 and 42, respectively, are spread apart by means of rod springs 46 and 47, respectively, so that the arms 48 and 49 provided with clamp portions 50 and 51, respectively, are pressed together for holding the weft thread 52 between clamping faces 55 and 56.

As seen in Fig. 9, the lever 41 is provided with an ear 53 which is placed symmetrically of the longitudinal axis of the lever 41, a bore being provided in the ear 53 for the fulcrum pin 43. The lever 42 is provided with two ears 59 which straddle the ear 53. This support of the levers 41 and 42 which is symmetric with respect to the longitudinal axes of the levers extending from the center of the clamping faces to the middle of the surface portion of the lever arms which is engaged by a rod spring, have the effect that the resultant bearing pressure, i. e. the resultant of the spring force acting on the lever and of the clamping force produced at the respective clamp face, is within the bearing surface of each lever, as it is with the separate supports of the levers 11 and 12 in the modification of the invention according to Fig. 7. The bearing surfaces of the levers 11 and 12 extend over the entire width of the levers, whereas the bearing surface of the lever 41 of the modification shown in Figs. 8 and 9 is formed by the width of the ear 53. Since this ear is arranged in the middle of the lever 41, the resultant bearing pressure remains inside of a region b , thus preventing tilting of the lever 41 which would cause a slanted position of the clamping face 55 of the clamp portion 50 relatively to the clamping face 56 of the clamp portion 51. The same applies to the lever 42, whose bearing surfaces are formed by the contact surfaces between the ears 54 and the pin 43. Since the resultant bearing pressure is located within the width of the ear 53 and consequently between the two ears 54, tilting of the lever 42 is not possible.

The shuttle 40 is provided with recesses 57 and 57' in the neighborhood of the arms 44 and 45, respectively. The recesses are adapted to receive prongs 58 and 58', respectively, of a fork-shaped clamp opening element. Since the shuttle 40 trails the thread 52 when the latter is inserted into the shed, a common fulcrum 43 can be provided for both levers 41 and 42, whereby the space required by the clamping device 41, 42 within the shuttle 40 is small. This is essential if a clamping device having rigid jaw levers is used for gripper shuttles.

The clamping devices according to the invention have the following advantages: Because of the provision of the rigid levers 11, 12 or 41, 42, the closing position of the clamp faces 24, 25 or 55, 56 cannot be impaired by deformations or changes in the resilient force provided by the springs 16, 17 or 46, 47. The exact closing position of the clamping faces 24, 25 or 55, 56 is of great importance for reliably gripping the threads 26 or 52. Since the levers 11, 12 and 41, 42 are separate from the resilient prongs 16, 17 and 46, 47, each part can have the hardness and strength required for its function, for example, the arms 18, 19 and 44, 45 can have the most favorable hardness to resist wear, and the resilient prongs 16, 17 and 46, 47 can have the hardness required for producing adequate resiliency.

The arrangement of the clamp openers 29 and 58 close to the end of the element which may carry a plurality of clamp holders 10 and which is adapted to selectively move the clamp holders, for example, into the picking position, as shown in my application Serial No. 376,780, filed August 27, 1953, has the advantage that the forces occurring during the opening and closing of the clamps are received in a relatively short portion of the guides for the holders or carriers 10. This reduces bending stresses in the carriers 10. When adjusting and pre-tensioning the resilient prongs 16, 17 and 46, 47, only the production of the correct clamping force must be considered. There is no need for adjusting the position of the clamping faces. The forks 30 and 58 for opening the clamp can be so constructed that there is sufficient

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space for passage of the shuttle 34 and of the thread 26. No special provisions are needed for removing the clamp openers for providing passage of the shuttle and of the thread, and simple carrying levers 31 provide satisfactory operation. The points of the forks 30 and 53 are so remote from the path of the threads 26 and 52 that there will be no interference with the threads.

The clamping force of the devices according to the invention can be increased to a degree not possible with conventional arrangements. This is particularly desirable when weaving wool.

While specific embodiments of the invention have been shown and described, it will be apparent to those skilled in the art that various changes, modifications, substitutions, additions and omissions may be made therein without departing from the spirit and scope of the invention as set forth in the appended claims.

What is claimed is:

1. A thread clamp for temporarily holding one or more threads in a loom for weaving, comprising a holder, two two-arm levers fulcrumed to said holder, two resilient rods, each of said rods having an end fixed to said holder and having a free end abutting against one arm of one of said levers, the other arm of said levers forming a jaw, the jaws of said levers facing and being pressed against each other by the action of said resilient rods for gripping a thread.

2. A thread clamp as defined in claim 1, in which the fulcrums of said levers are individually arranged in the individual centers of gravity of the systems including an individual lever and a respective portion of the resilient rod engaging the lever.

3. A thread clamp as defined in claim 1, in which the engaging surfaces of the individual levers and of the

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respective resilient rods are shaped for rolling engagement of the surfaces.

4. A thread clamp as defined in claim 1, in which said resilient rods form the prongs of a fork-like member.

5. A thread clamp as defined in claim 1, comprising an abutment connected with said holder and adapted to be abutted by one of said levers when the jaw of the latter is in closing position, the resiliency of the rod engaging the lever abutting said abutment being less than the resiliency of the rod engaging the other lever.

6. A thread clamp according to claim 1, in which the fulcrum of at least one of said levers is arranged symmetrically with respect to the center line of the lever.

7. A thread clamp according to claim 1, comprising a clamp actuating means, said levers being arranged on opposite sides of the thread or threads to be gripped, the sides of the arms of said levers, which sides are engaged by said rods, facing each other, and the sides of the arms of said levers, which sides are distal with respect to the sides engaged by said resilient rods, being provided with operating surfaces adapted to be engaged by said clamp actuating means.

8. A thread clamp according to claim 7, in which said holder is provided with recesses situated oppositely to said operating surfaces for receiving said clamp actuating means.

9. A thread clamp according to claim 8, in which the arms of said levers which are engaged by said rods have a portion extending beyond said operating surfaces and beyond the recesses in said holder and are adapted to abut against the latter.

No references cited.