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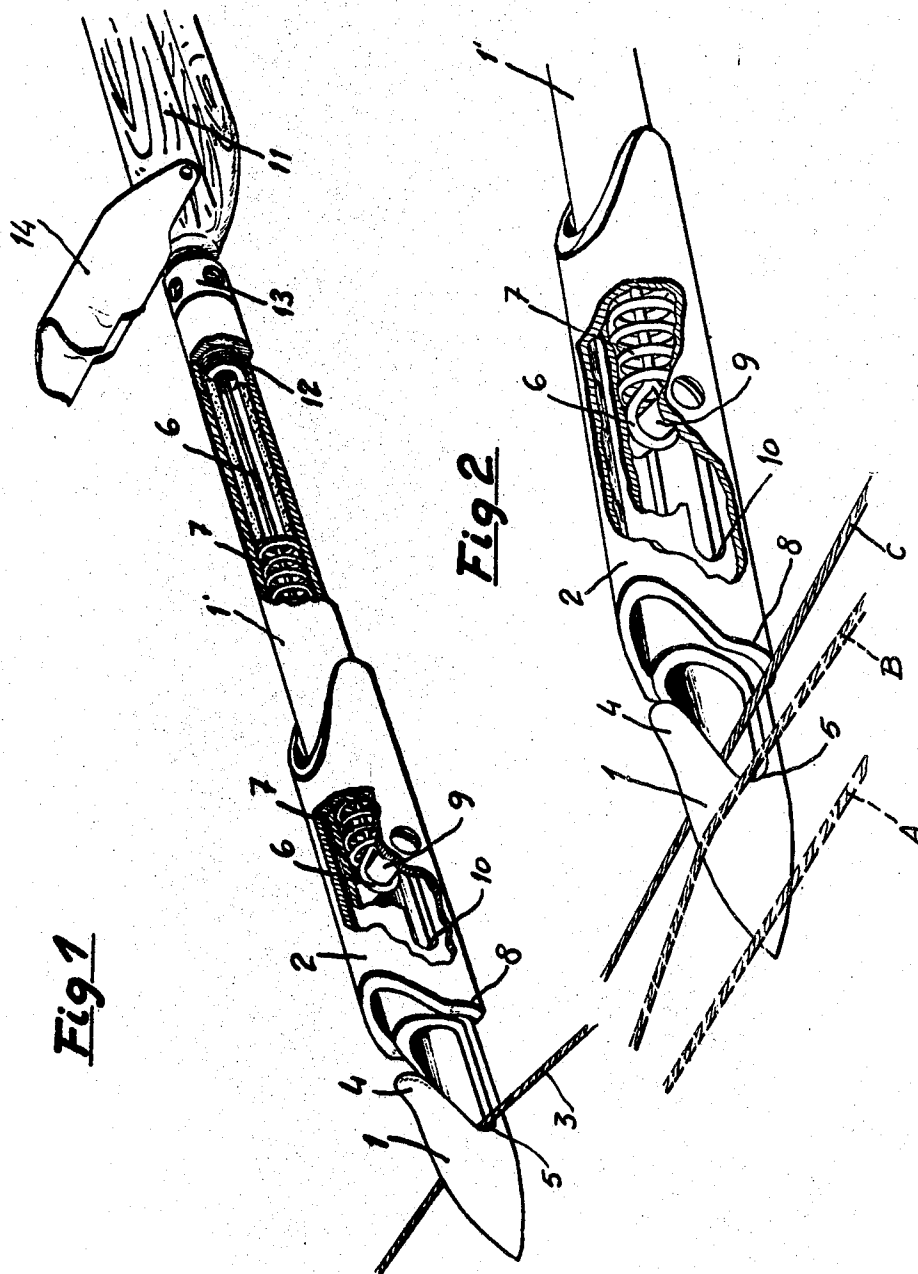
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WEFT THREAD INSERTING DEVICE IN WEAVING MACHINES

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2 Sheets-Sheet 1



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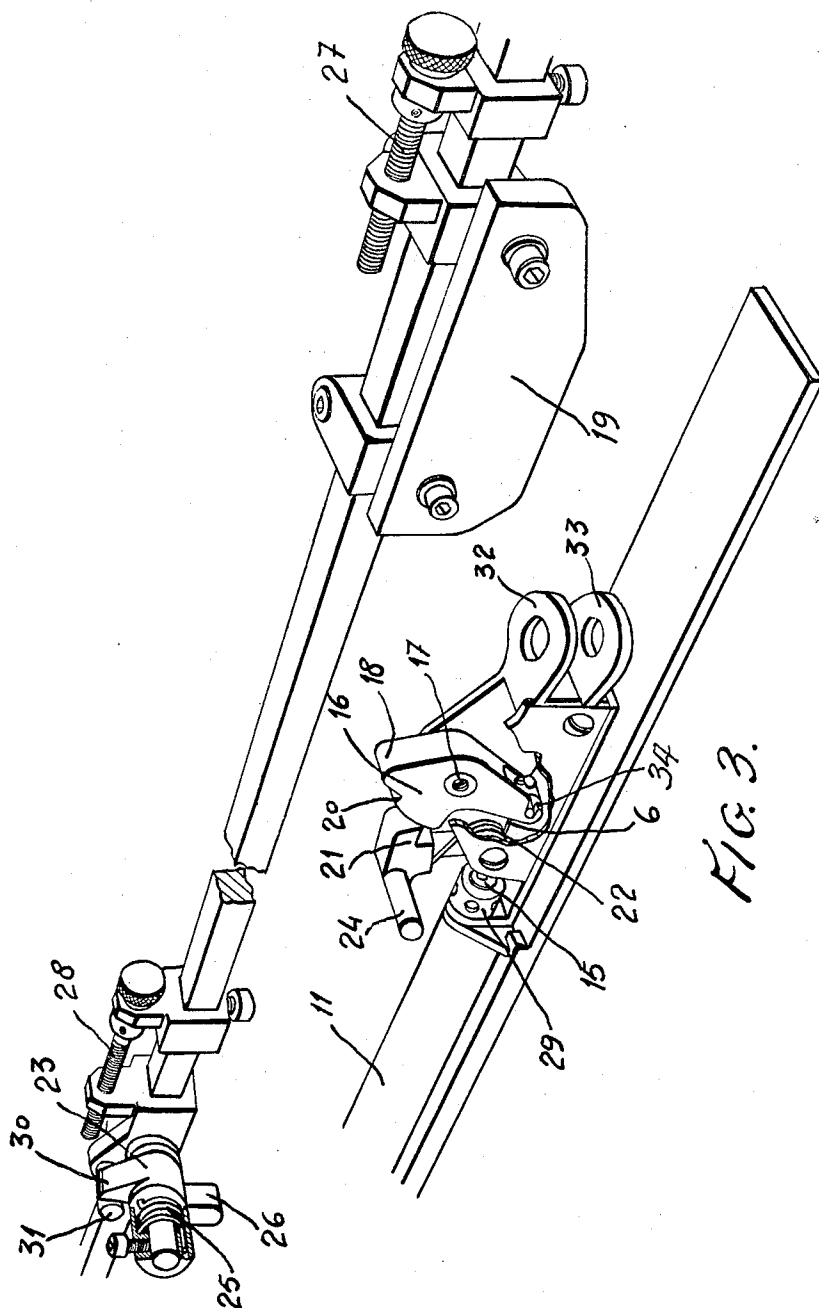
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1

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**WEFT THREAD INSERTING DEVICE IN
WEAVING MACHINES**
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307,145
8 Claims. (Cl. 139—122)

ABSTRACT OF THE DISCLOSURE

A weaving machine having a hollow rigid member for inserting a weft thread through the shed, with a clamping member for the thread at one end and a controlling mechanism for the clamping member at the other end, the clamping member having a fixed jaw and a movable jaw, at least one of the jaws having a throat for the insertion of the thread to be clamped, the movable jaw being slidably arranged on the fixed jaw and moved, in one direction, by a spring and in the opposite direction by a traction member controlled by said controlling mechanism in timed relationship to the reciprocating movement of the weft thread inserting member.

The present invention relates to a device having a clamping member for assuring the insertion of the weft threads in weaving machines.

This device comprises, in addition to the mentioned clamping member, a clamping member support arm adapted for passing entirely, with its extreme end through the warp threads of the shed, driven by its normal reciprocating movement which is necessary for weaving, and a set of controlling members adapted to assure the opening and closing of said clamping member at certain moments during the reciprocating movement of the clamping member to grip and release the weft thread for effecting the correct weaving operation.

The clamping member being part of the device has a fixed jaw and a movable one and presents essentially the following features:

When said clamping member is free of weft threads, the movable jaw may pass to the closed position of the clamping member without meeting any obstacle in front of the fixed jaw, but when between the jaws of the clamping member a weft thread is inserted, this forms an abutment for the movable jaw with respect to the fixed jaw, so that the clamping member acts as a knife which, however, has not the necessary strength to cut the thread inserted into the clamping member.

At least one of the two jaws is provided with a throat into which the weft thread or weft threads to be gripped by said clamping member are located.

Two knives are associated, respectively, with the fixed jaw and the movable one, in such a manner that when one or several threads are gripped between the movable jaw and the fixed jaw of the clamping member, said knives sever this or these weft threads so that only one end of the thread or of each of the gripped threads is retained in the clamping member.

There are known various types of clamping members forming part of weft inserting members generally consisting of a shaft or arm adapted to insert the weft threads into the shed. Moreover, it is known that the weaving of different industrial fibres causes a more or less speedy wear of the jaws of these clamping members, which is essentially due to the unavoidable friction occurring during gripping and especially during releasing of the weft thread. This wear causes the formation of grooves in the jaws.

2

In clamping members with jaws having an even surface approaching respectively the corresponding surface of the other jaw to grip the weft thread or weft threads, the movable jaw finally hits the fixed jaw through the edges of the worn out grooves, even when the clamping member is fed by one single thread to be gripped. When a groove has been formed during a long period of time, the thread normally is located in this groove, but, if this groove is rather deep, said thread cannot be retained by the jaws of the clamping member. Generally, the mentioned wear aggravates progressively and as in many cases the weft thread or its consistence are not uniform, the said wear does not cause the abrupt stopping of the weaving operation, but gives rise to defective fabrics.

In looms having a clamping member, this constitutes the main and also one of the most delicate parts of the machine. It is difficult to construct a clamping member in which the worn out pieces may be replaced easily and which, at the same time, fulfills the other imposed conditions for a correct operation of the loom, namely: Lightness of the clamping member; rigorously controlled operation and position of each thread insertion cycle; irreplaceable faultless clamping of the thread, etc.

In the clamping member according to the invention, the inconveniences referred to above are practically nil and may endure a rather heavy wear until put out of service, and in this case any part of the very simple clamping member may be replaced easily.

A notable advantage of the clamping member of the present invention consists in the above described features and in the possibility to adapt the throat into which the weft threads to be gripped are inserted, so that it can grip several weft threads simultaneously and more easily than by means of clamping members with jaws having an even surface approaching respectively the corresponding surface of the other jaw to grip the weft thread or weft threads. In this last mentioned case, when the clamping member is closed, the separation between the said surfaces depends on one or eventually two threads, which flatten less, while the other thread or threads are not correctly gripped.

In addition to the clamping member, which may have the before described characteristics, the subject device of the present invention may have all or some of the following original arrangements:

The fixed jaw of the clamping member is solid with the shaft being a part of the device, and the movable jaw, slidably arranged on the fixed jaw, is moved, on the one hand, by a spring which may be arranged inside the clamping member and, on the other hand, by a controlling member, such as a rod or cable. This controlling rod or cable may be arranged along or inside of the shaft and the clamping member support arm. The spring will tend to move the movable jaw in such a way that it closes the clamping member and a traction on the controlling rod or cable compresses said spring thus causing the opening of the clamping member. The strength exerted on the movable jaw by said spring is adjustable by an action on a screw or nut which regulates the tension of the spring when the clamping member is closed.

The fixed or the movable jaw of the clamping member, or both, may comprise a hook to facilitate the automatic insertion of the weft thread into the clamping member. Said hook then is covered by a casing of the clamping member when this latter is closed in order to avoid that the warp threads might possibly be caught by said hook during the passage of the clamping member through the shed.

The controlling mechanism of said clamping member is fixed at the opposite extreme end of the clamping member support arm which carries the shaft with its corresponding clamping member.

This mechanism closes the clamping member when the weft threads are inserted and opens it again when the clamping member has passed through the shed. This mechanism is essentially constituted by a lever and a pawl.

The lever is movable around a stationary point with respect to the clamping member support arm and has a trigger groove and a projecting nose adapted to co-operate with a cam fixed on the frame of the loom. The pawl has an appendix upon which may actuate a trigger mechanism also fixed on the frame of the loom.

When the clamping member support arm effects its normal reciprocating movement to produce the fabric, this movement actuates the clamping member and its controlling mechanism, the cycle of operation being as follows:

(a) When the clamping member support arm and the clamping member are leaving the shed, the projecting nose of the lever of the controlling mechanism rests on the corresponding cam fixed on the frame of the loom. Thus the lever is constrained to balance and pulls the controlling rod or cable of the clamping member, the spring of the clamping member is compressed and the clamping member is opened for the exit of the weft thread or weft threads which had been gripped before and passed through the shed. Moreover, the trigger groove of the lever is situated beneath the pawl, and this pawl falls into said groove, blocking the lever in the position just reached, which corresponds to the opened clamping member.

(b) The clamping member support arm then pushes the clamping member through the shed. When the clamping member has completely passed through the shed, the weft thread feeding mechanism inserts the corresponding weft threads into the clamping member.

(c) Thereafter, the clamping member support arm starts to execute a movement in the inverse direction of the preceding one and the appendix is actuated by the trigger mechanism fixed on the frame of the loom. The pawl leaves the trigger groove of the lever of the controlling mechanism and this lever, once liberated from the pawl, balances in consequence of the action of the spring of the controlling rod or cable. This very movement closes the clamping member and actuates it to grip the weft thread or weft threads introduced into said clamping member.

(d) The clamping member support arm then moves the weft thread or weft threads inserted in the clamping member through the shed until the projecting nose of the controlling pawl of the clamping member comes to rest on the corresponding cam fixed on the frame. From this moment on the above described cycle starts again.

The clamping member support arm is rigid and needs no guidance for its passage through the shed.

In order that the invention may be clearly understood and readily carried into effect, one embodiment thereof will now be described, by way of example, with reference to the accompanying drawings, in which:

FIG. 1 is a perspective view, with parts in section, of the clamping member joined to the clamping member support arm;

FIG. 2 is an enlarged perspective view, with parts in section, of the jaws of the clamping member, and

FIG. 3 is a perspective view of the clamping member support arm with the controlling device of the clamping member, showing also the elements which produce opening and closing of the clamping member.

In FIGS. 1 and 2, 1 shows the fixed jaw which is solid with a shaft 1' adapted to pass through the shed formed by the warp threads; 2 shows the movable jaw which slides on the fixed jaw 1 and starts from shaft 1'. The weft thread 3 (FIG. 1), tensed in a direction which is normal or inclined to the direction of the displacement of the clamping member, is gripped by the hook 4 of the fixed jaw 1 when the shaft 1' moves back. A, B and C

(FIG. 2) show three successive positions which the weft thread occupies with respect to the clamping member. When the thread is inserted into the throat 5, the tension of the controlling rod or cable 6 diminishes and the spring 7 displaces the movable jaw 2 until this jaw grips the weft thread. The end of the thread is then slackened by a mechanism (not shown) which operates synchronously with the displacing mechanism of the shaft 1' which carries the fixed jaw 1 and the driving mechanism on the rod 6. Therefore, the weft thread is inserted correctly by the displacement of the clamping member through the shed.

There might also be gripped and inserted several weft threads simultaneously. The different threads are then introduced into the throat 5 (FIG. 2) and are clamped by the part 8 of the movable jaw 2. Knowing the type of weft threads to be inserted successively into the clamping member to produce a given fabric, it is possible, if necessary, to arrange or adapt accordingly, the form and shape of the throat 5 of the fixed jaw 1 and of the part 8 of the movable jaw 2.

When during the normal operation of the above described apparatus with several types of weft threads the throat 5 of the fixed jaw 1 and the part 8 of the movable jaw 2 are worn out, the tension of the spring 7 can be increased or decreased accordingly to adjust the movable jaw 2 for gripping the thread even in case of a very heavy wear of the jaws. The maximum wear at which the clamping member can still work normally is defined by the position of the rod 9 and of the adjusting slot 10. For the movable jaw 2 there is no other obstacle than the very weft thread, it being understood that the strength exerted by the spring 7 on the movable jaw 2 in the gripping position must be less than the necessary force for severing the weft thread or weft threads between the two jaws, but sufficient for avoiding the slipping of the weft thread or weft threads between the two jaws. A device, for instance with an adjusting screw, may be provided for the regulation of the tension of the spring 7. The closing pressure may then be adapted to the type of weft thread.

In FIG. 1, 11 shows the clamping member support arm; 12 shows a hollow screw through which the clamping member support arm 12 is connected with the shaft 1'; 13 shows a counter-nut for assuring the connection; 14 shows a casing or cover adapted to assure the continuation between the shaft 1' and the clamping member support arm 11 and to avoid damage of the warp threads during the passage through the shed.

For modifying the strength exerted by the spring 7 during the thread gripping by the fixed jaw 1 and the movable jaw 2, it is sufficient to loosen the counter-nut 13, to turn the clamping member some complete revolutions and to tighten again the counter-nut 13.

In FIG. 3, 15 shows the hollow screw for connecting the controlling mechanism with the clamping member support arm 11 and the counter-nut 29. Through said hollow screw 15 passes the controlling rod or cable 6, which is connected by the crossbar 34 to the driving lever 16. 17 shows the support and rotating point of the lever 16. 18 shows the projecting nose of the lever 16, which is adapted to co-operate with the cam 19 (FIG. 4) fixed on the frame of the loom (not shown), where the normal movement of the clamping member support arm starts.

When the projecting nose 18 of the lever 16 (FIG. 3) enters into contact with and comes to rest on said cam 19 (FIG. 4), the lever 16 (FIG. 3) balances around the support 17, pulls the rod or cable 6 (FIG. 1) and thus opens the clamping member. The driving and trigger groove 20 (FIG. 3) thereafter comes to be situated beneath the pawl 21, which is introduced by the spring 22 in the groove 20.

When the pawl 21 (FIG. 3) passes underneath the trigger mechanism when moving in a leftward direction, the pawl 23 is displaced in front of an appendix 24 of the pawl 21 and then returns immediately to its position

5

6

by means of the spring 25. On the contrary, when the pawl 21, is passing underneath the trigger mechanism with the clamping member support arm 11 moving in a rightward direction, the tooth 26 protruding on the underside of the pawl 23 actuates the appendix 24 and lifts up the pawl 21 by the action of the upper nose 30 of the pawl 23 against the pin 31. The lever 16 is now free and the spring 7 (FIG. 1) of the clamping member pulls the controlling rod or cable 6, balances the lever 16 (FIG. 3) and closes the clamping member, until the weft thread introduced into the clamping member by any known weft presenting or selecting device (not shown) grips the said thread between the jaws 1 and 2.

The cam 19 and the control pawl 23 are adjustably mounted on a unitary rod and are spaced there along a distance slightly greater than the width of the warp. In so placing the control means, the clamping member is controlled adjacent the weft insertion aside of the shed, by control pawl 23 to close and grip the weft thread to be inserted therein and is controlled on the opposite side of the shed by control cam 19 to release the weft end just drawn into the shed. The control members may be adjusted along their mounting rod by screw means 27 and 28, to accommodate warps having a plurality of widths.

32 and 33 show two flange members for the connection of the device with the reciprocating driving system (not shown).

It will be understood that the foregoing disclosure has been given only by way of example, that the two jaws of the clamping member may have different forms from those described, that the movement of the two jaws may be different from the transfer movement, and that the driving mechanism may be arranged at any convenient point of the clamping member support arm.

What I claim is:

1. A weft inserting means including a clamping member operable to move a weft thread through a shed, characterized in that the clamping member mounted at one end of said weft inserting means includes a fixed jaw and a movable jaw operable to engage a weft but adapted to remain out of contact with one another, and a control

mechanism for said jaws mounted at the other end of said inserting means, said movable jaw being arranged to slide along means forming said fixed jaw, one of said jaws forming a throat which is adapted to receive and position a weft thread to be gripped by said jaws.

2. A weft inserting means as claimed in claim 1 including spring means forcing the movable jaw into clamping position and drive means returning said jaw into non-clamping position against the action of said spring means.

3. A weft inserting means as claimed in claim 2 comprising a screw and nut means adapted to adjust the tension of said spring means.

4. A weft inserting means as claimed in claim 2 wherein said drive means is a member of the group consisting of rods and cables.

5. A weft inserting means as claimed in claim 1 wherein said control mechanism includes a pivoted lever and a cam actuating said lever when the jaws are in clamping position, so as to open said clamping means.

6. A weft inserting means as claimed in claim 5 including a pawl constantly urged against said lever and engaging a groove of said lever so as to block pivotal movement of the lever and retain the movable jaw in non-clamping position while thus engaged, and means disengaging said pawl when the clamping means moves into weft gripping position.

7. A weft inserting means as claimed in claim 1 wherein said jaws have the shape of part of a cylindrical body.

8. A weft inserting means as claimed in claim 7 wherein the movable jaw forms a sleeve around the fixed jaw.

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