June 27, 1939. A. MOESSINGER 2,163,760

THREAD TRANSFER APPARATUS

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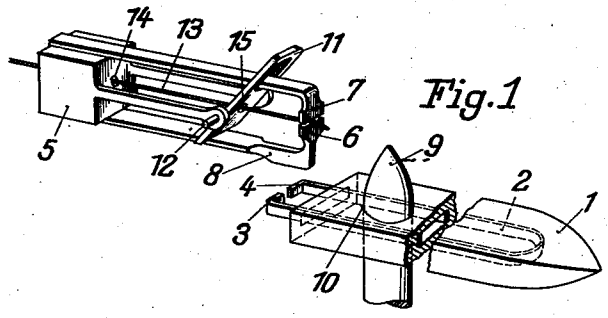


Fig.1

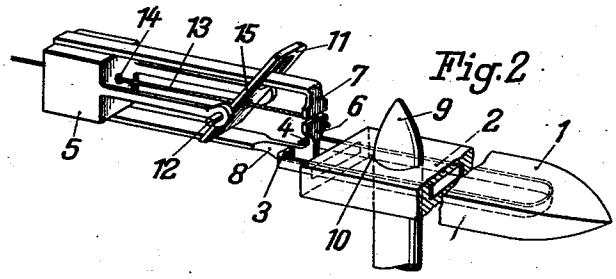


Fig.2

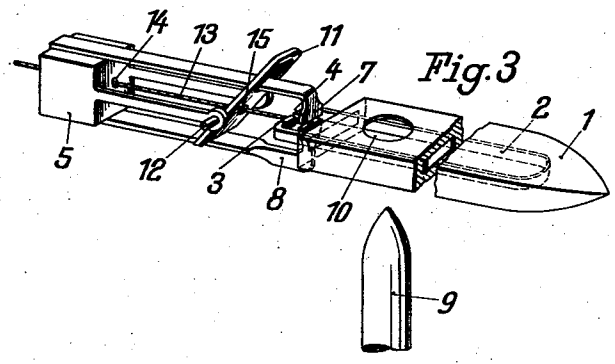


Fig.3

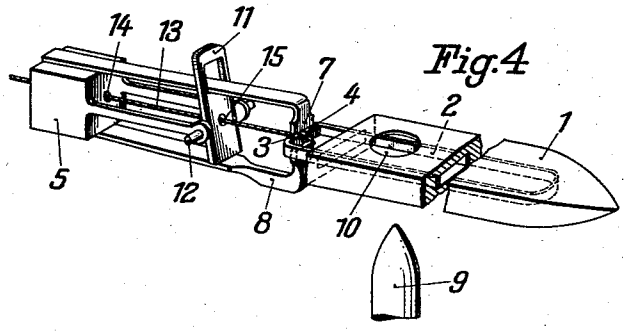


Fig.4

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THREAD TRANSFER APPARATUS

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Fig.5

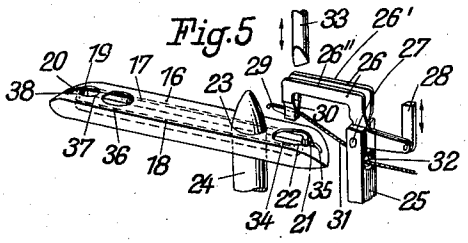


Fig.6

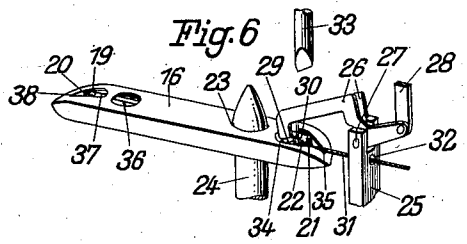


Fig.7

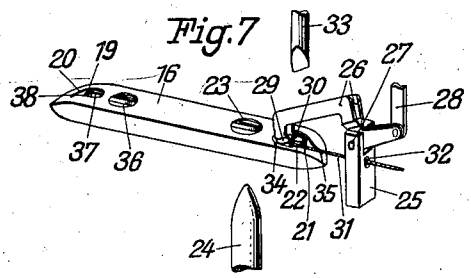


Fig.8

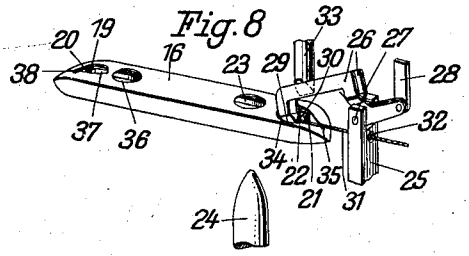
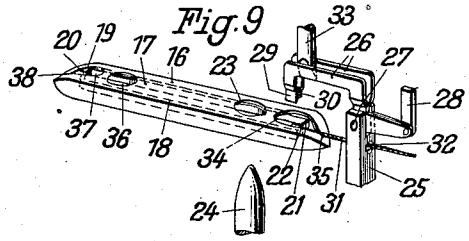


Fig.9



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THREAD TRANSFER APPARATUS

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Fig. 10.

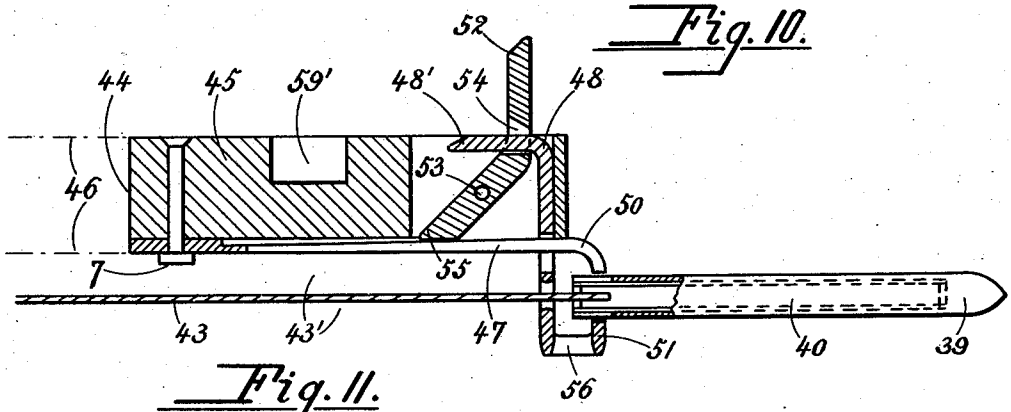


Fig. 11.

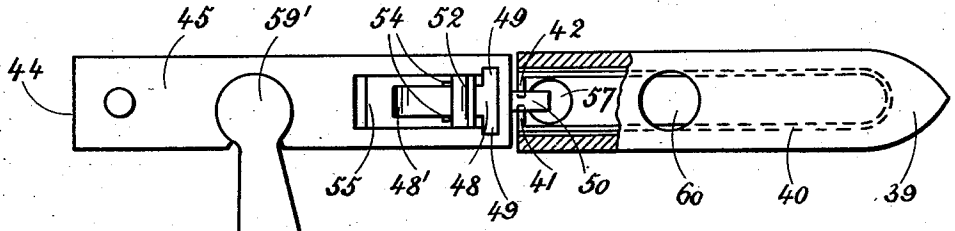


Fig. 12.

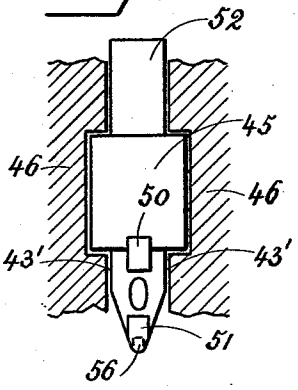
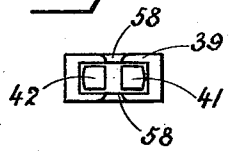


Fig. 13.



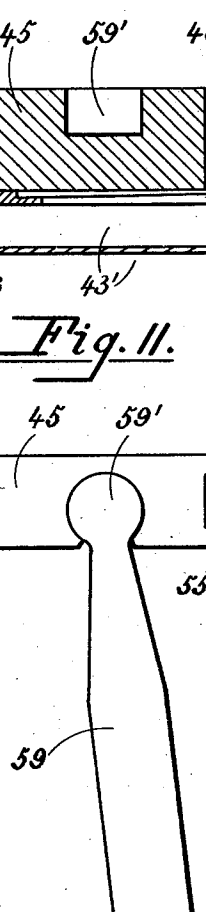
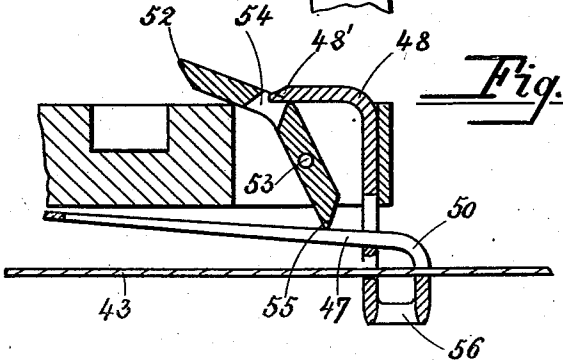


Fig. 14.



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UNITED STATES PATENT OFFICE

2,163,760

THREAD TRANSFER APPARATUS

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Application July 13, 1937, Serial No. 153,348
In Switzerland August 1, 1936

7 Claims. (Cl. 139—125)

The present invention relates to a method and apparatus for feeding the weft thread to the gripper shuttle of looms for weaving having stationary spools for the weft threads, particularly to weft thread transfer apparatuses in which the thread clamps of the thread transfer means and the clamps of the gripper shuttle are positioned perpendicularly with respect to one another and in which the clamping means of the shuttle grip the weft thread in the rear of the clamp of the thread transfer means.

In the conventional apparatuses of this type, the clamp of the thread transfer means passes through the opened clamp of the shuttle so that the latter clamp, in order to accommodate the former clamp, must be opened at least as wide as is the width of the former clamp. This necessitates excessive deformation of the shuttle gripper at every weft transfer operation and, accordingly, a large and heavy spring so that either the shuttle is so heavy as to permit relatively low speeds only or the resilient material of which the gripper is made is overstrained and frequently breaks. With such grippers, great forces are required for opening the clamp.

It is an object of the present invention to provide weft thread transfer means which do not have the aforesaid disadvantages. With a transfer apparatus according to the present invention, movement of the clamps with respect to one another is so controlled that one clamp does not need to pass through the mouth of the other clamp.

A further object of the present invention resides in the provision of thread transfer means in which the clamp of the shuttle gripper is moved transversely to the direction of the movement of the weft thread or in which the path of the clamp of the weft thread transfer means has such configuration that the weft thread is introduced into the clamp of the gripper shuttle in a direction which is transverse to the direction of movement of the shuttle.

Another object of the present invention is to provide a weft thread transfer apparatus in which the clamp springs are not highly stressed and in connection with which the weight of the shuttle can be kept small; the jaws of the clamps with the apparatus according to the present invention, nevertheless, have a width which is a multiple of the diameter of the weft threads, and reliable transfer of the threads is assured. The small weight of the shuttle reduces the shocks when picking and receiving the shuttle so that the number of picks per minute and also the weaving speed can be greatly increased.

The apparatus according to the present invention is much more reliable as compared with gripper shuttles which grip the weft thread when entering the shed without the aid of additionally controlled auxiliary devices solely by means of the clamping action of resilient clamps which are located in the interior of the shuttle. With customary gripper shuttles, the weft thread is inserted into the gripper at great velocity because the shuttle is already started on its way across the loom. It is obvious that, with such operation, the thread can easily be damaged and even torn by the gripper so that the shuttle passes without a thread through the shed. A knot in the thread will seriously interfere with the gripping operation of customary gripper shuttles.

Transfer of the thread to the shuttle and cutting of the thread require considerable power which must be provided by the shuttle. Since this power requirement may vary considerably because of the unreliability of the various operating steps, energy must be imparted to the shuttle in order to be sure that it reaches the shuttle receiving box, which energy is considerably greater than is necessary to just shoot the shuttle through the shed; because of this much too great an energy, the braking forces in the receiving box must be great, and the operation is accompanied by great shocks which are very undesirable.

Further and other objects of the present invention will be hereinafter set forth in the accompanying specification and claims and shown in the drawings which, by way of illustration, show what I now consider to be a preferred embodiment of my invention.

In the drawings:

Figs. 1–4 diagrammatically show a thread transfer apparatus according to the present invention in various phases of the cooperation of the shuttle gripper and the transfer apparatus, whereby the shuttle gripper is moved towards the thread in a direction which is transverse to the direction of the movement of the shuttle through the shed.

Figs. 5–9 illustrate a modified thread transfer apparatus according to the present invention and the movement of the thread clamps relatively to one another, whereby, by means of the thread transfer clamp, the thread is moved towards the shuttle gripper in a direction which is transverse to the picking direction of the shuttle.

Figs. 10–14 show details of a modification of the present invention, whereby the bulk of the

weft thread transfer means moves outside of the space through which the weft thread passes.

Fig. 10 is a diagrammatic longitudinal part sectional view of a modified thread feeder and shuttle.

Fig. 11 is a diagrammatic part sectional top view of the apparatus shown in Fig. 10.

Fig. 12 is a front view of the thread feeder shown in Figs. 10 and 11, showing in section the guide means by which said feeder is slidingly supported.

Fig. 13 is a rear view of the shuttle shown in Figs. 10 and 11.

Fig. 14 shows part of Fig. 10 with the thread feeder clamp in closed position.

Like parts are designated by like numerals in all figures of the drawings.

For the cooperation of the shuttle and the thread transfer means, which cooperation is shown in Figs. 1–4 and 5–9 by illustration of the individual means in various positions relative to one another, it does not matter whether the gripper shuttle is moved towards the thread transfer means or whether the transfer means are moved towards the stationary shuttle or whether both are moved towards one another.

The gripper shuttle shown in Figs. 1 to 4 is provided with a clamp 2 made of resilient material in known manner and having jaws 3 and 4. Gripper 5 of the thread transfer means also consists of two jaw members 6 and 7 which form the clamping point of gripper 5. According to the present invention, the lower jaw is provided with a part 8 of small width just behind jaw 6, which part can be accommodated between jaws 3 and 4. Gripper 2 can be opened by inserting a tongue member 9 into opening 10 of shuttle 1. For opening gripper 5, a lever 11, which swings about pin 12, is provided. Weft thread 13 is moved through opening 14 of gripper 5 and opening 15 of lever 11 towards the point of engagement of gripper 5 and is clamped between jaws 6 and 7, whereby, in order to assure reliable engagement of the thread, the loose end thereof projects somewhat beyond the face of jaws 6 and 7.

The relative movement of jaws 3, 4 and 6, 7 takes place as follows. At first, the shuttle 1 is located below gripper 5. Gripper 2 has already been opened by means of tongue member or thorn 9. Then gripper shuttle 1 is lifted upwards by means which do not form part of the present invention and which are, therefore, not shown. Fig. 2 shows the apparatus in the position in which clamp 3, 4 is just passing the constricted part of gripper 5. As soon as shuttle 1 has reached the position shown in Fig. 3, thorn 9 is removed. Clamp 3, 4 catches thread 13 in the rear of clamp 6, 7 which still holds thread 13 until the upper end of lever 11 is moved to the left. Thereby, clamp 6, 7 is opened and thereafter the shuttle picked across the loom. Fig. 4 shows the apparatus at the moment when the closed clamp 3, 4 moves through the opened clamp 6, 7, which latter remains open during the pick so that thread 13 can be pulled by the shuttle without meeting any obstructions. After the thread has been pulled through the shed, the upper part of lever 11 is moved to the right. Gripper 5 is thereby closed, and clamp 6, 7 holds the weft thread. That part of the thread which is in the shed is then separated by cutting through the thread in between the shed and gripper 5 so that gripper 5 is ready for transferring the weft thread to the next arriving shuttle in the manner shown in Fig. 1.

Figs. 1 to 4 show a gripper shuttle which is pointed at one end, which is shot in one direction through the shed, and which is brought back outside of the shed to the picking side of the loom by known transport means.

Figs. 5 to 9 show a gripper shuttle 16 pointed at both ends which can be shot in both directions through the shed and carry a weft thread in each direction. Shuttle 16 passes two resilient clamp members 17 and 18 which are bent at both ends to form a weft engaging point 19, 20 and 21, 22, respectively, and which are connected in their centers to shuttle 16 in such manner that both their ends can move freely. When clamp 19, 20 is closed, clamp 21, 22 is opened by means of thorn 24 which extends through opening 23 of shuttle 16. Figs. 5 to 9 show a modified apparatus for transferring the weft thread to the shuttle. The transfer means 25 are provided with a gripper 26 which can be revolved about the fulcrum 27 by moving rod 28 up and down. Gripper 26 consists of two similar members 26' and 26'' to one end of which rod 28 is movably connected and the other ends of which are bent towards one another forming jaws 29 and 30 for holding thread 31 which is passed through opening 32. Above gripper 26, a stamp or wedge member 33 is provided which can be inserted between members 26' and 26'', whereby clamp 29, 30 is opened.

Fig. 5 shows the apparatus in the position in which shuttle 16 has been moved towards the weft transfer or delivery means and in which clamp 21, 22 has already been opened by insertion of thorn 24 and is ready for taking over the thread. For this purpose, rod 28 is pulled upwards so that clamp 29, 30 moves downwards and enters opening 34 of shuttle 16. Thereby, thread 31 is inserted into the clamp 21, 22 in a direcction transverse to the picking direction of the shuttle. This is illustrated in Fig. 6. Opening 34 is provided with a slot 35 of V-shaped configuration, whereby the point of the V is directed towards the end of the shuttle. This slot takes care that thread 31 is centrally located in the shuttle and clamp 21, 22 need be opened only very little to receive the thread. The other end of the shuttle is provided with a bore 36 for accommodating a thorn which corresponds to thorn 24 and is situated at the other end of the shed; this other end of the shuttle is provided with an opening 37 having a V-shaped extension 38 adjacent to the previously mentioned clamp 19, 20.

Fig. 7 shows a further phase of the operation of my improved thread transfer apparatus. Thorn 24 has already been removed from bore 23 so that clamp 21, 22 has closed itself and caught thread 31. In the next step of operation which is shown in Fig. 8, stamp 33 is lowered and enters with its point between members 26' and 26'', whereby clamp 29, 30 is opened and the end of the weft thread released. Thereafter, rod 28 is lowered, whereby gripper 26 is turned clockwise so that clamp 29, 30 is lifted out of opening 34 and shuttle 16 is ready for starting. This position is shown in Fig. 9. Shuttle 16 pulls thread 31 behind itself through bore 32. As soon as the shuttle has reached the other side of the shed and has entered the brake, rod 28 is lifted upwards, and clamp 29, 30, which is still held open by means of stamp 33 located in between members 26' and 26'', is lowered so far that members 26' and 26'' are located adjacent to the weft thread. Wedge 33 is then pulled upwards, and clamp 29, 30 catches the weft thread which, by means of a cutting mechanism not shown because it is not part of the present invention, is

cut in between clamp 29, 30 and the shed. Thereafter, gripper 26 is brought into the position shown in Fig. 5 by lowering rod 28.

The shuttle 39 shown in Figs. 10 and 11 is provided with a spring clamp 40, the ends 41 and 42 of which are so bent as to form the jaws for holding thread 43.

The thread transfer or thread return mechanism 44, the body 45 of which slides in guides 46, which are shown in Fig. 12, and which is located above the space 43' for thread 43, carries a thread clamp which consists of spring 47 and slide member 48. Only the point where engagement with the thread takes place extends into space 43' for the weft thread. The means for holding, guiding, and controlling clamp 47, 48 are all connected with body 45 in the space of guide 46. Slide member 48 is vertically guided within body 45 by means of the shoulders 49. Lever 52 serves for closing jaws 50, 51 of the weft clamp of the weft return apparatus 44. Lever 52 swings about fulcrum 53 and is provided with a slot 54 through which the horizontal slide part 48' of slide member 48 extends. Upon turning of lever 52, for example, into the position shown in Fig. 14, slide member 48 is lifted upwards, whereby its vertical part slides in to the slots 49 and its horizontal part is also definitely guided in slot 54. Upon clockwise movement of lever 52, slide member 48 is moved downwards, whereby it is also definitely guided so that it always must assume a correct position with respect to thread 43 and shuttle 39. Spring 47 rests on nose 55 of lever 52 and is pressed downwards by said nose when lever 52 is turned in counter-clockwise direction. Slide member 48 is provided with a narrow part 56, corresponding to part 8 in Figs. 1 to 4, permitting shuttle 39 with opened gripper to be moved upwards in the same manner as in the embodiment of my invention shown in Figs. 1 to 4. The shuttle body is provided with an opening 57 which accommodates jaw 51. Opening 57 communicates with the narrow slots 58 which extend to the rear end of the shuttle and which are clearly shown in Fig. 13. In order to assure smooth entrance of the weft thread and of the narrowed part 56 through the shuttle and into the shuttle gripper 41, 42, slots 58 are rounded out or funnel-shaped towards the surface of the shuttle. After the pick of shuttle 39, the thread feeder or thread return apparatus 44 is moved towards the shed by clockwise movement of lever 59 which is fulcrumed to member 45 at 59' in order to catch thread 43, which is still connected with its spool after the pick, close to the edge of the woven fabric and before the thread cutter comes into operation.

After the thread is cut, lever 59 is turned counter-clockwise and the thread feeder 44 brought back into the position shown in Figs. 10 and 11. Thereby, that part of the thread which is between the spool and the feeder 44 is stretched by known means. Then a shuttle 39 is lifted from below into the picking position, whereby the legs of the U-shaped spring 40 are forced apart by means of a thorn entering the shuttle through opening 60 in the same manner as does thorn 9 in Figs. 1 to 4 and thorn 24 in Figs. 5 to 9.

The thread transfer apparatus shown in Figs. 1 to 9 or the thread feeder of the thread return device shown in Figs. 10 to 14 and the shuttle as well as members 9, 28, 52, 59 etc. are operated in known manner by the loom or by the main drive shaft thereof, whereby notches, cranks, abutments or stationary or moving parts or the like are used and their operation controlled and timed mechanically, pneumatically, electrically or electromagnetically. Such means have not been shown in the present application because they are not part of the present invention and in order to make the disclosure clear.

The width of the opening of clamps 6, 7, 29, 30, and 50, 51 is not so limited as is the opening width of the shuttle grippers because the thread transfer means move at much slower speed—if they move at all—than do the shuttles, and their size and weight may be larger. It is of no particular interest to avoid passage of the shuttle gripper through the opened thread transfer clamp.

While I believe the above described embodiments of my invention to be preferred embodiments, I wish it to be understood that I do not desire to be limited to the exact details of method, design, and construction shown and described, for obvious modifications will occur to a person skilled in the art.

What I claim is:

1. In a weft inserting control means for looms, a thread feeder having a main body, a weft clamp connected to said body, said clamp comprising a resilient jaw member which is provided with a clamping end which projects from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted, and a substantially hook-shaped and stiff jaw member which is slidingly guided in said body and which has a clamping end which also projects from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted, an operating member movably connected with said body and said jaw members and adapted to force said jaw members towards and from one another, said body and said operating member being remote from said weft thread at all operating conditions.

2. In a weft inserting control means for looms, a thread feeder having a main body, a weft clamp connected to said body, said clamp comprising a resilient jaw member which is provided with a clamping end which projects from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted, and a substantially hook-shaped and stiff jaw member which is slidingly guided in said body and which has a clamping end which projects also from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted, an operating member movably connected with said body and said jaw members and adapted to force said jaw members towards and from one another, said body and said operating member being remote from said weft thread at all operating conditions, and guide members positioned remote from said weft thread and being adapted to slidingly cooperate with said body and being positioned substantially laterally thereof, whereby said body can slidingly be moved in said guide members without interfering with the weft thread.

3. In a weft inserting control means for looms, a thread feeder having a main body, a weft clamp connected to said body, said clamp comprising a resilient jaw member which is provided with a clamping end which projects from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted, and a substantially hook-shaped and stiff jaw member which is slidingly guided in said body and which has a clamping

end which also projects from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted and which has an opening for accommodating the weft thread, an operating member movably connected with said body and said jaw members and adapted to force said jaw members towards and from one another, said body and said operating member being remote from said weft thread at all operating conditions.

4. In a weft inserting control means for looms, a thread feeder having a main body, a weft clamp connected to said body, said clamp comprising a resilient jaw member which is provided with a clamping end which projects from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted, a sliding surface in said body extending substantially transverse to the direction of weft insertion and a substantially hook-shaped and stiff jaw member slidingly cooperating with said sliding surface and having a clamping end which also projects from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted, an operating member movably connected with said body and said jaw members and adapted to force said jaw members towards and from one another, said body and said operating member being remote from said weft thread at all operating conditions.

5. In a weft inserting control means for looms, a thread feeder having a main body, a weft clamp connected to said body, said clamp comprising a resilient jaw member which is provided with a clamping end which projects from said body in a direction which is substantially transverse to the direction in which the weft is inserted and a substantially hook-shaped and stiff jaw member which is slidingly guided in said body and which has a slide part which also projects from said body in a direction which is substantially transverse to the direction of weft thread insertion, an operating member swingably connected with said body and having an opening through which said slide part extends, whereby, upon movement of said operating member, the clamping end of said hook-shaped jaw member is moved towards and from the clamping end of said resilient jaw member, said body and said operating member being remote from said weft thread at all operating conditions.

6. In a weft inserting control means for looms, a thread feeder having a main body, a weft clamp connected to said body, said clamp comprising a resilient jaw member which is provided with a clamping end which projects from said body in a direction which is substantally transverse to the drection in which the weft thread is inserted and a substantially hook-shaped and stiff jaw member which is slidingly guided in said body and which has a slide part which also projects from said body in a direction which is substantially transverse to the direction of weft insertion, an operating member swingably connected with said body and having a free end which contacts said resilient jaw member, whereby, upon movement of said operating member, the clamping end of said resilient jaw member is moved towards and from the clamping end of said stiff jaw member, said body and said operating member being remote from said weft thread at all operating conditions.

7. In a weft inserting control means for looms, a thread feeder having a main body, a weft clamp connected to said body, said clamp comprising a resilient jaw member, which is provided with a clamping end which projects from said body in a direction which is substantially transverse to the direction in which the weft thread is inserted, and a substantially hook-shaped and stiff jaw member, which is slidingly guided in said body and which has a slide part which also projects from said body in a direction which is substantially transverse to the direction of weft thread insertion, an operating member swingably connected with said body and having an opening through which said slide part extends, whereby, upon movement of said operating member, the clamping end of said hook-shaped jaw member is moved towards and from the clamping end of said resilient jaw member, and having a free end which contacts said resilient jaw member, whereby, upon movement of said operating member, the clamping end of said resilient jaw member is moved towards and from the clamping end of said stiff jaw member, said body and said operating member being remote from said weft thread at all operating conditions.

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