Dec. 11, 1951 E. PFARRWALLER 2,578,205

GRIPPER-SHUTTLE LOOM

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Fig. 1.

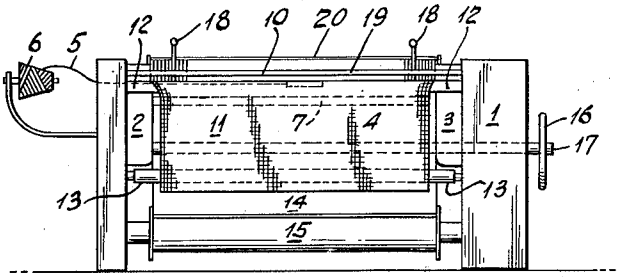


Fig. 2.

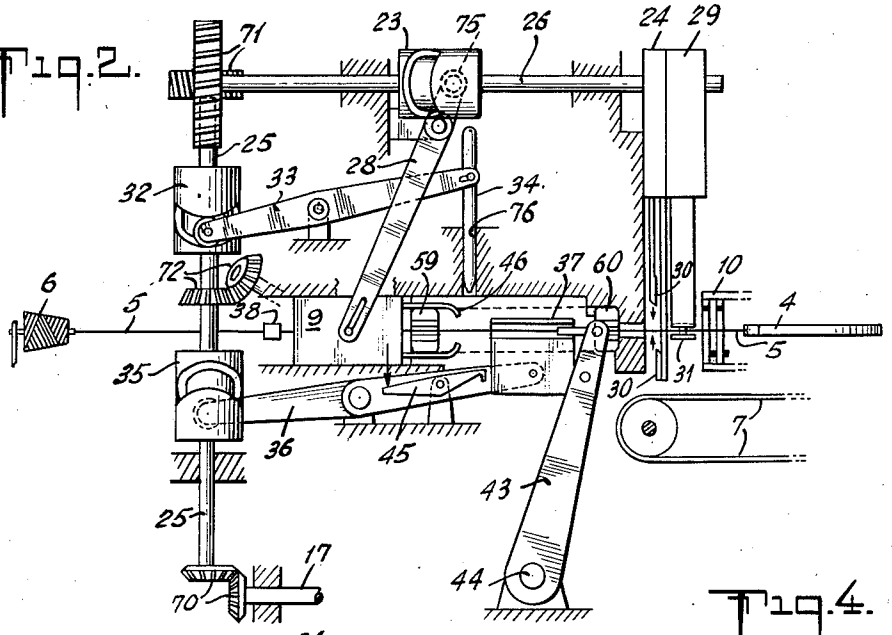


Fig. 3.

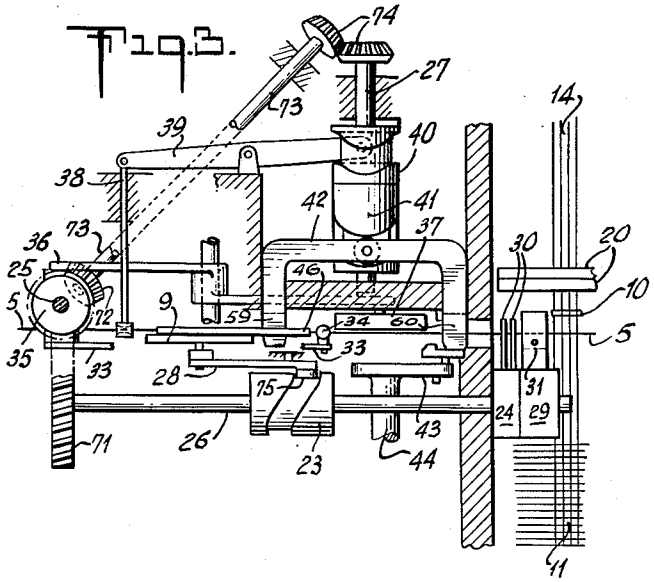


Fig. 4.

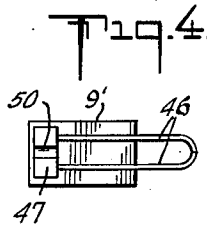
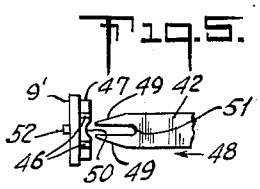


Fig. 5.



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Fig. 6.

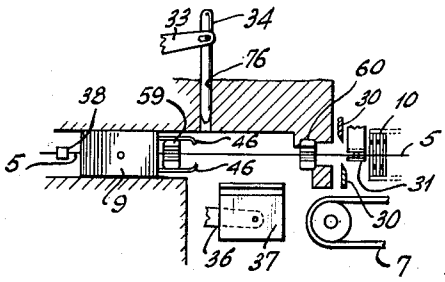


Fig. 8.

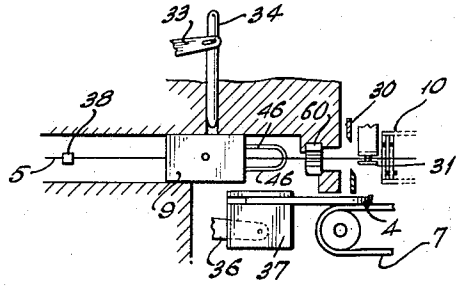


Fig. 7.

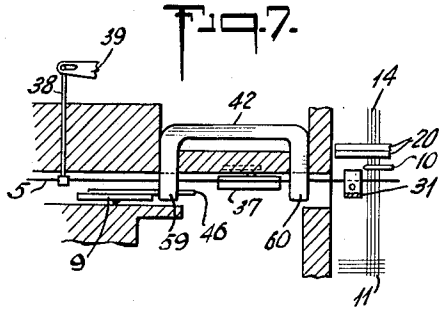


Fig. 9.

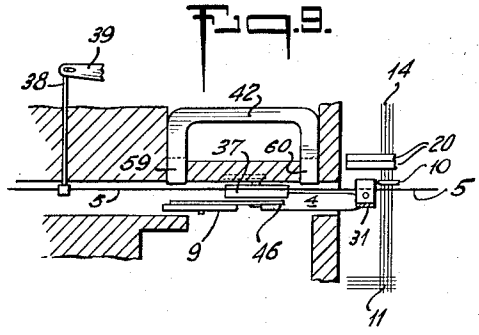


Fig. 10.

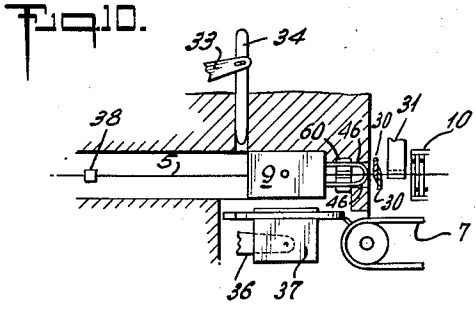
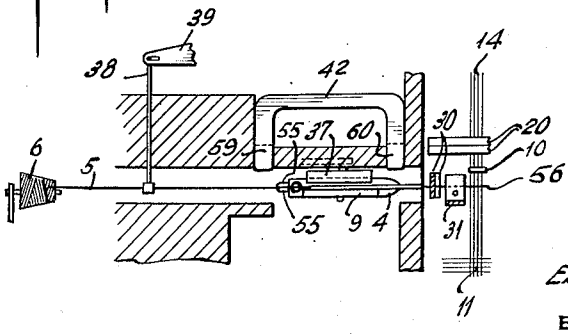


Fig. 11.



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GRIPPER-SHUTTLE LOOM

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Fig. 12.

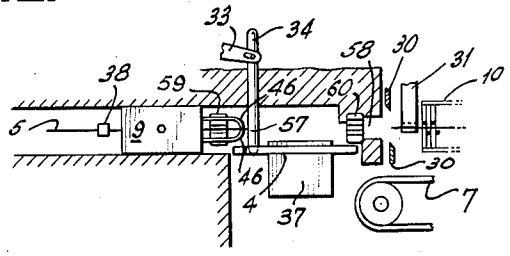


Fig. 13.

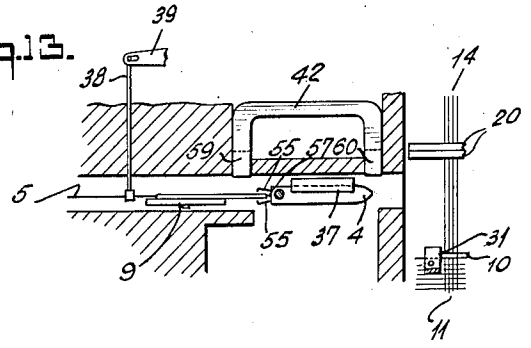


Fig. 14.

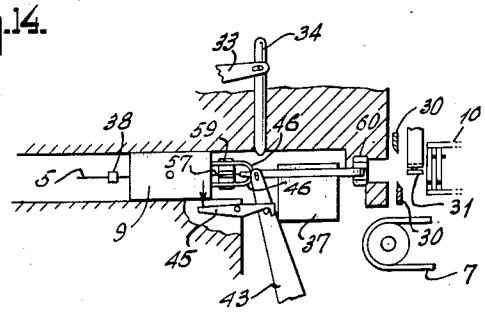
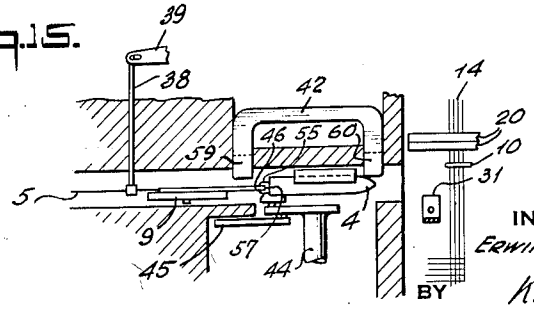


Fig. 15.



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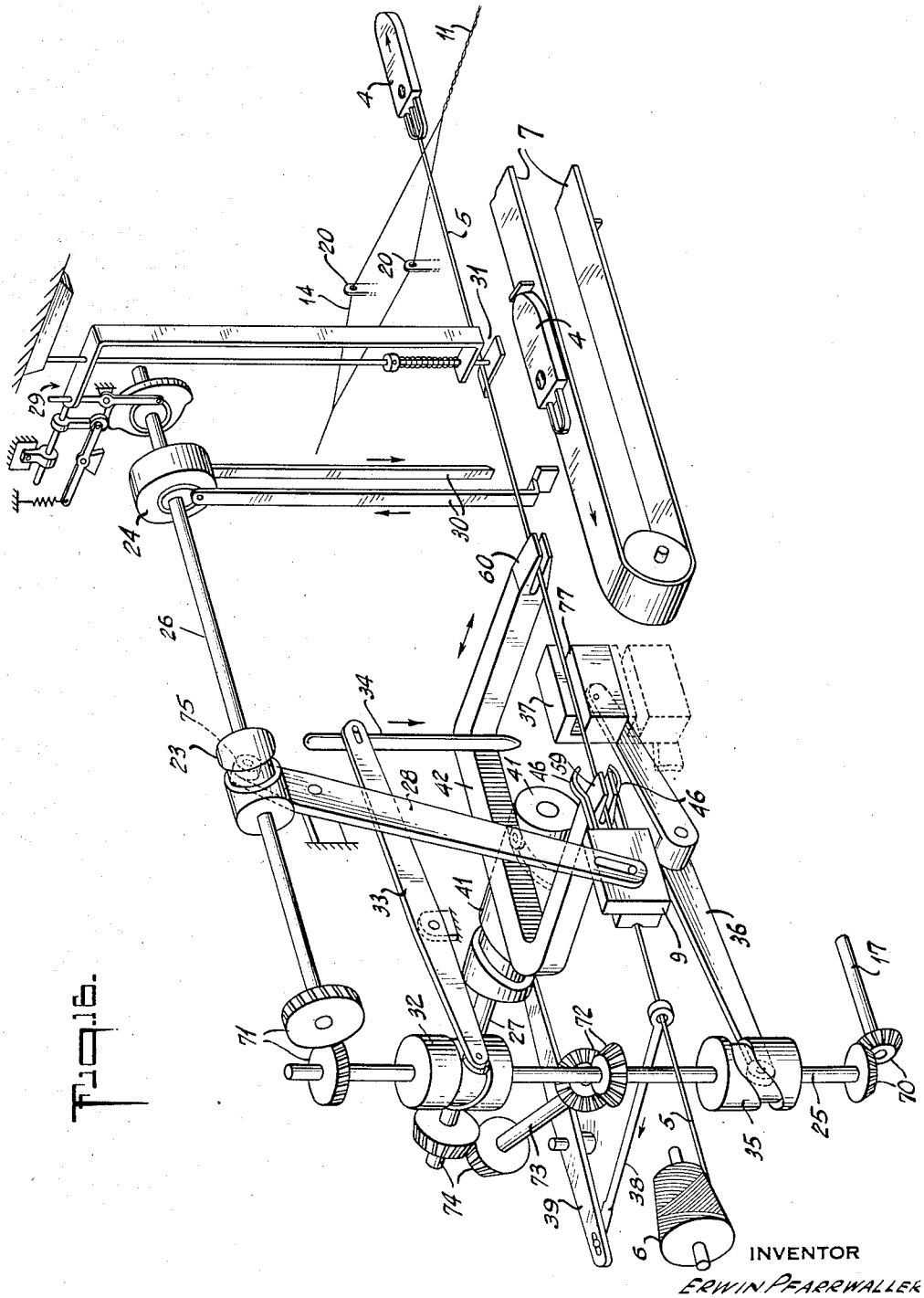


Fig. 16.

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UNITED STATES PATENT OFFICE

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GRIPPER-SHUTTLE LOOM

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Application June 3, 1948, Serial No. 30,795
In Switzerland June 5, 1947

5 Claims. (Cl. 139—126)

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The invention relates to a method of weaving on gripper-shuttle looms with weft thread bobbins located outside of the shed and to a device for performing the method.

Looms of this kind comprise a gripper mechanism which grips a weft thread, after it has been inserted in the shed at the side of the shed at which the thread has entered the shed. Thereupon the thread is severed between the gripper and the shed, and the end of the thread which is held by the gripper and which is still connected with the bobbin is carried back, i. e. toward the bobbin, by the gripper to be connected with a shuttle which is subsequently picked through the shed. After completion of transfer of the thread end to a new shuttle, the grippers must be returned to the side of the shed for gripping the thread after its insertion in the shed. If the grippers are moved away from the side of the shed and returned thereto in a line which coincides with that in which the shuttle is picked, the grippers must be held wide open after they have fed the thread end to the new shuttle and during their return to the side of the shed, to provide free passage for the thread which is being pulled through the shed by the shuttle, or the grippers must be moved out of the way of the thread, as is done, for example, in the mechanism disclosed in Patent No. 2,420,380 to A. Moessinger.

The object of the present invention is to provide a method and means for moving the weft thread out of the way of the grippers of a mechanism for transferring the end of a weft thread, which is still connected with the bobbin from which the thread unwound during the previous pick, to a new shuttle for a subsequent pick, at least during the time when the grippers, after feeding the thread end to a new shuttle, move back to the side of the shed.

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

In the drawings:

Fig. 1 is a diagrammatic illustration of a loom viewed toward the cloth beam;

Fig. 2 is an elevational diagrammatic view of the mechanism according to the invention, the casing or frame means for supporting the mechanism being shown in section, and the mechanism being in the position just after a pick;

Fig. 3 is a diagrammatic top view of the mechanism according to the invention in the position shown in Fig. 2; here, too, the frame supporting the mechanism is shown in section;

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Fig. 4 is a side view of the thread gripper of the weft thread positioning device according to the invention;

Fig. 5 is an end view of the thread gripper shown in Fig. 4 and illustrates also an end of the gripper opener according to the invention in the position ready to be inserted between the jaws of the gripper for opening same;

Fig. 6 is a diagrammatic elevational view of the mechanism according to the invention in the position in which the weft thread is moved laterally away from the gripper of the weft thread positioning device, making the device ready for closing the gripper of the weft thread transfer device and moving it toward the shed;

Fig. 7 is a plan view of the mechanism in the position shown in Fig. 6;

Fig. 8 is a diagrammatic elevational view of the mechanism according to the invention in the position after closing of the gripper and moving it about half-way toward the shed;

Fig. 9 is a plan view of the mechanism in the position shown in Fig. 8;

Fig. 10 is a diagrammatic elevational view of the mechanism according to the invention in the position after the gripper of the thread transfer device has been opened, the weft thread moved thereinto, and the gripper closed and the weft thread cut between the gripper and the side of the shed;

Fig. 11 is a plan view of the mechanism in the position shown in Fig. 10;

Fig. 12 is a diagrammatic elevational view of the mechanism according to the invention in the position in which the thread transfer device holding the end of a thread has been returned to the position where the thread end is transferred to a shuttle;

Fig. 13 is a plan view of the mechanism in the position shown in Fig. 12;

Fig. 14 is a diagrammatic elevational view of the mechanism according to the invention in the position after the grippers of a gripper-shuttle have been closed upon a thread end still held by the gripper of the thread transfer device;

Fig. 15 is a plan view of the mechanism in the position shown in Fig. 14;

Fig. 16 is a diagrammatic perspective showing of the mechanism according to the invention in the position illustrated in Figs. 2 and 3.

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

Referring more particularly to Fig. 1, the loom is driven by a motor and gears located in a housing 1. Shuttles 4 with threads 5 attached thereto and unwinding from bobbins 6 are picked by a picking mechanism in housing 2 from the left side of the loom into a shuttle receiving mechanism in a housing 3 at the right side of the loom and are returned therefrom by a conveyor 7 to the picking mechanism after the threads have been disconnected from the shuttles. After a weft thread has been inserted in the shed of warp threads 14 unwinding from a warp beam 15, the weft thread is held by grippers to be described later at the left side of the shed, where it entered the shed, and is severed between the grippers and the shed. Thereupon it is beaten up in the conventional manner by a reed 10 forming cloth 11, which moves over a breast beam 12 and is wound on a cloth beam 13. Shedding is effected in the conventional manner by heddles 29. The loom comprises a main shaft 17 which is driven normally by the motor and gears in housing 1, but can be operated by hand by means of a hand wheel 16. Manipulation of handles 18 effects connection (or disconnection) of the loom motor with the main shaft. The last mentioned means are conventional and not part of the present invention and are therefore not shown in detail.

The mechanism according to the invention receives its drive from main shaft 17 by means of bevel gears 70 which rotate a shaft 25. At the top end of this shaft, as seen in Fig. 2, is a helical gear 71 meshing with a gear connected to and driving shaft 26. Shaft 25 also drives a horizontal shaft 27, which extends at a right angle to shafts 25 and 26 and is seen in Fig. 3, by means of bevel gears 72, an intermediate shaft 73, and bevel gears 74. Numeral 9 designates a reciprocatingly movable thread transfer mechanism which is illustrated per se in Figs. 4 and 5 and which is movably connected to one end of a two-arm lever 28 whose other end carries a cam follower 75 inserted in a groove in cam 23 which is connected to and rotated by shaft 26 and shown in Fig. 2. Lever 28 is oscillated upon rotation of cam 23 for reciprocating movement of mechanism 9. Shaft 26 also drives a mechanism 24 for operating a thread cutter 30 and a machanism 29 for operating a thread gripper 31 of a selvage forming device. A weft thread cutting device may be used, for example as shown in Patent No. 2,420,380 to A. Moessinger, and a thread gripper may be used as disclosed in Patent No. 2,389,808 to A. Moessinger.

The shuttles of looms of the type to which the present invention is applied have clamps or grippers for connecting to the shuttle the end of the weft thread to be inserted. Such a shuttle is shown in the Patent No. 2,090,703 to R. Rossmann and Patent No. 2,163,760 to A. Moessinger. The prongs of the grippers of such shuttles are normally closed and are spread apart by a thorn or rod for opening the clamp to receive a thread. Numeral 34 designates such an opener for the grippers on a gripper-shuttle 4, the opener being reciprocatingly moved toward or from the position of the grippers of a shuttle ready to receive a new thread. Rod 34 is vertically slidable in a guide 76 in the housing for the mechanism according to

the invention and is movably supported on one end of a two-arm lever 33 whose other end carries a cam follower inserted in a groove on cam 32, which cam is fixed to shaft 25.

The shuttles, which are returned on conveyor 7 from a shuttle receiving station at the right side of the loom shown in Fig. 1, are lifted to the position in which a weft thread can be attached thereto by a lifter 37. This lifter has a slot 77 for receiving a shuttle arriving on conveyor 7 when the lifter is in its lowest position, as illustrated in Fig. 8. The lifter is reciprocatingly moved up and down by an arm of a two-arm lever 36 to the end of which it is movably connected. The other end of lever 36 carries a cam follower engaging a groove on cam 35 which is fixed to shaft 25.

The weft thread running off bobbin 6 passes through an eye at the end of a reciprocatingly movable horizontal rod 38 guided in the housing of the mechanism according to the invention. Rod 38 is movably connected with one end of a two-arm lever 39 whose other end carries a cam follower engaging a groove in cam 40 which is fixed to horizontal shaft 27.

The thread transfer device 9 is provided with grippers consisting of two flexible prongs 46, the free ends of which are normally yieldingly pressed together. For opening the grippers either leg 59 or leg 60 of a horizontal U-shaped opening member 42 is inserted between the prongs 46. The legs of member 42 are reciprocatingly movably guided in the casing of the mechanism according to the invention, and the bottom carries a cam follower inserted in a groove of cam 41 which is fixed to shaft 27.

When a thread has been fed to the shuttle, the later is picked by a picking mechanism comprising a picking lever 43 mounted on a torsion spring rod 44 and periodically retained in tensioned position by a catch 45 when waiting for the next shuttle to be picked. Such a mechanism is disclosed in Patent No. 2,160,338 and No. 2,160,339 to A. Moessinger. It does not form part of the present invention, and for this reason no detailed showing is made.

The weft transfer device 9 according to the invention, whose drive has been described supra, comprises a plate 9' from one side of which projects a pin 52 inserted in an elongated hole in one end of lever 28. On the other side of the plate is a protuberance 47 to which the gripper members 46 are rigidly connected. A groove 50 is provided in the protuberance accommodating a thread 5 when it is in line with the gripping point of the prongs 46. The ends of legs 42 of the opener for prongs 46 are wedge-shaped having sloping surfaces 49 for facilitating insertion between the prongs by movement in the direction of arrow 48. The legs have a longitudinal slot 51 at their ends, accommodating a weft thread when it is laterally displaced from groove 50.

Figs. 2 and 3 show the mechanism according to the invention in a position just after a shuttle 4 has been picked. Jaws 46 are held open by leg 59 of the opening means 42, and the thread moves freely in groove 50, slot 51, and jaws 46. After the moment illustrated in Figs. 2 and 3, the thread guide 38 is moved to displace thread 5 laterally out of groove 50 into the position shown in Fig. 7, in which the thread is also laterally clear of the prongs 46. This displacement of thread 5 is supplemented by the movement of the selvage thread gripper 31 (upward in Fig-

ures 3 and 7), which is driven by the same shaft (25) as guide 38. The opener for the jaws 46 can now be removed into the position shown in Fig. 9, and the jaws be closed, and the thread transfer device 9 moved toward the shed formed by warp threads 14.

At the same time, shuttle lifter 37 has been lowered to the position shown in Figs. 6 and 8 for receiving a shuttle 4 returned on conveyor 7.

When grippers 46 have reached a position adjacent to the thread cutter 30, as shown in Figs. 10 and 11, opener 42 is returned toward the device 9 and, this time, leg 60 is inserted between the prongs 46 for opening the gripper. The weft thread displacing means 38 and clamps 31 can now move thread 5 into the gripping range of jaws 46, and the latter can be closed by removing the opener into the position shown in Fig. 11. (Note the difference in the position of thread 5 in Fig. 9 and in Fig. 11!) The thread is now firmly held by grippers 31 and 46, and the portion 56 of the thread which is in the shed can be severed by cutters 30 from the portion coming from bobbin 6. The end of the latter portion is held by grippers 46, and device 9 can now be returned to the position where it can be connected to the next following shuttle, which position is illustrated in Figs. 12 and 13. Shuttle lifter 37 at the same time raises a shuttle 4, and opener 34 is inserted between the jaws 55 of the gripper which is attached to the shuttle and opens said jaws which can now pass the grippers 46 of the thread transfer device 9, so that the shuttle can be elevated to the position from which it is picked and in which the thread end 57 is within reach of grippers 55. This operation is similar to that illustrated in Patent No. 2,163,760 to A. Moessinger.

Upon withdrawal of member 34, the shuttle grippers 55 close on the thread end 57 which is held in suitable position by the device 9. This situation is illustrated in Figs. 14 and 15. Grippers 46 can now be opened by insertion of leg 59 of opener 42. Thereupon the shuttle with a thread connected thereto can be picked and the device is once more in the position shown in Figs. 2 and 3.

I claim:

1. The method of weaving on gripper shuttle looms, comprising the steps of inserting a weft thread in the shed by picking a shuttle to which the thread has been connected through the shed, gripping the weft thread at the side of the shed where the shuttle entered the shed, severing the weft thread between the shed and the point where the thread has been gripped, moving the portion of the thread which has not been inserted in the shed away from the shed to make room for the shuttle which is next to be picked through the shed, connecting the thread to the shuttle, and laterally displacing a portion of the thread proximal to the shed while the thread is inserted in the shed for making room for performing said gripping step.

2. In a gripper-shuttle loom having a weft bobbin spaced from the shed, a thread cutter disposed near the shed, a thread transfer means reciprocable along a portion of the path of the thread between the bobbin and the thread cutter for moving the cut thread toward the bobbin and connecting it to the shuttle: thread displacing means, and actuating means connected with said thread transfer means and with said displacing means for coordinated operation thereof and so constructed as to displace the thread out of the path of said transfer means when the latter moves toward the shed.

3. In a gripper-shuttle loom having a weft bobbin spaced from the shed, a thread cutter disposed near the shed, a thread transfer means reciprocable along a portion of the path of the thread between the bobbin and the thread cutter and having a thread gripper for gripping the cut thread and moving it toward the bobbin and connecting it to the shuttle: a gripper opener adapted to be temporarily inserted in said gripper for opening same, a thread displacing means, and actuating means connected with said transfer means, said opener, and said displacing means, and being so constructed as to insert said opener in said gripper at both dead-end positions of said transfer means and to displace the thread out of the path of said thread gripper when the latter is moved toward the shed after it has transferred a thread to the shuttle and to return the thread to the gripper when the latter has opened in its dead-end position distal to the bobbin.

4. In a gripper-shuttle loom as defined in claim 3, said gripper having resiliently closed jaws, and said opener being inserted between said jaws when connected with said gripper for opening same, and having slot means receiving the thread when it is displaced out of the path of the gripper.

5. In a gripper-shuttle loom as defined in claim 3, said gripper having resiliently closed jaws, and said opener having the shape of a two-pronged fork forming a wedge adapted to be inserted between said jaws for opening same and receiving the thread between the prongs when the thread is displaced out of the path of the gripper.

ERWIN PFARRWALLER.

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The following references are of record in the file of this patent:

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