June 17, 1930. W. NICOLET 1,764,577

MEANS FOR WEAVING FABRICS

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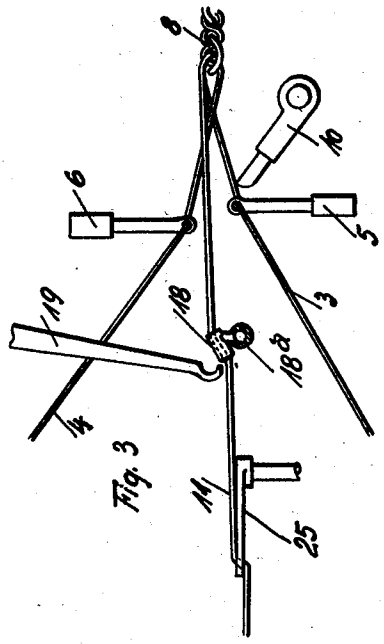


Fig. 3

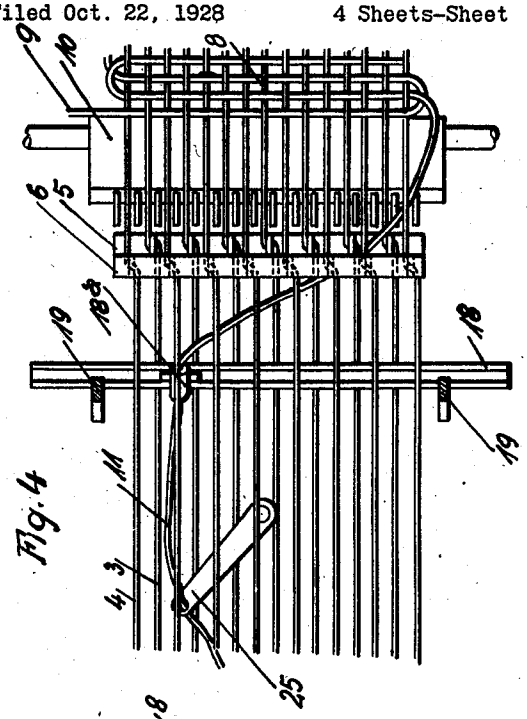


Fig. 4

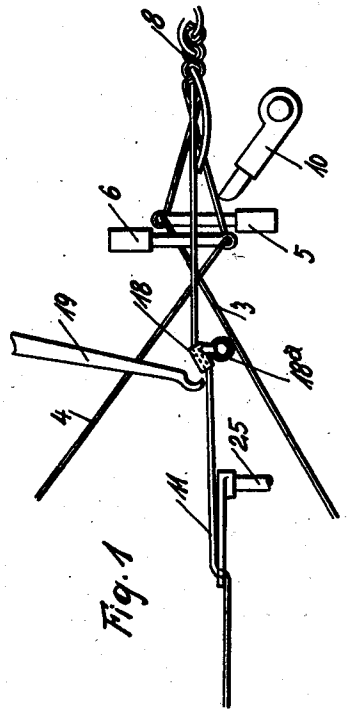


Fig. 1

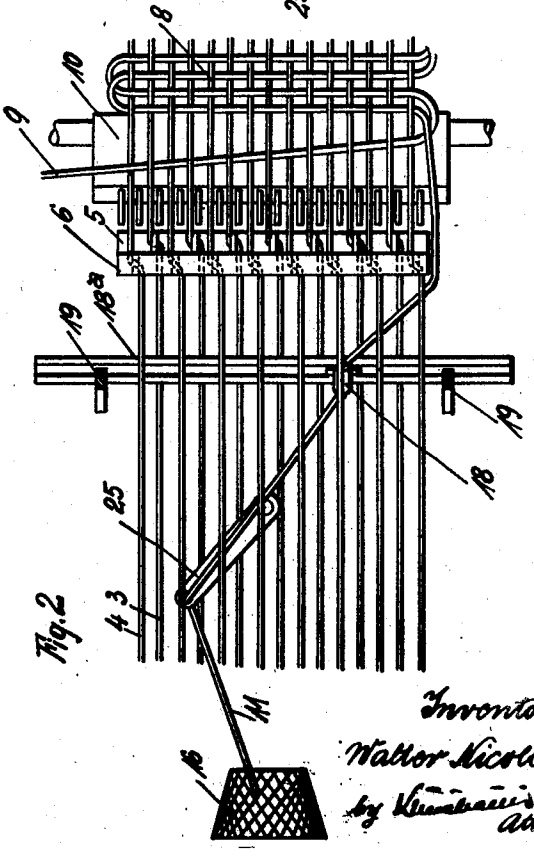


Fig. 2

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MEANS FOR WEAVING FABRICS

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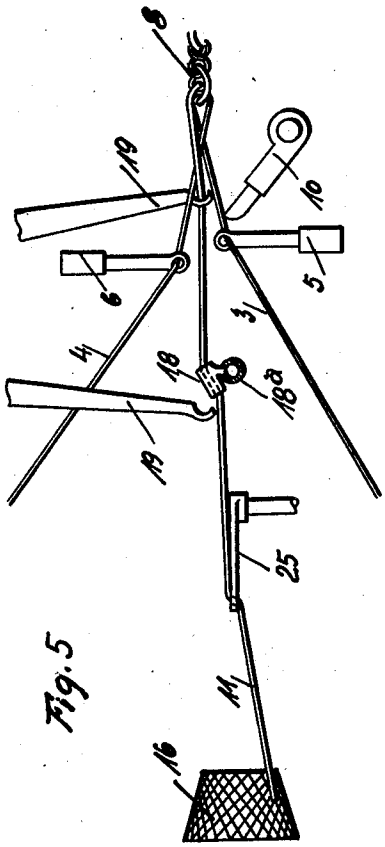


Fig. 5

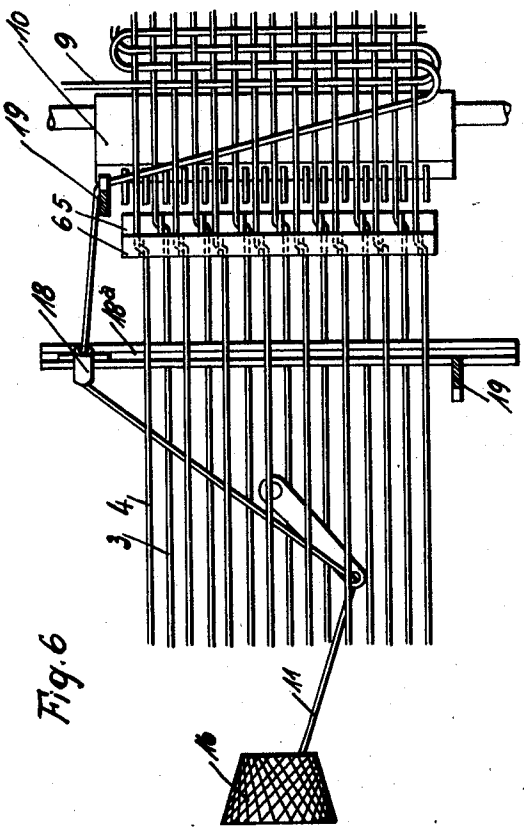


Fig. 6

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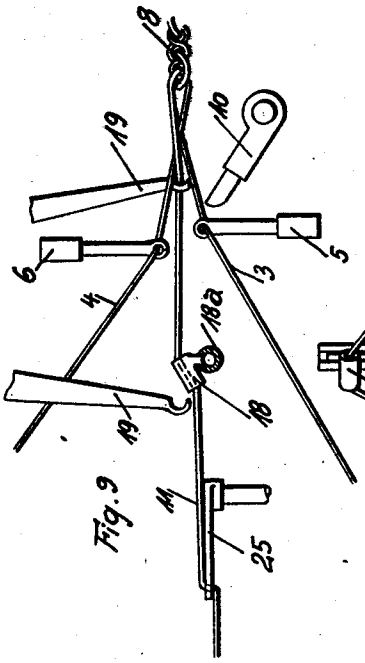


Fig. 9

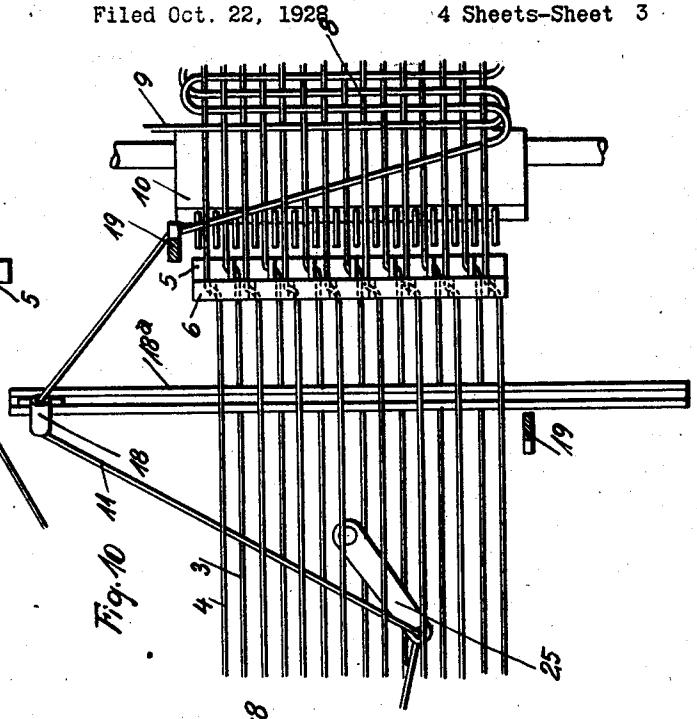


Fig. 10

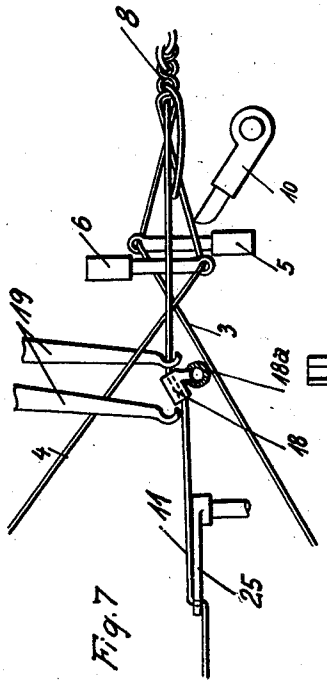


Fig. 7

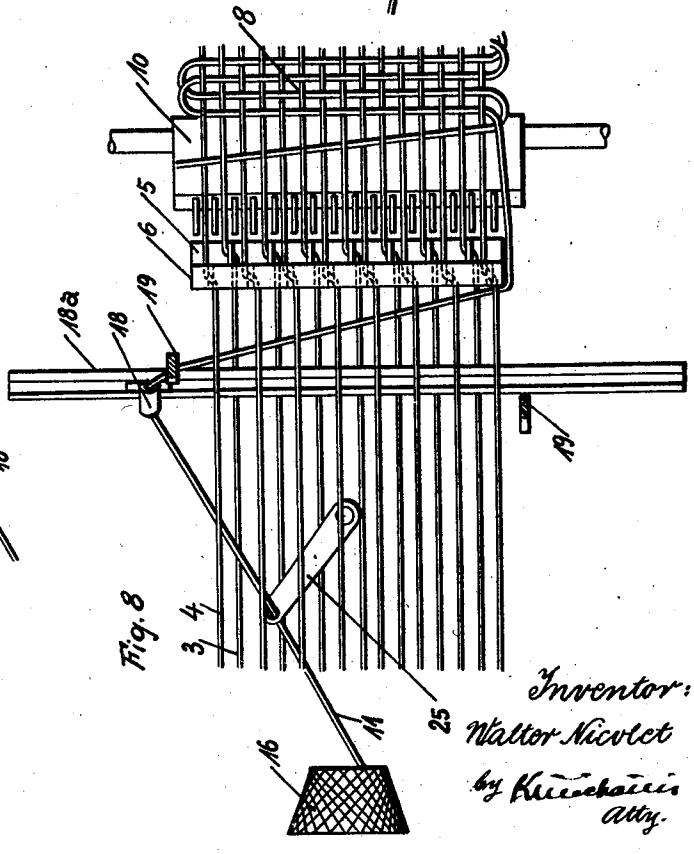


Fig. 8

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Fig. 11

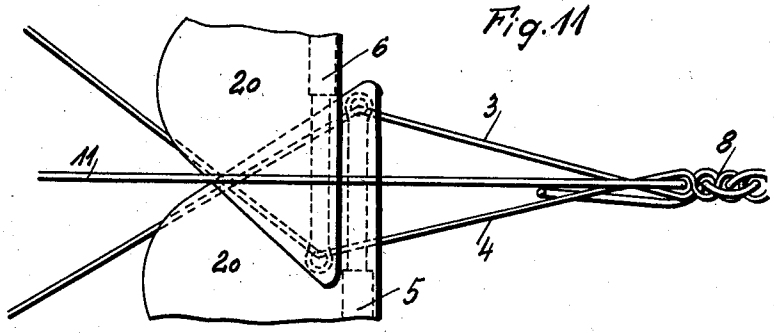


Fig. 12

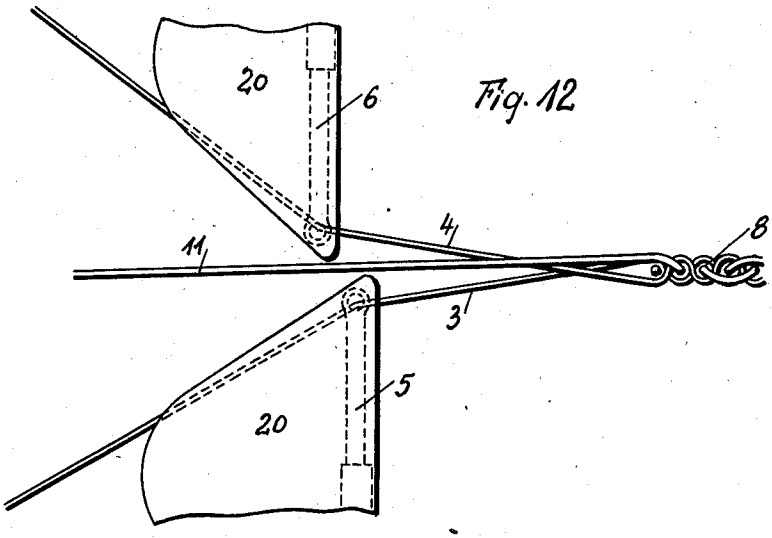
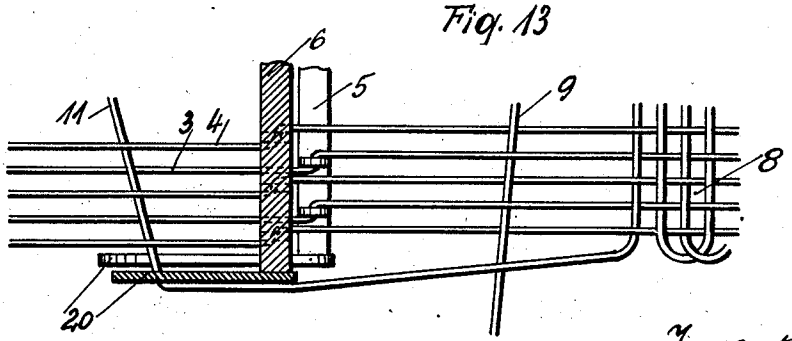


Fig. 13



Inventor:
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Patented June 17, 1930

1,764,577

UNITED STATES PATENT OFFICE

WALTER NICOLET, OF LEIPZIG, GERMANY

MEANS FOR WEAVING FABRICS

Application filed October 22, 1928, Serial No. 314,278, and in Germany October 24, 1927.

My invention refers to the art of weaving and more especially to the method and means disclosed in my copending applications for patent of the United States, Serial Nos. 73,718, filed December 7, 1925, 194,382, filed May 26, 1927 and 200,650, filed June 22, 1927. The present invention is an improvement upon the methods and means disclosed and sought to be protected in the above mentioned applications and has for its particular object to prevent failure in the operation and a correct cooperation of the threads in forming the fabric.

According to the weaving method disclosed in my patent application aforesaid No. 73,718, two groups of warp threads, one of which may extend at an angle to the other, are operated upon to form two sheds, a closed shed and an open shed to the rear of such closed shed, a weft thread being passed simultaneously or one after the other through each shed. In the operation of this method, the weft entered in the closed shed is cast on first and after the shedding members have then been operated to open the closed shed, and extending the open shed up to the fabric, the weft thread entered in the permanently open shed is cast on open. The threads of both groups of warp threads are guided in holes provided in the teeth of a pair of shedding members, one for each group, which move in parallel relative to each other. The casting on of the weft threads is effected by means of reciprocating reeds, the weft threads being entered in the sheds in any desired manner, for instance into the open shed from a stationary bobbin by means of a thread guide reciprocating in the open shed transversely to the warp. The end of this weft thread which adjoins the fabric extends in parallel to the warp threads and laterally thereof, and the weft thread then extends at an angle to the warp threads. Obviously this oblique position of the rear weft relative to the warp threads is disadvantageous as regards a proper action of the reed. Therefore, means must be provided for carrying the weft thread forward towards the fabric before the thread is cast on, these means being arranged sideways of the warp threads and gripping the weft entered in the shed, behind the thread guide and pushing or pulling it forward.

It has now been found, that the whole of the weft thread extending between the warp threads can be transferred from the oblique position into the position at right angles to the warp threads only if the weft thread is taut. If the thread is not sufficiently taut the action of the forward carrying means will only result in the weft thread extending between the warp threads in a curved line and in this case it will happen very frequently that the reed is unable to fully catch the curved weft thread, whereby parts of this thread will be left behind, and in the next following shedding operation will prevent the formation of a correct shed.

I have found that in order to insure correct operation, it is imperative that the weft thread extending between the warp threads be placed entirely in front of the reed and be kept as taut as possible. I obtain this according to the present invention by causing the shedding members to move apart allowing the rear weft thread to pass through between them, before the weft thread guide has completed its course between the warp threads. When the weft thread now continues its course, the weft thread which at first extends from the fabric over the point of crossing of the warp threads at an angle towards the thread guide is tightened and will now extend from the fabric to the thread guide in a straight line.

In order further to keep the rear weft thread taut also during the operation of the forward carrying means, and to place it in front of the reed in taut condition, I cause the thread guide, while the forward carrying means are operated to carry out an additional lateral movement so that the weft thread is tightened simultaneously by the thread guide and by the forward carrying means.

Alternately the thread guide may remain stationary while the forward carrying means are operated, and a separate tightening

means may be provided which is set operating during the operation of the forward carrying means.

In the drawings affixed to this specification and forming part thereof, the new weaving method and the means for carrying same into effect are illustrated diagrammatically by way of example.

Figs. 1 and 2 being a side elevation and plan view respectively of the parts of a loom as disclosed in my copending applications for patent aforesaid, a weft thread being introduced into the rear open shed.

Figs. 3 and 4 are similar views of the parts, in which however the closed shed has been opened and the weft thread guide has continued its course, part of the weft thread passing through between the shedding members.

Figs. 5 and 6 are similar views showing the parts in the position where the weft thread, while being carried forward towards the fabric, is tightened, both by the action of the thread guide and separate tightening means.

Figs. 7 to 10 illustrate a different mode of operation, Figs. 7 and 9 being side elevations and Figs. 8 and 10 plan-views of parts of a similar loom, in which however the operation of the parts is so timed that the shedding members move apart only after the thread guide has completed its course between the warp threads.

Figs. 11 to 13 illustrate auxiliary means for guiding the weft thread while it is being introduced into the open shed, Figs. 11 and 12 being side elevations drawn to a larger scale of the shedding members, while Fig. 13 is a plan view.

Referring to the drawings and first to Figs. 1 to 6, 3 and 4 are the two groups of warp threads, and 5 and 6 are the two reciprocating shedding members, through holes in the teeth of which the warp threads extend, being so arranged as to diverge from the shedding members to the rear in the direction of the warp beams (not shown). In consequence of this arrangement, when the two shedding members 5 and 6 are drawn apart, as shown in Fig. 3, the two groups of warp threads extend at an angle from the fabric or on the other hand, if the two shedding members 5 and 6 are moved towards each other, the groups of warp threads 3 and 4 are crossed, the apex of the angle formed by the warp threads being now positioned in the line of crossing of the warp threads and to the rear of the shedding members. There is now formed a closed or front shed in front of the shedding members and an open or rear shed to the rear of the shedding members and to the line of crossing. (Fig. 1). In these two sheds weft threads are now entered, the weft thread 9 in the closed or front shed, the weft thread 11 in the open or rear shed.

The entering of the weft thread 11 in the rear shed is effected from a stationary weft bobbin 16 by means of a thread guide 18. This thread guide may be of any desired kind; in the present case it is shown as consisting of an eye-shaped hook guided in a slotted tube 18^a by a cord or chain (not shown). During the entering of the weft thread 11 by the thread guide 18 the weft thread 11 in its portion adjoining the fabric extends sideways of the warp threads and substantially in parallel to them as far as the crossing line (Fig. 2), and from this line to the thread guide 18 obliquely to the warp threads. On each side of the warp threads and to the rear of the tube 18^a is arranged a hook-shaped rock lever 19 forming a forward carrying means. Whenever the thread guide 18 has moved past one of these rock levers 19, this lever will rock and in doing so will grip the weft thread at a point to the rear of the thread guide 18, carrying it forward towards the fabric and in reach of the reed 10.

If the two shedding members 5 and 6 are moved apart, thereby opening the closed shed, only after the weft thread guide had come to a standstill, the weft thread would extend in the shed in an irregular line and the rock lever would not be able to carry it forward in taut condition. In order to prevent this, the movements of the shedding members 5 and 6 and of the thread guide 18 are so timed, that the shedding members move apart, while the thread guide 18 is still on its course between the warp threads. After the closed shed has been opened (Figs. 3 and 4) the weft thread can now pass through between them. On the thread guide 18 continuing its course, first the angle formed in the weft thread at the crossing line (Fig. 2) will disappear, the weft thread 11 being tightened and now extending in a straight line, but obliquely to the warp threads from the fabric to the thread guide in order to permanently keep it taut, while the rock lever 19 advances to carry it forward towards the fabric, the thread guide 18 continues moving also after rock lever 19 has gripped the weft thread, until this lever has reached its end position, having carried the weft thread in reach of the reed (Fig. 6). The reed 10 on starting in its casting on operation now meets the taut weft thread so that the casting on can be correctly effected.

As shown in Figs. 1 to 6, the shedding members may be moved apart and the closed shed may be opened while the weft thread guide 18 is still between the warp threads (Fig. 4). The shedding members may however also be actuated in such manner as to move apart only after the weft thread guide

has already passed through between the warp threads and has reached the other side. This later case is illustrated in Figs. 7 to 10, which does not need any further explanation.

The later the shedding members are moved apart, the longer will be the distance through which the weft thread guide must be moved after the thread has been fully entered between the warp threads as best shown by comparing Figs. 6 and 10. On the other hand, if the shedding members 5 and 6 are moved apart too soon, it may happen, that the weft thread moves forward too soon also, getting partly in the path of the reed returning from the preceding casting on operation, whereby the weft thread may be forced by the reed downwardly across the lower group of the warp threads, thus disturbing the next following shedding operation.

If a further motion of the thread-guide 18 after having passed the warp threads is not desirable or possible, a special means for tightening the weft thread may be provided, e. g. a rocking lever 25 which stretches the weft thread during its forward movement.

Obviously the weft thread 11, as long as it extends at an angle from the fabric to the thread guide, will exert on the outermost warp threads a considerable tension at the crossing point, and this tension may cause either the weft thread or the outermost warp threads to be torn. In order to prevent this I prefer mounting on the ends of the shedding members 5 and 6 guards 20, which may be made of sheet metal or the like, the front edges of the guards of a pair disposed on one side of the warp threads, which are averted from the fabric, being tapered at an angle which may be substantially the same as the angle of the crossed warp threads so that they extend substantially in parallel to the crossed warp threads. I prefer arranging these edges somewhat farther away from the fabric than the crossed warp threads, so that the weft thread 11 will not be in a position to come in contact with the warp threads at their crossing point, but will rest between the crossed edges of the guards 20. On the shedding members being moved apart the crossing point of the edges of the guards will move together with the crossing point of the warp threads towards the shedding members 5 and 6 and the weft thread 11 will be retained by and glide on the smooth edges of the guards until these guards have moved apart also. Owing to the circumstance that the guards do not cross when the closed shed is opened, the weft thread 11 is now enabled to freely move towards the fabric without coming in contact with the warp threads.

Obviously instead of using full sheet metal guards or the like, I might also use ordinary wires or the like for preventing the weft thread from jumping forward too soon.

I wish it to be understood that I do not desire to be limited to the exact details of construction shown and described for obvious modifications will occur to a person skilled in the art.

In the claims affixed to this specification no selection of any particular modification of the invention is intended to the exclusion of other modifications thereof and the right to subsequently make claim to any modification not covered by these claims is expressly reserved.

I claim:

1. The method of weaving which comprises moving the warp threads so as to form in each alternate operation two sheds, a closed shed and an open shed to the rear of said closed shed, causing a weft thread to enter said closed shed and another weft thread to enter said open shed, casting on the first mentioned weft thread, causing the warp threads to move relative to each other so as to open the closed shed and extend the open shed up to the fabric before the rear weft thread has reached the end of its course, carrying the second mentioned weft thread forward towards the fabric into casting-on position, causing said weft thread to be carried forward in the direction towards the fabric while it is still on its course, and simultaneously tightening it and casting it on.

2. Loom comprising means for moving the warp threads so as to form in each alternate operation two sheds, a closed shed and an open shed to the rear of said closed shed, means for entering weft threads in both said sheds, means for causing the warp threads to move relative to each other and for opening the closed shed before the weft thread has been fully entered in said open shed, and means for carrying this weft thread forward in the direction towards the fabric while said thread is still on its course.

3. Loom comprising means for moving the warp threads so as to form in each alternate operation two sheds, a closed shed and an open shed to the rear of said closed shed, means for entering weft threads to both said sheds, means for causing the warp threads to move relative to each other and for opening the closed shed before the weft thread has been fully entered in said open shed, means for carrying this weft thread forward in the direction towards the fabric while said thread is still on its course and means for retaining said weft thread during the carrying forward.

4. Loom comprising means for moving the warp threads so as to form in each alternate

operation two sheds, a closed shed and an open shed to the rear of said closed shed, means for entering weft threads in both said sheds, means for causing the warp threads to move relative to each other and for opening the closed shed before the weft thread has been fully entered in said rear shed, and weft thread retaining means at the ends of said shedding members.

5. Loom comprising means for moving the warp threads so as to form in each alternate operation two sheds, a closed shed and an open shed to the rear of said closed shed, means for entering weft threads in both said sheds, means for causing the warp threads to move relative to each other and for opening the closed shed before the weft thread has been fully entered in said open shed, and weft thread tightening means at the ends of said shedding members, said retaining members extending substantially in parallel to the crossed warp threads and crossing each other at some distance from the crossing plane of said warp threads.

6. Loom comprising means for moving the warp threads so as to form in each alternate operation two sheds, a closed shed and an open shed to the rear of said closed shed, means for entering weft threads in both said sheds, means for causing the warp threads to move relative to each other and for opening the closed shed before the weft thread has been fully entered in said open shed, and triangular weft thread retaining means at the ends of said shedding members.

In testimony whereof I affix my signature.

WALTER NICOLET.