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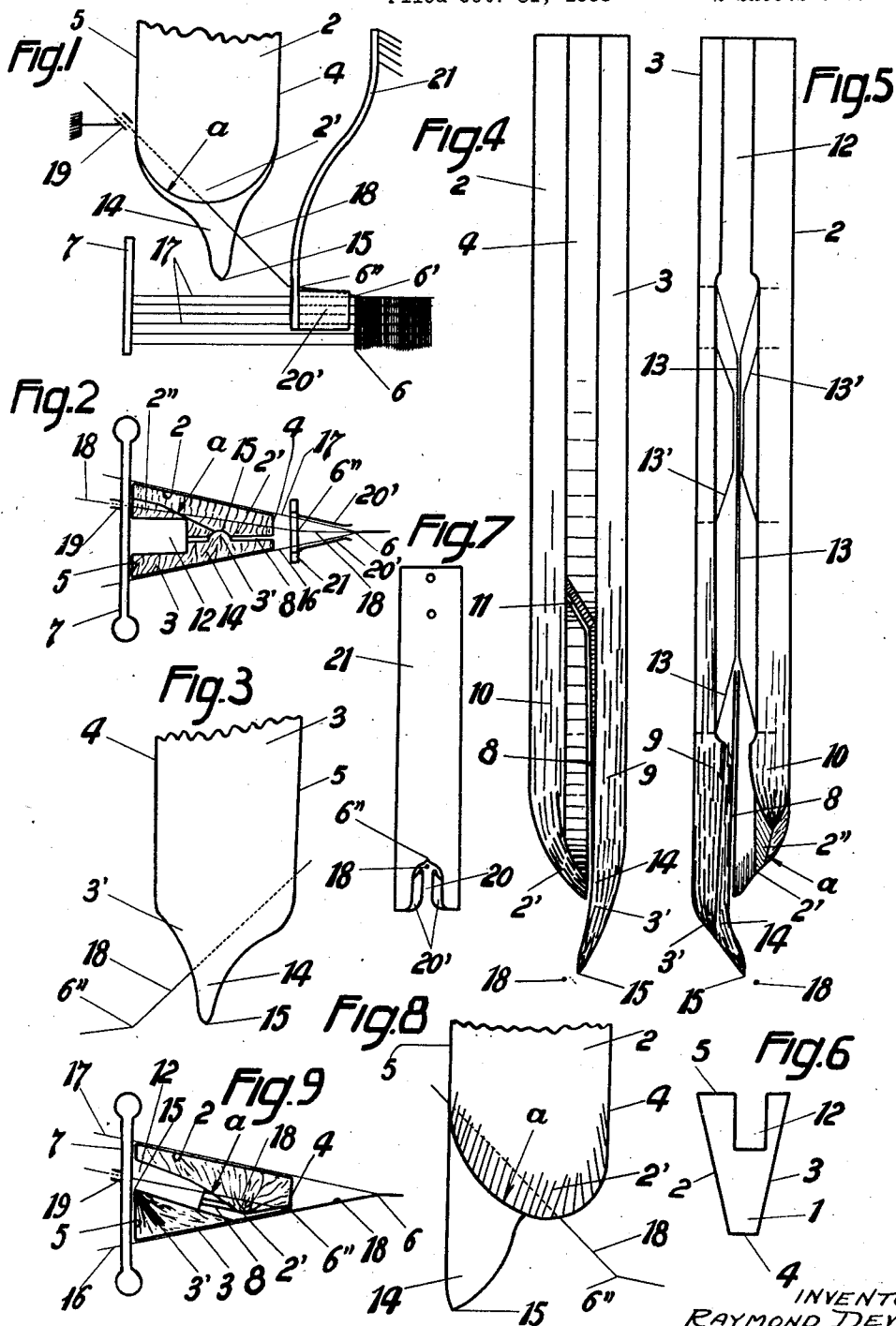
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PIRNLESS SHUTTLE FOR WEAVING LOOMS

Filed Oct. 31, 1933

2 Sheets-Sheet 1



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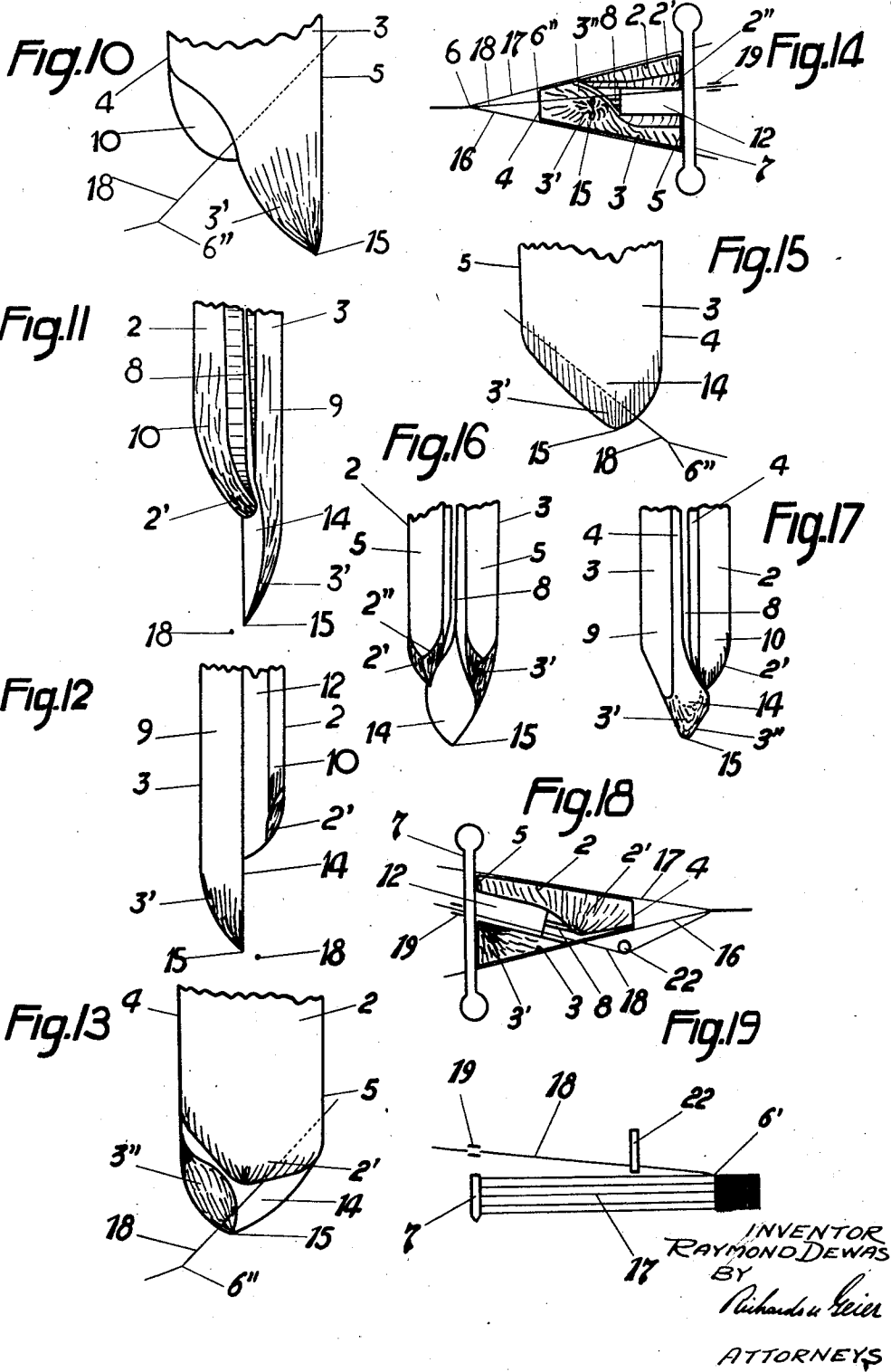
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UNITED STATES PATENT OFFICE

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PIRNLESS SHUTTLE FOR WEAVING
LOOMS

Raymond Dewas, Amiens, France

Application October 31, 1933, Serial No. 695,996
In France November 12, 1932

10 Claims. (Cl. 139—125)

This invention relates to improvements in pirnless shuttles of the kind described in my prior applications for patents filed respectively on May 31, 1933, Ser. No. 673,672 and June 17, 1933, Ser. No. 676,251, said improvements enabling the shuttle, which has been improved, to be used equally well in all kinds of looms. In ordinary looms, in which shuttles with pirns are employed, it is known that, when the shuttle traverses the shed, that is to say when it traverses the free space left between the reed, the fell of the cloth and the upper and the lower sheet of the divided warp sheet, it happens more or less often that the shuttle encounters warp threads which obstruct the shed and belong to the upper or the lower sheet, said threads being displaced sideways either to one side or the other by the point of the shuttle.

In looms where pirnless shuttles are employed the kind described in my above mentioned applications, and in which the shed is of much reduced dimensions, these slack threads are a serious inconvenience, because the pirnless shuttle or weft inserter has no point but, on the contrary, has in its place a slot which separates the two branches of the rider which forms the shuttle, said slot being intended to receive, on entering the shed, the weft thread to be passed through, with the result that the slack warp threads enter the slot, and are either cut or broken.

The present invention has for its object to eliminate this disadvantage and consists:—

(a) In shaping the end of this kind of shuttle which is formed like a rider, in such a way that the slack threads are pushed aside by the shuttle itself during its travel through the shed; it being understood that in the case of shuttles which pass through the shed in either direction, the two extremities of the said shuttles will be shaped alike.

(b) In presenting the weft thread which is stretched across the entrance to the shed so as to be caught and carried along by the shuttle, in such a way that it is not pushed to one side or the other of the shuttle, as are the slack warp threads.

This shaping of the ends of pirnless shuttles of the kind described in the above mentioned patent applications, in combination with the arrangement of the weft thread at the entrance to the shed, together with other minor improvements which assist to ensure perfect functioning, constitute the purpose of the present invention which is described hereinafter and illustrated diagrammatically in the attached drawings which

show four different forms of application, although obviously other forms of application of the invention also are possible within the same combination.

With reference to the first form of application: 5

Figure 1 is a fragmentary plan view of the improved pirnless shuttles before its entry into the shed; at the moment when the weft thread is being caught.

Figure 2 is an end view of the above. 10

Figure 3 is a plan view of the same shuttle as illustrated in Figure 1 but viewed in the opposite direction.

Figure 4 is a side view of the same shuttle as illustrated in Figure 1, showing the side which 15 faces the fell of the cloth.

Figure 5 is a view exhibiting the opposite side of the shuttle to that illustrated in Figure 3, so as to show the side which faces the reed.

Figure 6 is an end view of the opposite extremity of the shuttle according to Figure 4. 20

Figure 7 is a front view of the elastic fork which guides the weft, showing the side which faces the shuttle.

With reference to the second form of application: 25

Figure 8 is a fragmentary plan view of the improved pirnless shuttle, before its entry into the shed, similar to Figure 1.

Figure 9 is an end view of the above. 30

Figure 10 is a plan view of the shuttle illustrated in Figure 8 but viewed in the opposite direction.

Figure 11 is a side view of the shuttle illustrated in Figure 8, showing the side which faces 35 the fell of the cloth.

Figure 12 is a view exhibiting the opposite side of the shuttle to that illustrated in Figure 10, so as to show the side which faces the reed.

With reference to the third form of application: 40

Figure 13 is a fragmentary plan view of the improved pirnless shuttle, similar to Figure 8.

Figure 14 is an end view of the above.

Figure 15 is a plan view of the shuttle shown in Figure 13 but viewed in the opposite direction. 45

Figure 16 is a side view of the shuttle illustrated in Figure 13, showing the side which faces the reed.

Figure 17 is a view exhibiting the opposite side of the shuttle to that illustrated in Figure 15, so as to show the side which faces the fell of the cloth. 50

Figure 18 is an end view of the shuttle, similar 55

to Figure 9, showing a variation in the guiding device for the weft thread.

Figure 19 is a plan view of the above.

As regards the first form of application (Figures 1 to 7), the shuttle or rider consists of a body 1, preferably made of metal and having a trapezoidal cross section, of which 2 and 3 are the sides arranged to come into contact with the sheets of warp threads which form the shed, 4 being the narrow side which faces the fell of the cloth 6, and 5 the wider side which faces the reed 7.

One of the ends of this shuttle is slotted at 8 for a certain distance in the direction of the width, so as to divide the body 1 into two prongs or branches 9 and 10. A sharp blade 11 which is used for the cutting of the weft thread, is preferably removably attached to the bottom of the slot 8.

The wider side 5 is provided with a large groove 12 in which is arranged the clamp for holding the weft thread, constituted by two straight and flexible blades 13, arranged parallel to one another and in elastic contact the one with the other in the middle of the groove 12, the ends of these blades being bent towards the walls of the said groove in which they are fixed in such a way as to ensure the secure holding of the clamp which they form, the elastic contact between the blades being strengthened by means of elastic auxiliary blades 13' fixed in the same way, this clamp enabling the weft thread to be received and held between its branches, as well as the passage of the release blade, which is not shown in the drawings and which, when the shuttle completes its passage after traversing the shed, by penetrating into and passing between the two branches 13, releases the weft thread held by the said blades, this arrangement being similar both in the case of shuttles which travel only in one direction as well as shuttles with alternating direction of travel.

It must be noted that this elastic clamp 13 is distinctly longer than the catching of the weft would require, in order to release the said weft without tension so as to avoid the twisting incidental to the withdrawal from the shed by the action of the elasticity of the thread.

Thus constituted, as applied to the shuttles described in my prior above mentioned applications, the shape of one or both ends of such shuttles, intended to push aside the warp threads loose in the shed, is characterized according to the present invention in that the end of one of the branches of the rider or shuttle, for example the branch 9, is shaped like a beak 14, the end being slightly overhung, as shown at 15, so as to project beyond the plane of the slot 8, which thus is masked, the outer surface 3' of this beak having a trimmed, rounded or bevelled shape uniting with and merging into the flat surface 3 of the body 1 of the shuttle, whilst the end of the other branch of the rider or shuttle, for example 10, simply having its outer surface 2' similarly trimmed, rounded or bevelled so as to unite with and merge into the flat surface 2 of the body 1 of the shuttle.

It will be clear that, when the ends of the shuttles are thus shaped, the slack threads, belonging either to the sheet 16 or to the sheet 17 of the divided warp, coming into contact, during the travel of the shuttle through the shed, either with the beak 14 having the rounded surface 3' and belonging to the branch 9, or with the rounded surface 2' of the branch 10, will slide along these rounded surfaces and thus will be deflected and thrown over one or other side of the shuttle, these slack threads not being able to enter the slot 8

on account of the obstacle formed by the overhanging end 15 of the beak 14. Consequently, due to the described shape of the end of the shuttle, the groove 12 leading to the slot 8 is protected from loose warp threads in the shed, provided that these threads extend at right angles to the direction of movement of the shuttle; these threads meet the overhanging end of the shuttle beak and slide along the side surface of the shuttle without penetrating into the groove 12 and without being caught by the clamp 13.

In accordance with the present invention an arrangement is provided which allows the weft thread, which is stretched out at the entrance to the shed and across it, to be caught by the shuttles in spite of the shape of the ends thereof which has the tendency to push aside any warp threads met during the passage, this arrangement consists in that a part of the weft thread 18 is stretched obliquely with respect to the shuttle between a first point formed by the fell of the cloth 6' or a point 6'' located in the shed in advance of the point 6', and a second point which is constituted in the present instance by the eyelet 19 situated at a certain distance from the edge in front of the shed, as shown in Figs. 1, 3, 8, 10, 13 and 15.

By this arrangement, the shuttle comes into contact with this stretched portion of the weft thread 18 before entering the shed, this contact taking place, as a result of the oblique position of the weft thread thus stretched and of the form of the shuttle, at a point marked *a* situated on the side of the ridge of the opposite slope 2'' of the bevelled part 2', which slope is also bevelled. The thread 18 is then guided into the slot 8 without coming into contact with the point 15 of the beak 14 of the branch 9, near which the said thread passes.

As it is preferable that the point from which the weft starts should be situated in front of the fell of the cloth 6', at a point 6'', it can be constituted, for example, by the bottom of a notch 20 arranged at the end of a resilient blade 21 affixed to a rigid part of the frame of the loom, the first threads of the warp or of the edges of the shed, pass through this notch. Consequently during the crossing of the warps the threads cross each other within the notch 20. The edges 20' of the notch 20'' are curved towards the fell of the cloth 6, in order to prevent the said edge threads from opening too widely, so that the end of the cut shoot, which is to be inserted, does not tend to get away, the said resilient blade 21 being pushed back at each stroke of the batten against the fell of the cloth and thereupon returning to its front position by its own resiliency as soon as the batten has moved back. Due to this arrangement the thread is stretched more obliquely when the point 6'' is used than when the point 6' is used. Furthermore, the point 6'' does not change its position while the point 6' may move slightly due to variations in the position of the selvage and the action of the batten.

With regard to the second form of the application (Figures 8 to 12), it conforms with the purpose of the present invention in that it includes, like the first form, the combination of the shape of the ends of the shuttle with the particular arrangement of the weft stretched across the entrance to the shed.

The characteristic feature consists in that the groove 12 is arranged obliquely in relation to the middle plane of the shuttle and in such a way that the branch 9 has, on the side 5 which faces the reed, a height which is equal approximately

to one half of the total height of this side, with the result that the point 15 of the beak 14 prolongs the said branch 9, and without any overhanging of said point, into a similar relative position to that of the beak of the first form of application, the oblique position of the slot 12 making it possible to do without the interior bevelling 2'' of the end of the branch 10.

In the modification shown in Fig. 2 of the drawings, the groove 12 is parallel to the middle plane of the shuttle, so that in order to enable the obliquely stretched thread to penetrate into the shuttle between the prongs 9 and 10, the end of the prong 10 must be provided with an inner surface 2''. In the modification shown in Fig. 9 both the groove 12 and the slot 8 are oblique with respect to the middle plane of the shuttle, so that if the thread is stretched obliquely it can penetrate into the groove 12 although overhanging loose threads in the shed will not be able to get into the groove 12.

As regards the third form of application (Figures 13 to 17), it also conforms with the purpose of the present invention, in that it includes, like the two others, the combination of the shape of the end of the shuttle with the particular arrangement of the stretched weft at the entrance to the shed.

The characteristic consists in that the end of the branch 9 which forms the beak 14 is not only provided with a bevelled outer part 3', but also with a bevelling 3'' on the opposite side whilst the end of the other branch is provided with the outer bevelling 2' and the inner bevelling 2''.

With regard to Figures 18 and 19 which are somewhat similar to those in the second form of application shown in Figures 8 to 12, these illustrate an arrangement which makes it possible to bring the tension point of the weft in front of the fell of the cloth, no longer in the shed, but outside the latter, this arrangement consisting of a finger 22 adapted to be reciprocated in such manner that it presses on the weft before the arrival of the shuttle, and thus moves the weft to a position in which it is stretched approximately parallel to the axis of the inclined groove 12, the weft, when caught by the shuttle, slipping off this finger 22, at the moment when said shuttle is inserted into the shed; in this case it is no longer necessary to incline so much the weft thread 18.

When the shuttle does not include a cutting blade, a cutting blade is added to the finger 22, said blade being arranged so as to come between the weft thread and the selvage.

It is clear that, without going outside the limits of the present invention, changes, improvements and additions can be made and that equivalent means could also be used.

For example, with reference to the first form of application (Figures 1 to 7) and the third form of application (Figures 13 to 17) the groove 12 could be arranged obliquely in relation to the middle plane of the shuttle, as in the second form of application. The same could be done with the slot 8 and the point 6''.

In the same way, with reference to the second form of application (Figures 8 to 12) the groove 12 can be separated to a greater extent, so that it ends on the surface 2, in close proximity to the side 5, the inclination of this groove being increased, or not, inasmuch as it is possible to give this groove a slight bend, so as to find room for it more easily, the releasing blade having to be given the same bend.

Furthermore, with reference to shuttles having

two grooves, it is clear that the ends also of these shuttles can be shaped according to the idea of the present invention.

With regard to the shape of the ends of shuttles, it is also understood that it may be the result of the combination between themselves of the forms specified in the different forms of application described.

Finally, when shuttles constructed according to any of the forms of application hereabove described or to others are employed, in circular looms or in certain other looms, it is clear that they will consist of a body 1, the shape of which will no longer be rectilinear but curvilinear.

What I claim is:

1. A weft shot inserter device, comprising a body, a slot extending longitudinally from the point thereof, forming two prongs, said prongs having flat outer surfaces, and a beak forming the end of one of said prongs, said beak having an overhanging point to cover said slot and an outer surface merging with the adjacent outer surface of the prong, the adjacent end of the other prong having an outer surface merging with the adjacent outer surface of the second-mentioned prong and an inner surface for guiding a weft thread into said slot.

2. In combination with a loom comprising a reed, a pirnless shot inserter member comprising an angular body having the shape of a two-pronged rider, a slot extending obliquely to the central longitudinal plane of said rider being formed between the two prongs, one of said prongs being longer than the other, the side facing said reed of said longer prong having a height substantially equal to one half of the total height of said side.

3. A pirnless weft shot inserter member, comprising a body, a slot extending longitudinally from the point thereof, forming two prongs, said prongs having flat outer surfaces, and a beak forming the end of one of said prongs, said beak having an overhanging point to cover said slot, a shaped outer surface merging with the adjacent outer surface of the prong and a bevelled side opposite to the shaped outer surface, an outer surface merging with the adjacent outer surface of the second-mentioned prong and an inner surface for guiding a weft thread into said slot.

4. In combination with a pirnless weft shot inserter member, having a longitudinal slot extending from the point thereof and means forming a part of said member for preventing loose warp threads from entering said slot; a loom comprising a shed, a flexible blade having a notch at one of its ends; and an eyelet, a weft thread being stretched obliquely across the entrance to the shed between said notch and said eyelet to enable said weft thread to penetrate between the two prongs and be carried off by the shuttle.

5. In combination with a pirnless weft shot inserter member having a longitudinal slot extending from the point thereof and means forming a part of said member for preventing loose warp threads from entering said slot; a loom comprising a shed, a flexible blade having a notch at one of its ends, the edges of the notch being bent backwards towards the fell of the cloth, the angles of the threads at the edge of the fell of the cloth being limited by said edges, the edge threads passing between the edges of the notch, the shape of said edges determining the degree of limitation; and an eyelet, a weft thread being stretched obliquely across the entrance to the shed between said notch and said eyelet to enable said weft

thread to penetrate between the two prongs and be carried off by the shuttle.

6. In a loom for weaving fabrics comprising a shed, a pirnless inserter member for the weft shots, a longitudinal slot in said inserter member extending from the point thereof, means in said slot for retaining therein a weft shot until penetration through said shed, means associated with said inserter member for preventing loose warp threads in said shed from entering said slot, and flexible means intermediate said weft shot inserter member and the fell of the fabric to be woven for guiding the weft thread and for reducing the angle between the converging warp threads of said shed adjacent to the selvage edge whereby the unravelling of the weft shot from the fell is prevented.

7. The combination with a loom comprising a shed and a weft thread extending obliquely to the entrance thereof and in a plane substantially parallel to the plane of said shed; of a pirnless weft shot inserter member, a longitudinal slot in said inserter member extending from the point thereof for receiving said obliquely extending weft thread, means in said slot for retaining therein said weft thread, means for cutting said weft thread upon penetration of said shed whereby a weft shot is produced, and means associated with said weft shot inserter member for preventing loose warp threads in said shed from entering said longitudinal slot and flexible means intermediate said weft shot inserter member and the fell of the fabric to be woven for guiding said weft thread and for reducing the angle between the converging warp threads in said shed adjacent the selvage thereof whereby unravelling of said weft shot is prevented.

8. The combination with a loom for weaving fabrics comprising a shed and a weft thread extending obliquely to the entrance of said shed and in a plane substantially parallel to the plane of said shed; of a weft shot inserter member, a longitudinal slot in said member for receiving said obliquely extending weft thread forming two prongs, clamping means in said slot for retaining said weft thread in said slot, means for cutting said weft thread adjacent said slot upon penetration through said shed whereby a weft shot is produced, one of said prongs forming a beak ex-

tending over the entrance to said slot, whereby loose warp threads in said shed are prevented from entering said slot.

9. The combination with a loom for weaving fabrics comprising a shed and a weft thread extending obliquely to the entrance of said shed and in a plane substantially parallel to the plane of said shed; of a weft shot inserter member, a longitudinal slot in said member for receiving said obliquely extending weft thread forming two prongs, clamping means in said slot for retaining said weft thread in said slot, means for cutting said weft thread adjacent said slot upon penetration through said shed whereby a weft shot is produced, one of said prongs forming a beak extending over the entrance to said slot, whereby loose warp threads in said shed are prevented from entering said slot and means for preventing the unravelling of said weft shot from said fell, a flexible blade intermediate said inserter member and the fell of the fabric to be woven and adjacent the selvage edge thereof, a notch at one end of said blade, adapted to engage the selvage strands of said shed, means in said notch for reducing the angle between the converging warp threads in said shed, and an eyelet for guiding said obliquely extending weft thread.

10. In a loom, means for supporting sheets of warp threads to form a shed, a shuttle supported for travel through the shed and comprising a body provided at an end thereof with a longitudinal slot to form complementary prongs one of which is longer than the other, said prongs being shaped to provide cam-like surfaces for deflecting occurring slack threads of the divided warp to either side of the entrance to said slot during travel of the shuttle through the shed, and means for supporting a weft thread stretched out at the entrance to the shed and with at least a part of the weft thread stretched obliquely with respect to the shuttle between a first point substantially at the fell and a second point in front of the shed whereby the shuttle comes into contact with said stretched part of the weft thread and receives the same in said slot before the shuttle enters the shed.

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