

May 20, 1930.

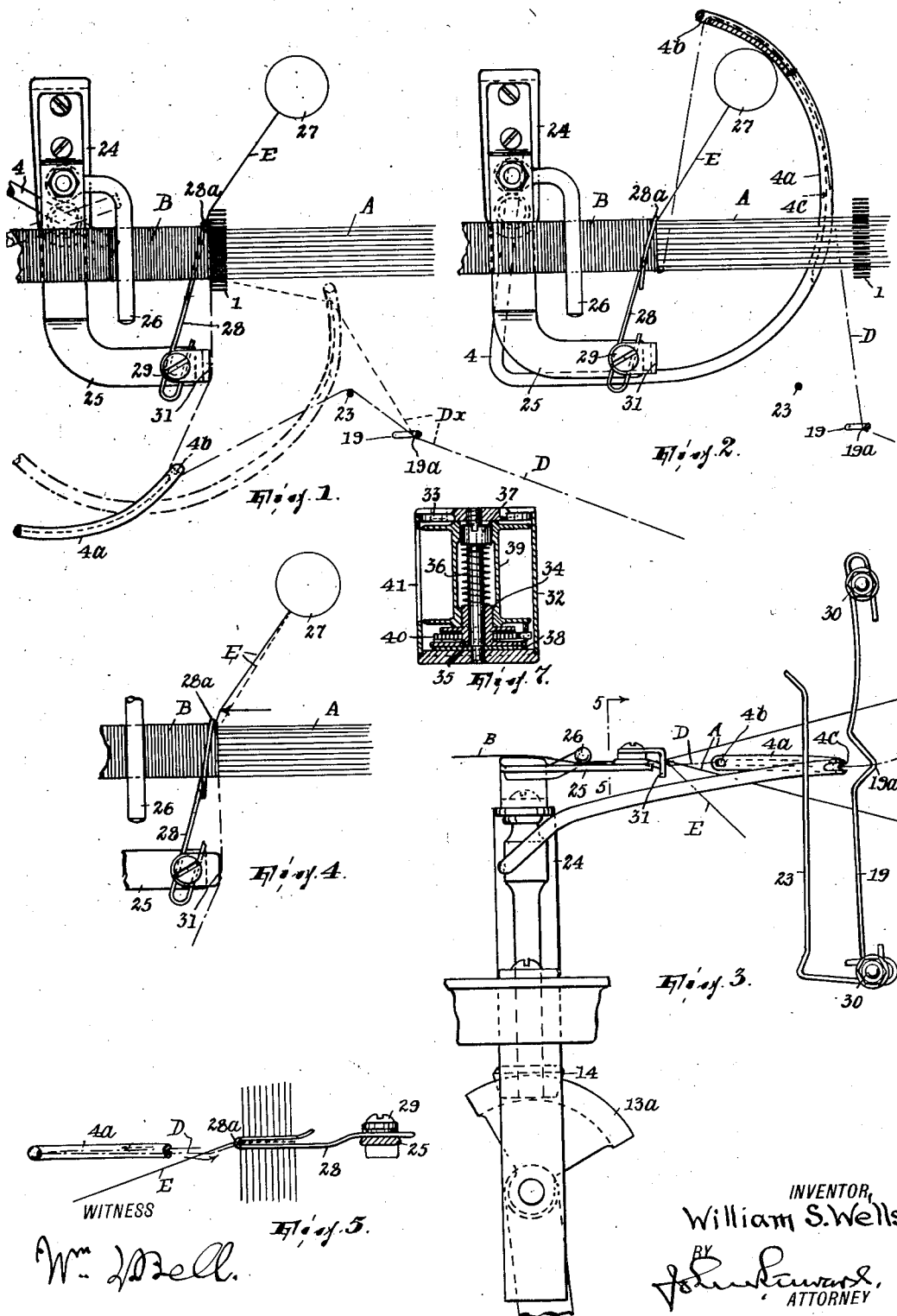
W. S. WELLS

1,759,532

NEEDLE LOOM

Filed Oct. 3, 1928

2 Sheets-Sheet 1



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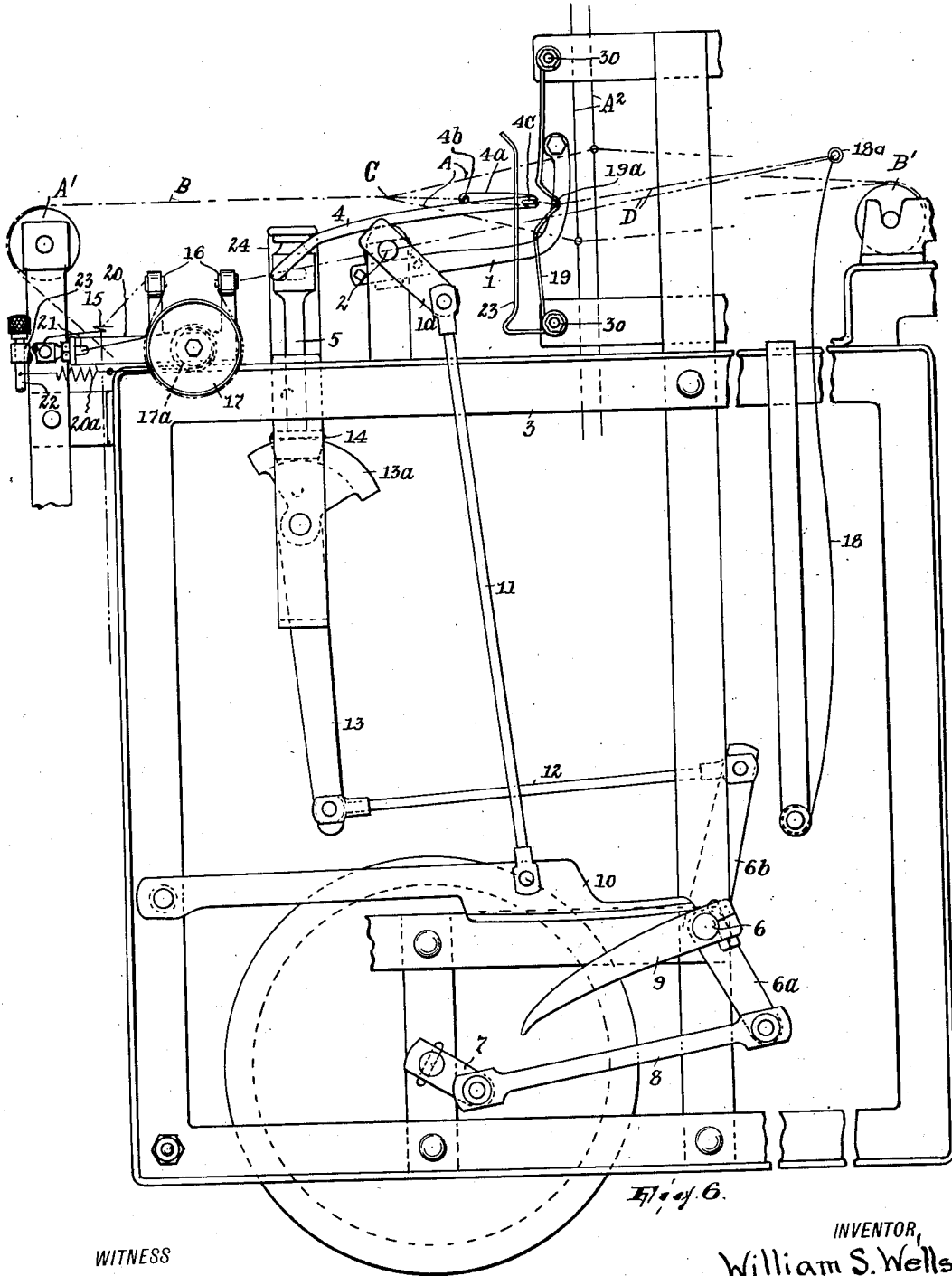


Fig. 6.

WITNESS

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NEEDLE LOOM

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This invention relates to that class of looms in which the filling, between crossings of the warps to form the sheds, is carried through the shed in the form of a loop by a 5 needle or other device through an eye in which the filling extends from a suitable supply, the retaining of the loop at the relatively far side of the warp being effected as by a binder thread which is passed through such 10 loop and becomes a selvage warp. The principal object is to provide a weaving mechanism of this class whereby high-speed weaving may be performed and yet a perfect weave will result. To this end the filling 15 thread should be manipulated in the forming of each loop and otherwise so as to be in a certain state of control at all times, both as respects tension and otherwise; and the binder thread should also be in a certain 20 state of control in addition to that of the tension to which it is assumed to be subject, especially when the beating up of the loop occurs and with the purpose and effect of forming the binder-thread side of the fabric with a perfectly straight and uniformly 25 constructed edge. These results I accomplish by the improvements herein set forth.

In the drawings,

Fig. 1 is a plan of the parts concerned in 30 the actual weaving in the positions occupied thereby when the needle or looper is retracted and the reed is at the end of its beating-up movement, the guides 19 and 23 appearing in section in the horizontal plane of guide 35 proper 19^a;

Fig. 2 is a similar view of said parts in the positions occupied thereby when the needle or looper has formed a loop in the filling 40 and the shuttle has passed down through the loop;

Fig. 3 is a side elevation of said parts, except the reed, in the positions of Fig. 2;

Fig. 4 is a detail in plan illustrating the 45 edge holder and its position at the moment the reed is in full beating-up position, as in Fig. 1, the reed being omitted but its action on the binder thread at this time being indicated by the arrow;

50 Fig. 5 is a sectional view on line 5—5, Fig.

3, illustrating the edge holder and its operation and showing the warp shed open;

Fig. 6 is a fragmentary side elevation of the loom with certain parts omitted; and

Fig. 7 is a longitudinal sectional view of 55 a form of shuttle for the binder thread which may be used.

The sheet of warp A and woven fabric B (hereinafter termed the fabric-and-warp sheet) will be understood to be by any well 60 known means supported and held taut and so as to be advanceable to the left in Figs. 1 and 2 as the weaving proceeds; at A' B' are shown rollers which may form parts of said means. It will also be understood that there 65 will be any means for forming the sheds, such being here indicated at A².

1 is the reed, in the present instance pivoted on an axis 2 in the loom-frame 3 parallel with and transverse to and below the warp; 70 the particular type of reed shown is not indispensable to the present invention. 4 is the looper pivoted in the frame with its axial portion 5 vertical. On each forming of a 75 warp shed the looper moves forward into the shed from one side thereof to lay in the loop, and then retreats; moving in synchrony therewith, the reed moves up to the fell C of the fabric to beat up the filling and retreats, the 80 beating up and retreating movements of the reed occurring, respectively, substantially when the looper retreats from and enters the sheds. Their movements in synchrony, are obtained from a rocker shaft 6, here shown as 85 oscillated from a rotating crank 7 through a pitman 8 connected with an arm 6^a on the rocker shaft, as follows: A wiper 9 on the rocker shaft actuates the lever 10 connected with an arm 1^a of the reed by a pitman 11; 90 an arm 6^b of the rocker shaft is connected by a pitman 12 with a lever 13 having a segment 13^a engaging a pinion 14 coaxial with and forming in effect a part of the looper.

The looper 4 is a stiff attenuated member 95 extending from its axial portion, which is at the far side of the sheet of warp and fabric (Figs. 1 and 2), first radially in a plane below said sheet and then in a bend (here a curve) around said axis, having an appreciable part 4^a of the extremity thereof lying (in the ex- 100

ample) substantially in a plane about coincident with that of the fabric. It oscillates through about 90 degrees, its tip or free end pointing toward the near side of the sheet when at one limit of its motion, or retracted (Fig. 1), and extending beyond the far side of the sheet when the looper is at the other limit (Fig. 2). At its tip or what I term its forward end portion is an eye or guide 4^b through which the filling reeves and leading relatively forward to this guide, in the outer or convex side of its bend, the looper has a longitudinal recess, here a groove 4^c. Thus the looper has a filling-supporting surface saliently bent lengthwise, or formed in the example by its convex side, whereby the filling is kept tangent to the looper during the critical portion of the stroke of the looper (i. e., when the binder thread is introduced); in the example this surface is recessed to receive the filling and offer actually positive obstruction to its lateral displacement, as by slipping or rolling. Thereby not only is a loop of ample size formed and made to project at the far side of said sheet A—B but the whole loop is steadied and kept in a state of control when the binder thread is passed through it, factors which are very necessary in high speed weaving in a loom of this type.

In order for the looper to function properly in this way there should be means to tension and guide the tensioned filling to the looper having its point of guidance at the near side of the sheet and approximately in a plane cutting the salient of the looper longitudinally. I do not wish to be limited to any particular construction or form of such means, but preferably, for reasons that will be apparent, I use the following.

The filling comes from any wound package (not shown) from which it may, for example, be drawn by the looper itself, of course intermittently as the result of the looper's working or loop-forming thrusts. It then extends in engagement with a fixed guide 15, then with fixed guides 16 and between the latter around a freely rotating roller 17 having a roughened, as sanded, periphery, and then with the guide 18^a of an elongated flexible elastic member 18 acting as a take-up and fixed to the frame, and finally around a stationary upright guide 19 which it is best to form with a filling-receiving notch 19^a or guide proper, the latter at least being at the near side of the sheet A—B; the region of filling delivery of this means is here reduced substantially to an actual and definite point (that is, the filling is confined to such point) by the notch 19^a and, since the looper is here formed to retain the filling on its saliently bent surface by having the groove 4^c, said point is located in substantially a plane cutting longitudinally said groove. Roller 17 is subject to the braking action of a band 20 extending around a brake wheel 17^a of the roller

and having at one end an elastic extensible portion, as a spiral spring, 20^a and at the other end being secured to some fixed point, as 21; the end of the spring or a cord or other flexible extension thereof may be attached to a spindle 22 which when turned in its bearing 23 will, by the wrapping or unwrapping of said extension, vary the braking action of the band. When the machine is operating member 18, under the pull of the filling, plays toward and from guide 19, beyond which it is located with respect to the nearer guide (16) from which the filling is delivered to it, wherefore it serves to hold the filling against guide 19 (in a flexion D^x, Fig. 1) at least while the looper is in that part of its stroke in which it tends to bend the filling toward the far side of the sheet A—B.

The looper, moving quickly, tends in the back portion of its stroke to whip the filling out of contact with this guide and in the example in retreating actually moves so far from the fabric and warp sheet as actually to produce this result unless prevented, so that it would fail to be kept in proper delivery relation to the salient of the looper. To prevent this I provide means, as a fixed upright guide 23, between the looper and guide 19 arranged to hold the filling against the latter, that is, to maintain flexion D^x therein when it is otherwise subject to a tendency to be flung or whipped away from guide 19.

An upright 24, in which the looper may be pivoted, has an extension 25 which forms in effect a breast-beam and is bent rearward. On this the fabric B rests, being held down against the same by an arm 26 extending from upright 24, so that under the tensioned condition of the sheet the latter is held as rigidly as possible close to the weaving line or fell.

The binder thread E is delivered by any suitable carrier, as a shuttle 27 moving down through each loop when it is formed as shown in Fig. 2 and then back when the looper retreats to allow the take-up member to draw back out of the shed so much of the filling as will be superfluous in the loop as finally developed as a filling "pick" or "shot" in and of the fabric; it will be understood that such loop will in this manner become bound in by the binder thread at the far side of the sheet A—B and that the binder thread develops as a selvage warp thread. At 28 is what I term an "edge-holder", being here a hook which by a screw 29 is adjustably fixed to the extension 25 at the near side of said sheet and extends across the same, its hook proper receiving the far edge of the sheet and also the binder thread, which is held by its bight 28^a in a flexion; said bight, which constitutes an abutment or shoulder maintaining the flexion, is normally located at or somewhat rearward, or at the warp side, of the fell. The important consequence of this construction is that,

instead of the binder thread pulling laterally on the sheet, it pulls on the edge-holder or hook and when the loop is fully taken up by member 18 its limit of take-up is determined by that part of the binder thread (forward of the bend in the hook) which is parallel with, instead of a part thereof deflected from, the main warp threads. In this manner a straight and nicely formed edge results and the loops when incorporated are all tight. The hook is elastic and flexible and therefore adapted to yield forwardly to the reed when the latter beats up the loop to the fell. The operation with respect to the edge-holder is more particularly as follows: When the shuttle carries the binder thread through the loop the abutment 28^a (see Fig. 2) of the edge-holder is holding the point of deflection of the binder thread rearward of the fell. The looper then retreating, as the loop is taken up by member 18 it is taken up (the loop drawing and sliding upon the diverted part of the binder thread) till at said point of deflection the take-up limit is reached. Meanwhile, the reed is moving forward to beat up, and in the final part of such motion it beats up the taken-up loop to the fell, to form the new fell, repressing the edge-holder from the position of Fig. 2 to that of Figs. 1 and 4, the edge-holder having meanwhile of course assumed the stress of the binder thread that would otherwise be exerted on the loop.

The parts 19 and 23 may be suitably bent wires held in position by bolts 30, the latter with its upper end free so that a space exists between them (Fig. 3) open at the top to permit entry of the filling to guide proper 19^a.

While I have defined the edge-holder more or less specifically and particularly, in reference to the example, have said that its abutment 28^a normally stands rearward of the fell-line, so far as I am aware it is broadly new to provide a device which affords an abutment around which a binder thread extends and so assumes in the vicinity of the critical transverse line represented by the fell the stress of the binder thread, which would otherwise come upon the fabric and warp sheet and cause an imperfect edge to be produced.

Secured to extension 25 and at the near side of the sheet is a stop or guide 31 whose rearward or filling-contact face is alined with the fell line. The looper retreats in the example so far that its guide 4^b is forward of the fell line, wherefore with guide 31 directly in the thread line the filling at that time is made to pull on the sheet at right angles thereto, and not in a forwardly or rearwardly oblique direction, which would respectively act to pack the filling loops unduly closely or not closely enough at the near selvage of the fabric.

The present invention is of course not concerned with how the shuttle causes the binder

thread to exert a pull to the end, especially, that the binder thread should be in a state of tension at least sufficient to maintain it in an angular bend around the abutment 28^a when the looper is retreating. But Fig. 7 sufficiently shows how this may be accomplished, 32 being a cylindrical shuttle case with a removable cover 33 and having a fixed axial spindle 34; 35 a spring barrel forming brake disk pressed toward the closed end of the case by a spiral spring 36 backed by a nut 37 on the spindle, a leather or other friction disk 38 being interposed between said brake disk and end of the cylinder; 39 a bobbin for the binder thread journaled on said nut and receiving the hub of the brake disk; and 40 a spiral spring coiled about the barrel and having its ends respectively connected to the barrel and bobbin. The binder thread is discharged through an opening 41 in the side of the case. It being assumed that the shuttle in moving back and forth has its case in any way held against turning as by some guide (not shown) in which it moves, it will be apparent that this construction allows the bobbin to turn to deliver the binder thread subject to a drag or brake, thereby tensioning the binder thread.

Having thus fully described my invention, what I claim is:

1. Mechanism for forming in the warp sheds produced in a stretched fabric-and-warp sheet loops of filling including a looper arranged to move forward from one side of the sheet through each shed as it is formed and back and having a filling-supporting surface saliently bent lengthwise of the path of movement of the looper and also having relatively forward of said surface a reeving guide for the filling, and means to tension and guide the tensioned filling to the looper having a substantially fixed instrumentality to confine the filling to a guiding point at said side of the sheet and approximately in a plane cutting said saliently bent surface longitudinally thereof.

2. Mechanism for forming in the warp sheds produced in a stretched fabric-and-warp sheet loops of filling including a looper arranged to move forward from one side of the sheet through each shed as it is formed and back and having a filling-supporting surface saliently bent, and also recessed to receive the filling, lengthwise of the path of movement of the looper and also having relatively forward of said surface a reeving guide for the filling, and means to tension and guide the tensioned filling to the looper having a substantially fixed instrumentality to confine the filling to a guiding point at said side of the sheet and approximately in a plane cutting the recess of the looper longitudinally thereof.

3. Mechanism for forming in the warp sheds produced in a stretched fabric-and-warp sheet loops of filling including a looper

arranged to move forward from one side of the sheet through each shed as it is formed and back and having a filling-supporting surface saliently bent lengthwise of the path of movement of the looper and also having relatively forward of said surface a reeving guide-eye for the filling, and means to tension and guide the tensioned filling to the looper having a guide at said side of the sheet and around which the tensioned filling extends in a bend whose salient side faces the direction of backward movement of the looper, and means to confine the tensioned strand so bent around the guide substantially throughout the forward and back movements of the looper.

4. A mechanism for weaving a fabric of the class described including means to support in stretched condition a sheet consisting of a fabric and a warp comprising a body of main warp threads and a binder-warp thread at one side of the sheet, means to enter loops of filling through sheds formed of the main warp threads and so that their loops project from said side, means to establish the binder-warp thread in extending-through relation to the projecting portions of said loops, and an abutment arranged in proximity to the fell-line of the fabric being produced and so as to form a flexion in the binder-warp thread.

5. A mechanism for weaving a fabric of the class described including means to support in stretched condition a sheet consisting of a fabric and a warp comprising a body of main warp threads and a binder-warp thread at one side of the sheet, means to enter loops of filling through sheds formed of the main warp threads and so that their loops project from said side, means to establish the binder-warp thread in extending-through relation to the projecting portions of said loops, an abutment, normally arranged at the warp side but yieldable toward the fell-line of the fabric being produced, to form a flexion in the binder-warp thread, and means, movable against the abutment and toward said fell-line, to beat up to the fell said loops of the filling.

6. A mechanism for weaving a fabric of the class described including means to support in stretched condition a sheet consisting of a fabric and a warp comprising a body of main warp threads and a binder-warp thread at one side of the sheet, means to enter loops of filling through sheds formed of the main warp threads and so that their loops project from said side, means to establish the binder-warp thread in extending-through relation to the projecting portions of said loops, and a hook extending across and receiving the sheet and arranged in proximity to the fell-line of the fabric being produced and having its bight at the binder-thread side of said sheet.

7. A mechanism for weaving a fabric of the class described including means to sup-

port in stretched condition a sheet consisting of a fabric and a warp comprising a body of main warp threads and a binder-warp thread at one side of the sheet, means to enter loops of filling through sheds formed of the main warp threads and so that their loops project from said side, means to establish the binder-warp thread in extending-through relation to the projecting portions of said loops, a hook extending across and receiving the sheet and arranged in proximity to the fell-line of the fabric being produced and having its bight at the binder-thread side of said sheet, and means, movable against the hook and toward the fell-line, to beat up to the fell said loops of filling.

8. In combination, means to support a fabric-and-warp sheet in stretched condition, a filling stop or guide arranged at one side of the sheet, a device to enter filling extending from the fabric into each shed as it is formed in the warp movable from a position at said side into the shed and back to said position, said device having a guide through which the filling reeves arranged to be outward of the first guide from the fabric and to form a bend in the thread around the first guide when said device is in said position, and means to tension the portion of the filling between the fabric and second guide.

9. In combination, means to support a fabric-and-warp sheet in stretched condition, a filling stop or guide arranged in approximate line with the fabric fell and at one side of the sheet, a device to enter filling extending from the fabric into each shed as it is formed in the warp movable from a position at said side into the shed and back to said position, said device having a guide through which the filling reeves arranged to be outward of the first guide from the fabric and to stand at the fabric side of said line when said device is in said position, and means to tension the portion of the filling between the fabric and second guide.

In testimony whereof I affix my signature.

WILLIAM S. WELLS.