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H. SKINNER & F. H. CONNOLLY.

NEEDLE LOOM.

No. 449,336 Patented Mar. 31, 1891.

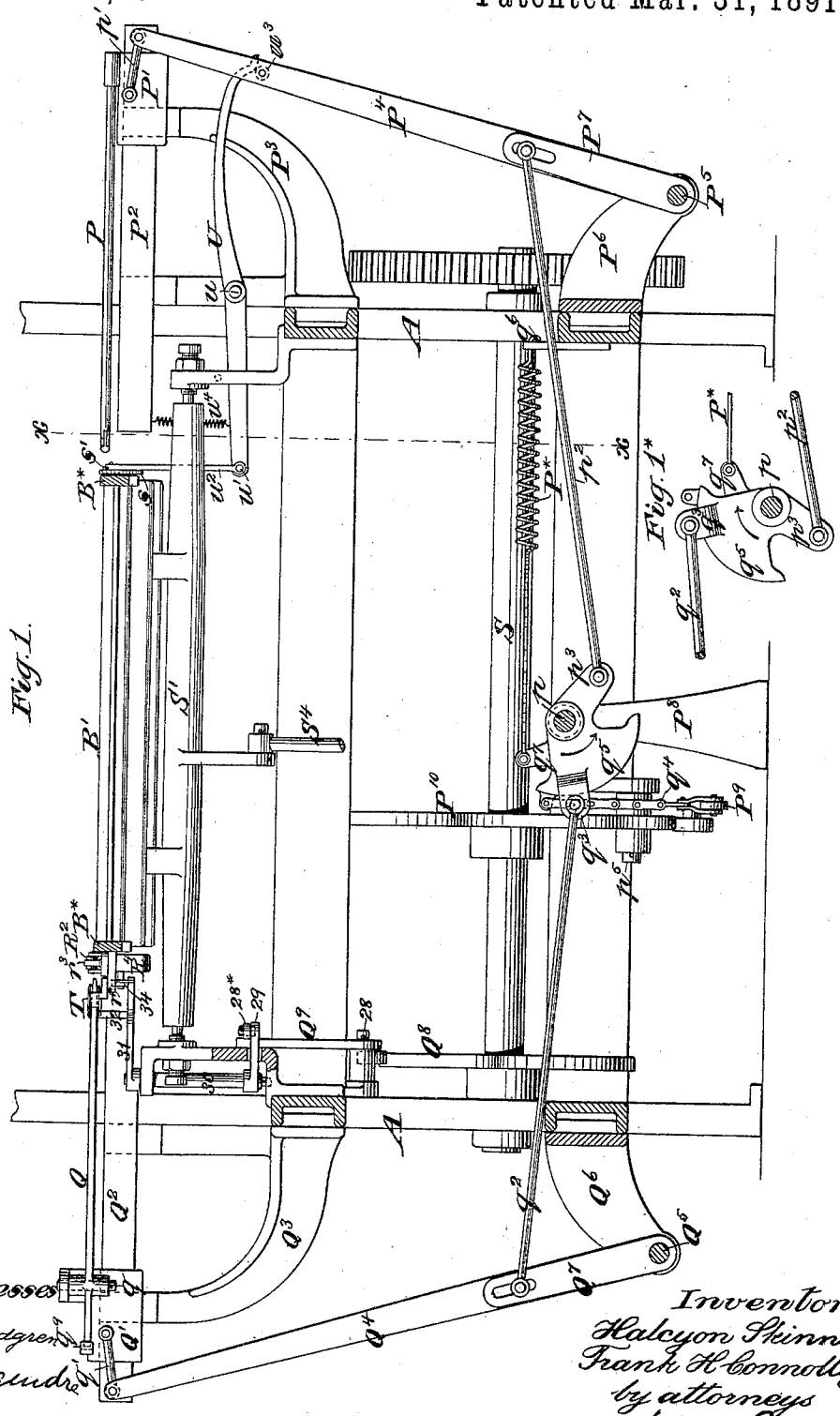


Fig. 1.

Fig. 1*

Witnesses
C. Sundgren
L. N. Legendre

Inventor:
Halcyon Skinner
Frank H. Connolly
by attorneys
Dunn & Dunn

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H. SKINNER & F. H. CONNOLLY.

NEEDLE LOOM.

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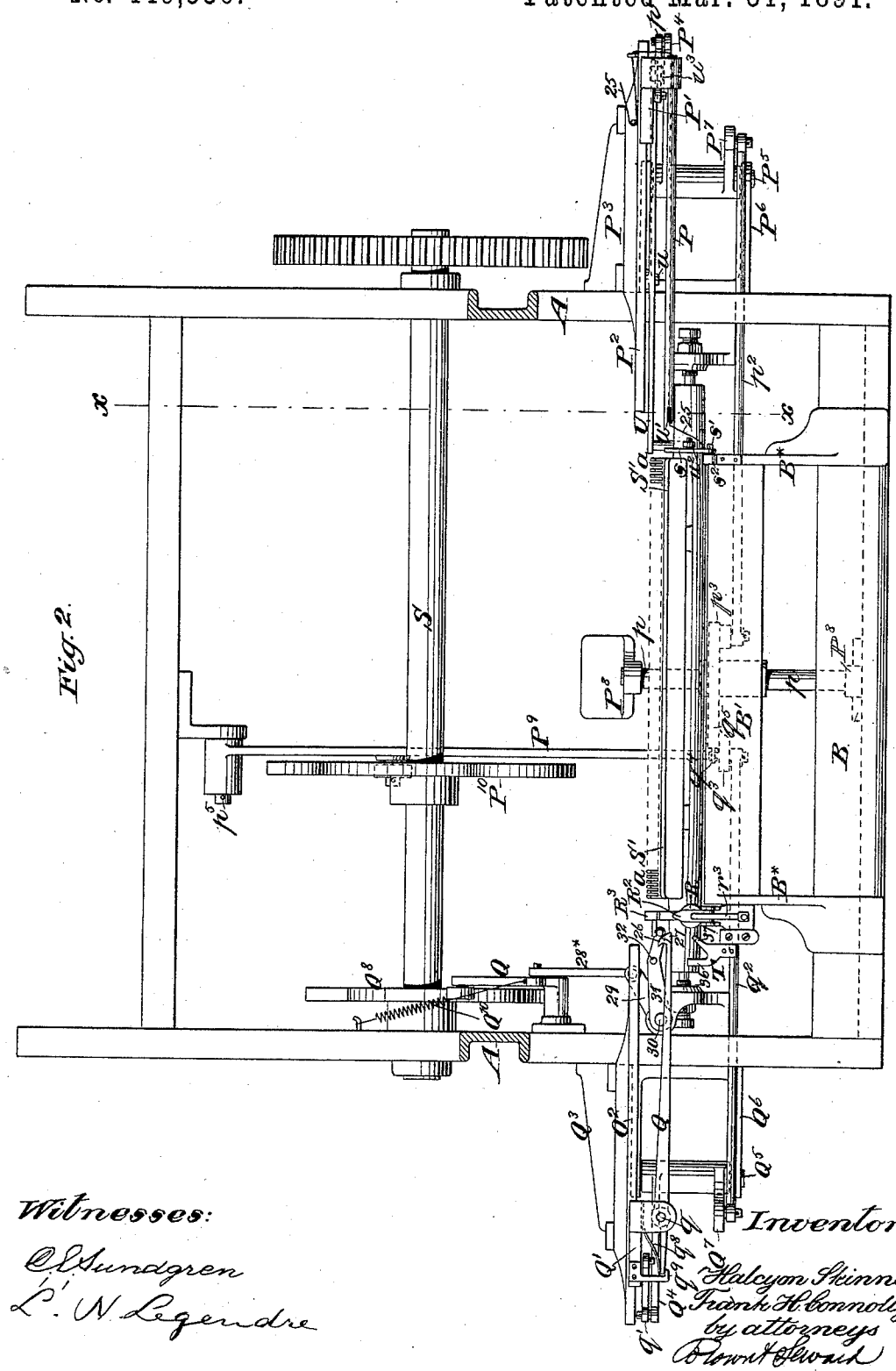


Fig. 2.

Witnesses:
C. L. Sundgren
L. N. Legendre

Inventor:
Halcyon Skinner
Frank H. Connolly
by attorneys
Brown & Seward

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

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H. SKINNER & F. H. CONNOLLY.

NEEDLE LOOM.

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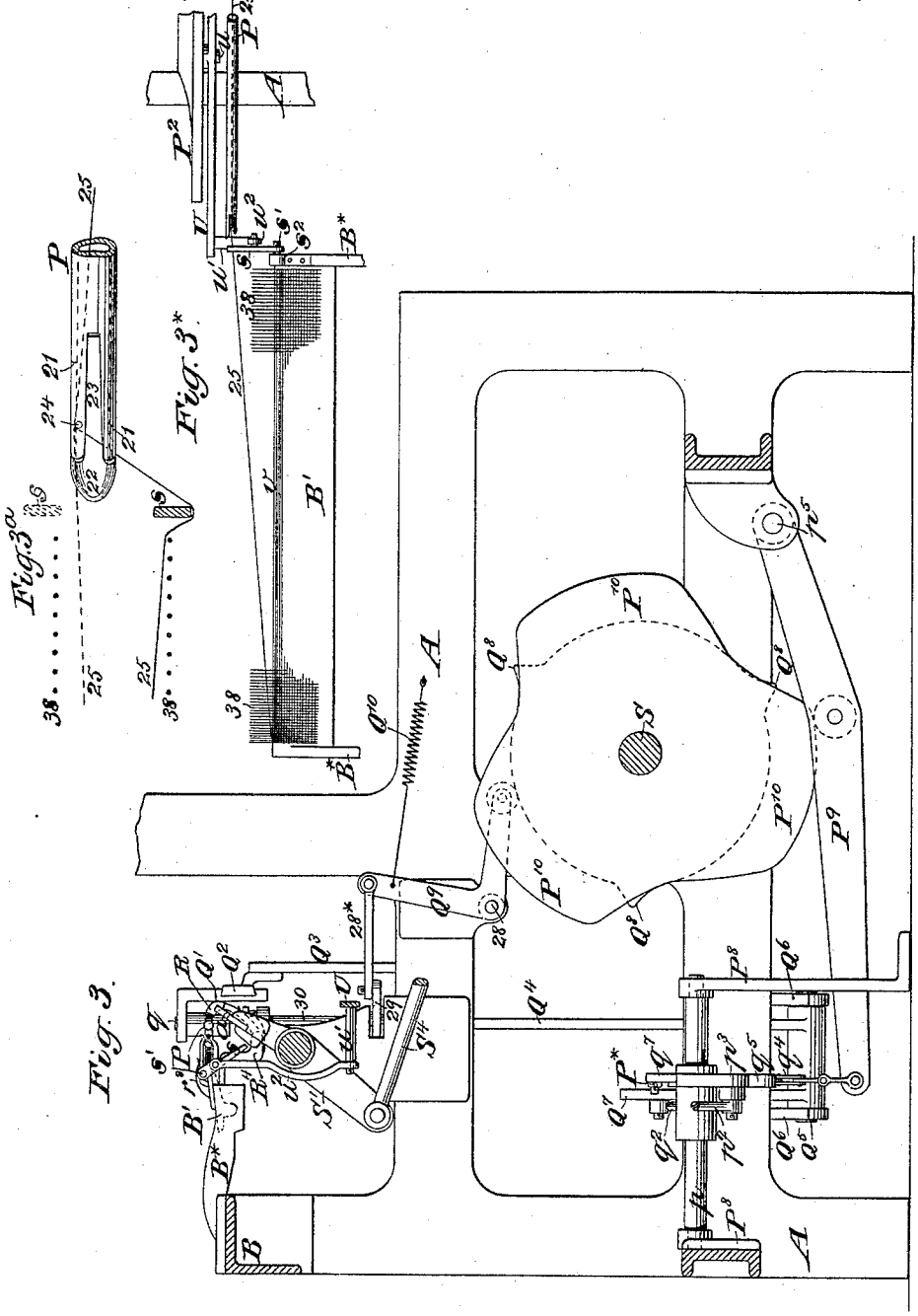


Fig. 3.

Fig. 3*.

Fig. 3a.

Witnesses:
O. Sundgren
L. N. Legendre

Inventor:
Halcyon Skinner
Frank H. Connolly
by attorneys
Brown & Seward

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

(No Model.) 4 Sheets—Sheet 4.

H. SKINNER & F. H. CONNOLLY.

NEEDLE LOOM.

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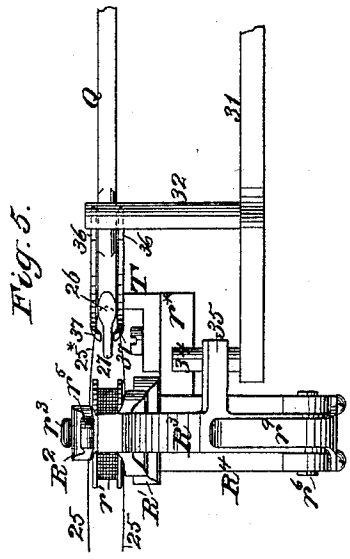


Fig. 5.

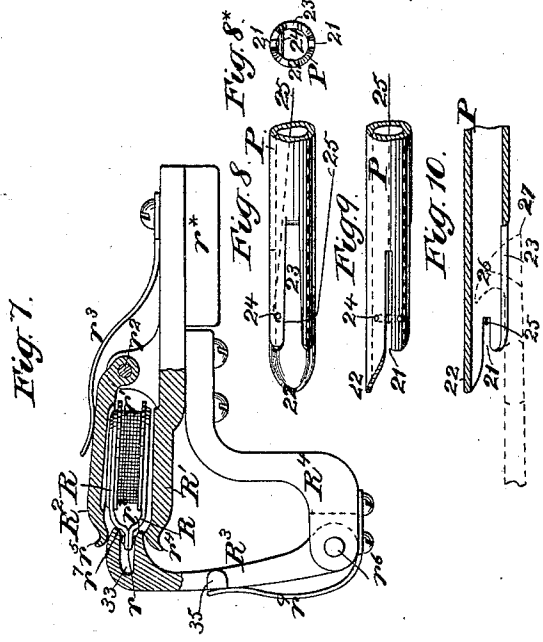


Fig. 7.

Fig. 8*. Fig. 8. Fig. 9. Fig. 10.

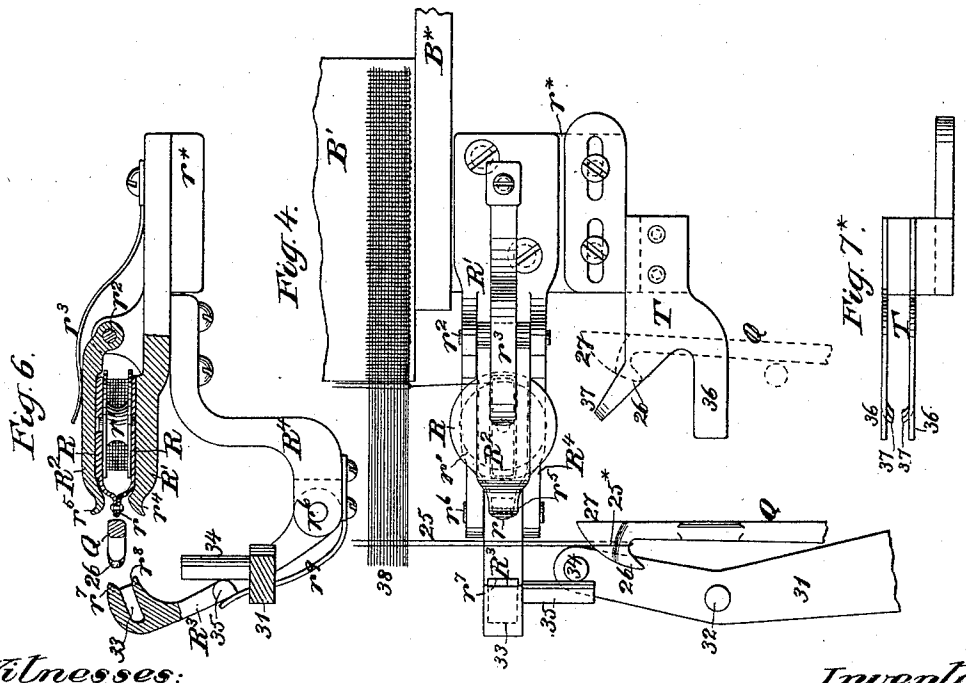


Fig. 6. Fig. 4. Fig. 7*.

Witnesses:

C. L. Sundgren

L. N. Legendre

Inventors

Halcyon Skinner

Frank H. Connolly

by attorneys

Brown & Lewis

THE NORRIS PETERS CO., PHOTO-LITHO., WASHINGTON, D. C.

UNITED STATES PATENT OFFICE.

HALCYON SKINNER AND FRANK H. CONNOLLY, OF YONKERS, NEW YORK.

NEEDLE-LOOM.

SPECIFICATION forming part of Letters Patent No. 449,336, dated March 31, 1891.

Application filed July 29, 1890. Serial No. 360,307. (No model.)

To all whom it may concern:

Be it known that we, HALCYON SKINNER and FRANK H. CONNOLLY, both of Yonkers, in the county of Westchester and State of New York, have invented a new and useful Improvement in Needle-Looms, of which the following is a specification, reference being had to the accompanying drawings of parts of a loom embodying our invention.

We will first describe in detail the example of our invention illustrated by these drawings, and afterward point out in claims the novelty of our invention.

All parts of the loom not necessary to illustrate our invention are omitted from the drawings.

Figure 1 is a vertical sectional view taken immediately in rear of the breast-beam of the loom and parallel therewith. Fig. 1* represents another position of certain parts shown in Fig. 1. Fig. 2 is a plan view. Fig. 3 represents a vertical section at right angles to Fig. 1 in the line $x\,x$ of Figs. 1 and 2, the parts being viewed from the right of those figures. Fig. 3^a represents a front view of the operative end of the forked inserting-needle and a section of what is hereinafter described as the weft-finger. Fig. 3* is a plan view corresponding with parts of Fig. 3. Fig. 4 is a plan view of a portion of one of the two needles employed to carry the weft through the warp, the shuttle which carries a selvage-thread by which the weft is secured to the web, and parts of the mechanism for operating the said needle and shuttle, showing also a portion of the unwoven warp and woven web. Fig. 5 is a back view corresponding with Fig. 4. Figs. 6 and 7 are side views corresponding with Figs. 4 and 5, showing some of the parts in section. Fig. 7* is a side view of one of the details shown in Figs. 4 and 5. Fig. 8 is a front view of the operative end of the other of the two needles. Fig. 8* is an end view of the same. Fig. 9 is a top view of the same. Fig. 10 is a horizontal sectional view parallel with Fig. 9, showing also in dotted outline the end of the first-mentioned needle. Fig. 3^a and Figs. 4 to 10, inclusive, are on a larger scale than Figs. 1, 2, 3, and 3*.

Similar letters and numbers of reference designate corresponding parts in all the figures.

A designates the main framing of the loom; B, the breast-beam; B′, the web-supporting plate mounted on arms B* in rear of the breast-beam; S, the main shaft; S′, the lay; a, the reed, and S^4 a rod through which the lay may be operated by any suitable means.

P Q are two needles for carrying the weft-thread through the warp, the said needles being arranged to enter the shed from opposite sides of the warp. The needle P is of peculiar forked construction, as hereinafter described, for taking the weft-thread supplied, as is common in needle-looms, from a bobbin or spool (not shown) on one side of the loom and carrying it in the form of a loop a part of the way through the shed. The needle Q is hooked to take the looped weft-thread from the forked needle P and draw the said thread the remainder of the distance through the warp.

The butt of the forked needle P is firmly secured to a reciprocating carriage P′, like that employed in many other needle-looms, running on a stationary horizontal slide P^2, which is carried by a bracket P^3, secured to the framing A on one side of the loom.

The hooked needle Q, which will be seen in Figs. 1 and 2 to have the character of a lever, is fulcrumed by a pin q to a reciprocating carriage Q′, which is fitted to a horizontal slide Q^2, supported by a bracket Q^3, which is bolted to the framing of the loom on the opposite side to that on which the slide P^2 is arranged. The slides P^2 and Q^2 are substantially in line with each other.

The needles P Q are represented as each long enough to pass a little more than half-way through the warp from opposite sides thereof. The needle-carriages P′ Q′ are connected, respectively, by short rods p' and q' with the long lever-arms P^4 Q^4 of two fulcrum-shafts P^5 Q^5, which are supported in brackets P^6 Q^6 on opposite sides of the loom-framing. Shorter lever-arms P^7 Q^7 of these fulcrum-shafts P^5 Q^5 are connected, respectively, by rods p^2 q^2 with the arms p^3 q^3 of a horizontal rock-shaft p, which is arranged parallel with the direction of the warp and supported in bearings in standards P^8. The rocking motion of the rock-shaft p and its arms p^3 q^3 produces, through the rods p^2 q^2, the movement of the levers P^4 P^7 and Q^4 Q^7, thereby

running the needle-carriages P′ and Q′ along the slides P^2 Q^2. The rocking motion aforesaid is imparted to the said shaft p and arms p^3 q^3 partly by a cam P^{10} on the main shaft S of the loom (see Fig. 3) and partly by a spiral spring P^*. (See Fig. 1.) The said cam P^{10} acts upon a friction-bowl on a lever P^9, one end of which works on a fixed fulcrum p^5, supported in the loom-framing, and the other end of which is connected by a chain q^4 with a projection on the arm q^3, the said chain working on a downward prolongation of the said arm q^3 in sector form, as shown at q^5 in Fig. 1. The spring P^* is connected at a fixed point q^6 with the loom-framing and at the other end with a projection q^7 on the arm q^3 of the rock-shaft p. The said spring acts to turn the rock-shaft in the direction of the arrow shown near it in Fig. 1* for the purpose of driving the needle and the weft-hook into the warp, and the cam P^{10} serves to turn the said rock-shaft in the opposite direction—namely, that indicated by the arrow in Fig. 1—for withdrawing the two needles.

The forked needle P is represented as of tubular construction throughout its whole length. This is desirable for the sake of lightness, and, though it might be solid for the greater portion of its length, it is necessary that the operative end should be hollow or of skeleton form, as shown in Figs. 8, 9, and 10. The said end has in it a narrow longitudinal vertical slot 21, (see Figs. 9 and 10,) which is open on both sides for the passage of the thread 25 through it, the upper portion of said slot extending, as shown in Fig. 9, farther back than the corresponding lower portion. (Shown in Fig. 10.) The portion of this end at the back of the vertical slot 21 is prolonged, as shown at 22, beyond the portion in front thereof, and the portion in front of the said slot is slotted longitudinally and horizontally, as shown at 23, the portion at the back of said slot 21 having no slot. Across the interior of the upper part of the first slot 21 there is secured in the needle a pin 24, forming a bridge opposite the back of the lower part of the said slot 21. The second slot 23 in the front part of the needle is wide enough for the entry of the hook 26 of the needle Q (shown in dotted outline in Fig. 10) to take the weft-thread 25. This thread, which, as hereinbefore mentioned, comes from a spool occupying a fixed position outside of the loom-framing, as is common in needle-looms, passes through the needle P, or the hollow point thereof, over the bridge 24, and during the inward movement of the needle down through the lower part of the slot 21, as shown in Fig. 8, the head of the loop, formed between the bridge 24 and the bottom of the slot 21, extending across the slot 23, as shown in Figs. 3^a and 8, so that the hook of the needle Q, entering the latter slot, as shown in dotted outline in Fig. 10, cannot fail to seize it.

The hooked needle Q has its hook 26 on its back, as shown in Figs. 2 and 4. This hook must be broad enough—that is to say, thick enough in a vertical direction—to give considerable spread to the loop of the weft-thread 25, as shown in Fig. 5; but beyond the hook the said needle has a thin point 27, as shown in Fig. 5. Besides the longitudinal movement hereinbefore described, by which the hook of the needle Q is caused to enter into the hollow point of the needle P to take the loop of the weft-thread from the latter and complete the carrying of the said weft-thread through the warp, the said needle Q is required to have a lateral oscillating or backward-and-forward movement on the pivot q for the purpose of delivering the said loop over the selvage-thread shuttle R, which will be presently described. While the said needle Q is moving longitudinally into and out from the warp the said needle is held substantially in line with the needle P by means of a spring q^8 (see Fig. 2) against a stop q^9, secured upon the needle-carriage Q′. When the needle Q has pulled the weft completely through the warp, its forward movement on the pivot q, for the purpose of passing the loop of said thread over the shuttle and casting it off, is produced by means of a cam Q^8 on the main shaft S, acting through an elbow-lever Q^9, which works on a fixed fulcrum 28, (see Fig. 3,) the said lever being connected by a rod 28^* with the lower arm 29 of an upright oscillating shaft 30, the upper arm 31 of which carries an upright pin 32, which moves forward against the needle Q. The said arm 31 is pulled backward again by means of a spring Q^{10}, connecting the elbow-lever Q^9 with a fixed point in the loom-framing.

The selvage-thread shuttle R is represented in Figs. 4, 6, and 7 as consisting simply of two cheek-plates united at one end to form the nose r and having pivoted within them the selvage-thread bobbin r'. The said shuttle is placed in a shuttle-holder R′ R^2, (see Figs. 1, 2, 4, 6, and 7,) which is situated on the same side of the loom as the needle Q and near the line in which the selvage of the web travels. This lower part R′ of this holder, which is represented as secured to a projection r^* on one of the brackets B^*, which supports the web-plate B′, constitutes a stationary bed or support for the shuttle. The upper part R^2 is simply a cover hinged to the front of R′ at r^2 and having applied to it a spring r^3, which presses it down with just force enough to hold the shuttle between the slightly-concave opposite faces of R′ R^2 and prevent its lateral movement. The nose of the shuttle is presented in a rearward direction, and the mouth of the shuttle-holder at which the nose r of the shuttle is presented has its lips r^4 r^5 flaring, as shown in Fig. 6, to facilitate the entry of the loops of the weft-thread between the shuttle-holder and shuttle.

In order to facilitate the passage of the loop of the weft between the shuttle and shuttle-holder after their entry into the latter, and

particularly to relieve the lower part of the loop as much as possible of the weight of the shuttle, which should be capable of containing the largest practicable quantity of thread, we employ in rear of the shuttle and shuttle-holder a lifter R^3, (see Figs. 4, 5, 6, and 7,) which consists of an arm or lever pivoted at a suitable fixed point r^6, represented as on a bracket R^4, secured to the fixed bottom R' of the shuttle-holder. The head of this arm is made, as shown in Figs. 6 and 7, with a cavity 33 to receive the nose r of the shuttle. Above the said cavity 33 in the said head is a wedge-surface r^7, which acts, as shown in Fig. 7, on the lip r^5 of the shuttle-holder cover R^2 to lift the said cover. The lower entrance of the cavity 33 is also beveled, as shown at r^8, to act with a wedge-like or cam-like action on the under part of the nose r of the shuttle to lift or tip the latter up from the shuttle support or bed R'. This operation of the lifting-arm is produced by means of a spring r^9, attached to the bracket R^4 and pressing against the said arm. The throwing back of the said arm after the operation to the position shown in Fig. 6 is produced by an upright pin or projection 34 on the arm 31 of the rock-shaft 30, hereinbefore described, acting against a lateral projection 35 on the arm R^3.

For the purpose of casting off the loop of the weft-thread from the hook 27 of the needle Q, after the latter by a movement from the position shown in bold outline in Fig. 4 to that shown in dotted outline in the same figure has carried the said loop over the shuttle, we provide what we term a "cast-off" T, the construction of which is illustrated in Figs. 4, 5, and 7*, and the stationary position of which in front of the said needle and outside of the shuttle-holders is shown in Fig. 2. This cast-off consists of a double fork, of which the prongs 36 36 farthest from the shuttle-holder are substantially parallel with the selvage-line, as shown in Fig. 4, are also parallel with each other, as shown in Figs. 5 and 7*, and are wide enough apart through their whole length to permit the passage of the shaft or stem of the needle to work between and be steadied by them; but the two prongs 37 37 nearest the shuttle-holder, which have their points inclined backward toward the shuttle and their rear edges oblique to the selvage-line, as shown in Fig. 4, while wide enough apart throughout the greater portion of their length to allow the passage of the shaft or stem and the hook of the needle Q between them, have their points so contracted toward each other, as shown in Figs. 5 and 7*, as to leave only sufficient space between them for the passage of the thin point 27 of the needle, which projects beyond the said hook. The points of the prongs 37 37 being thus contracted and the point of the needle being thus reduced in thickness, when the needle moves forward from the position shown in bold outline to that shown in dotted outline in Fig. 4 there is plenty of space between the needle and the loop 25* (see Fig. 5) of the weft-thread for the loop to be carried by the hook over the said points, and thereby extended in width. The continued movement of the needle toward the dotted position draws the loop against the inclined outer edges of the prongs 37, whereby the loop is detained while the completion of the said movement of the needle takes it completely out of the loop. The loop being then no longer held against the prongs 37, the said prongs, owing to their inclination, will no longer detain it, but leave it free to be drawn up tight in any way in which the loops of the weft are commonly drawn up to the selvage in needle-looms, as by the action of the inserting-needle P.

In order that when two needles P Q have been withdrawn from the shed, and the hooked needle has pulled the loop of the weft-thread as far beyond the selvage as is necessary, the latter needle may have its return movement postponed long enough for its casting-off movement, just above described, to take place, and that the said postponement might be effected while the needle P continues its outward movement, by which the loop is drawn up to the selvage, the arms p^3 q^3 of the rock-shaft are so arranged that the connection between the said arm q^3 and its rod q^2 in completing the movement in the direction of the arrow shown in Fig. 1, by which the outward movement of the needle Q is effected, passes by a line drawn transversely and horizontally through the rock-shaft p; but the arm p^3 of the said rock-shaft is so arranged that it never passes such a line. This may be understood by reference to Figs. 1 and 1*, in the latter of which the said arms are shown in the position in which they have, by a movement in the direction of the arrow shown in that figure, brought both needles to the end of their inward strokes, while in the former figure the said arms are shown with the needles at the end of their outward strokes. It will be obvious on comparing these figures, and particularly on reference to Fig. 1, that while the arm q^3 has been completing its stroke in the direction of the arrow shown on it in the last-mentioned figure there has been a scarcely perceptible movement of the rod q^2 and needle Q, while during the corresponding movement of the arm p^3 there has been a considerable movement of the rod p^2 and needle P.

s, Figs. 1, 2, 3, 3ª, and 3*, is what we term the "weft-finger," arranged near the selvage-line on the same side of the loom as the weft-inserting needle P for the purpose of pressing the weft 25 forward in the shed on that side of the loom after the withdrawal of the needle and preparatory to the weft being beaten up by the reed. It will be understood by reference to Fig. 3*, which includes a top view of the web-supporting plate B' and part of the web and of the end of the needle, that

after the withdrawal of the needle the weft 25 runs from the needle to the fell v at the opposite selvage in an oblique direction, and that at the selvage next the needle the weft is a good way forward of the fell. The weft-finger s, which consists of a thin flat piece of metal, is pivoted at s', a little way in front of the needle, to a small fixed bracket s^3, fastened to one of the brackets B*, which carries the plate B'. The operative movement of the said finger is downward and forward parallel with the selvage, and is represented as produced through a lever U, (see Figs. 1, 2, and 3*,) working on a fixed fulcrum u, one end of the said lever being connected by a pin u' and rod u^2 with the weft-finger, and the other end being arranged to be acted upon every time the needle P is withdrawn from the warp by a projection u^3 (see Fig. 1) on the needle-operating lever-arm P^4. This weft-finger first depresses the weft-thread downward in the shed and then carries it forward close or near to the fell, so that all that the reed has to do is to beat up the weft after it has been brought to the fell. The said finger serves the further purposes of taking up any slack of the weft-thread that may not have been taken up by the outward movement of the needle and of leading the said thread into the lower fork or lower part of the slot 21 of the needle P. This last-mentioned action is illustrated in Fig. 3^a, where the said thread is shown in dotted outline in the nearly-straight position it assumes when the needle is drawn out of the warp 38 and in full outline in the position to which it is depressed by the weft-finger, and thereby led into the said fork. The weft-finger s is shown in this figure in dotted outline in the position it occupies when not in operation and in bold outline as having depressed the weft-thread, as above mentioned, so that when the needle again moves forward the said thread will be looped across the slot or fork 23 of the needle, as shown in Fig. 8. Although the thread is moved forward in the shed by the continued movement of the finger, and although the finger is raised again before the needle is again inserted, the slack of the thread permits it to remain in position to be looped as the needle moves inward. The return movement of the weft-finger is produced by a spring u^4, which connects it with the needle-carriage slide P'.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination of a hooked needle for pulling the looped weft-thread through the warp, a carriage for said needle with which the latter is capable of moving lengthwise and to which it is pivoted to oscillate laterally, means for giving the said carriage and needle a reciprocating motion to produce the lengthwise movement of the needle, means for producing the pivotal oscillating movement of the needle, and a selvage-thread shuttle over which the loops of the weft are caused to pass by the pivotal oscillation of the needle, all substantially as herein set forth.

2. The combination, with a needle for carrying a weft-thread, a selvage-thread shuttle, and a shuttle-holder consisting of a support and a cap or cover, of a lifter engaging with said cap or cover to remove its pressure from the shuttle during the passage of the loops of the weft-thread over the shuttle, substantially as and for the purpose herein described.

3. The combination, with a needle for carrying a weft-thread, a selvage-thread shuttle, and a shuttle-holder consisting of a support and a cap or cover, of a lifter engaging separately with said shuttle and said cap or cover to remove the pressure of the latter from the shuttle and tip up or lift the shuttle from its support for the purpose of allowing the free passage of the loops of the weft-thread between the shuttle and the support and cover of the holder, substantially as herein set forth.

4. The combination, substantially as herein described, of a forked needle on one side of the loom and a reciprocating carriage for the same for carrying a weft-thread, a hooked needle on the other side of the loom for taking the said thread from the forked needle, a reciprocating carriage for said hooked needle to which the said needle is pivotally connected, a selvage-thread shuttle on the same side of the loom with the hooked needle, means, substantially as described, of giving the hooked needle an oscillating motion on its carriage to pass the loop of the weft-thread over the shuttle, and means, substantially as described, of producing the reciprocating movements of the said needles, whereby the said movement of the hooked needle is nearly suspended during its oscillating movement.

5. The combination, with the selvage-carrying shuttle and the hooked needle having its point 27 projecting beyond and thinner than its hook 26, of the stationary cast-off fork having its prongs 37 obliquely arranged relatively to the selvage line and having the space between said prongs wide enough throughout a part of their length for the passage of the hook, but having their ends constructed to leave a space between them only large enough for the point 27, substantially as and for the purpose herein set forth.

6. A weft-inserting needle for a loom, having in its point or end a longitudinal slot 21, which is open on both sides, having a prolonged point 22 on one side of said slot, having a second longitudinal slot 23 at right angles to the slot first mentioned, but open on one side only, and having a bridge 24 across the first-mentioned slot, substantially as and for the purpose herein described.

7. The combination, with a forked weft-inserting needle, of a weft-finger arranged on that side of the loom at which said needle enters the warp and capable of a movement in a plane parallel with the selvage for the purposes of taking up the slack of the weft

and beating the weft into the fork of said needle, and mechanism for producing the movements of the said needle and weft-finger, substantially as herein set forth.

8. The combination, with the needle P and its carriage and the arm P^4, which operates the said carriage, of the weft-finger *s*, pivoted at one side of the loom, the lever U, having a fixed fulcrum *u* and connected at one end with said finger, and the projection u^3, provided on said lever-arm P^4 to operate upon said lever U and through it on the weft-finger *s*, substantially as herein set forth.

HALCYON SKINNER.
FRANK H. CONNOLLY.

Witnesses:
THOMAS ELLIOT,
HERBERT G. UNDERWOOD.