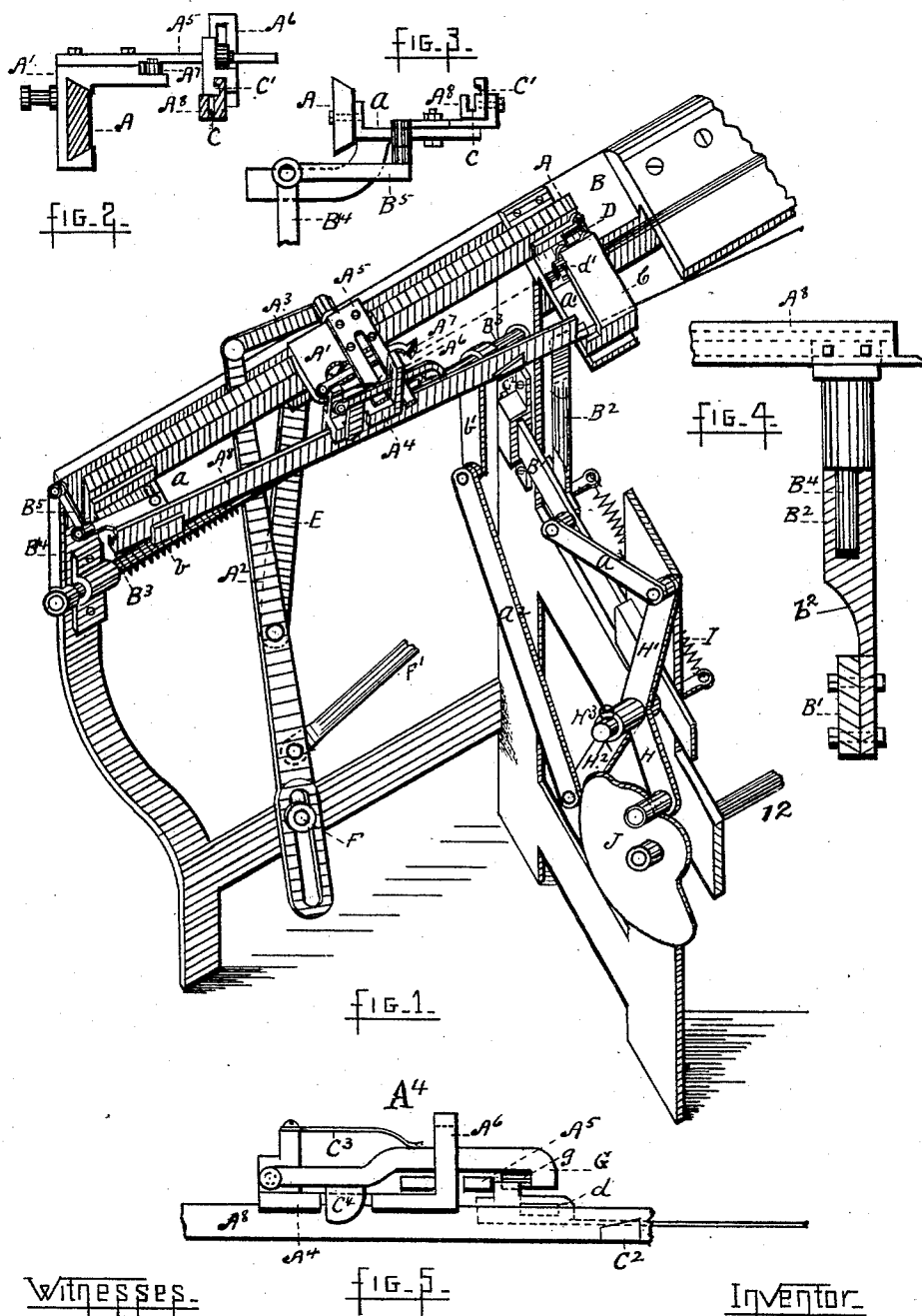


B. HILBERT.
LOOM FOR WEAVING PILE FABRICS.

No. 452,918.

Patented May 26, 1891.



Witnesses.

A. M. White.
H. M. Fowler

FIG. 5.

Inventor.

Baptiste Hilbert
By His Atty
Rufus Bennett Fowler

(No Model.)

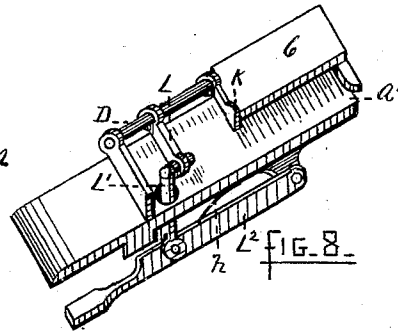
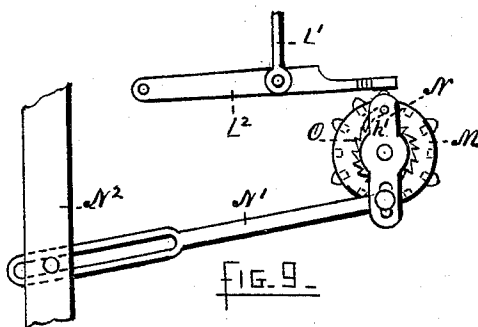
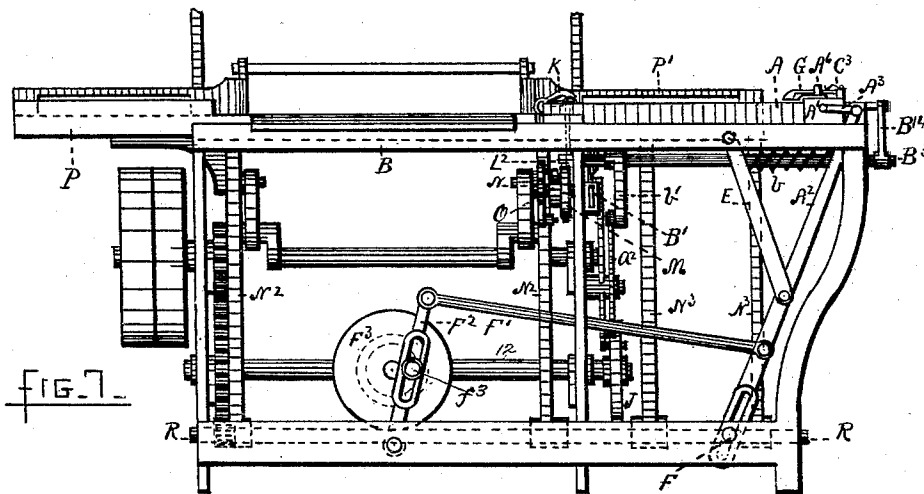
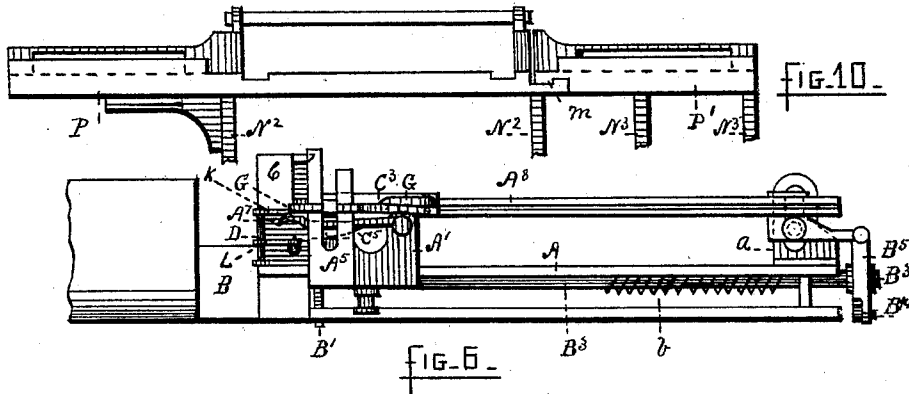
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H. M. Fowler

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Inventor:

Baptiste Hilbert
By his atty
Refus Bennett Fowler

By His atty

Refus⁷ Bennett Fowler

(No Model.)

3 Sheets—Sheet 3.

B. HILBERT.

LOOM FOR WEAVING PILE FABRICS.

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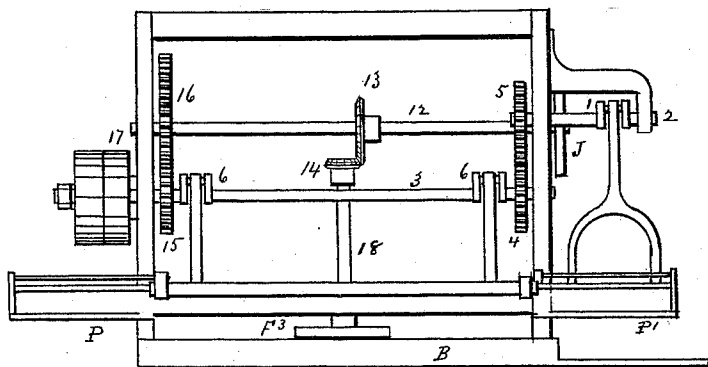


FIG. 14-

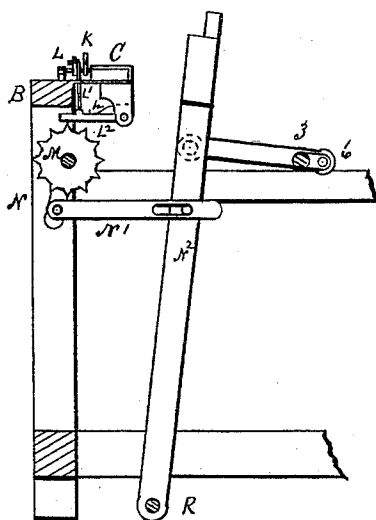


FIG. 11

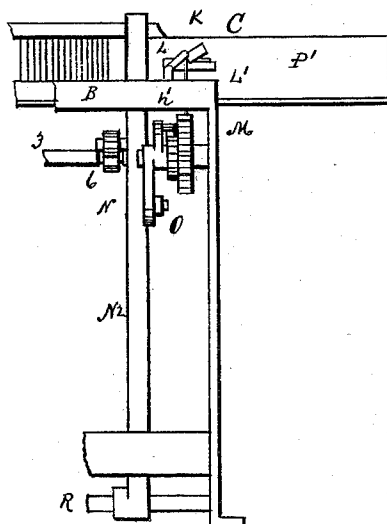


FIG. 12-

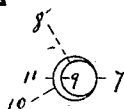


FIG. 15-

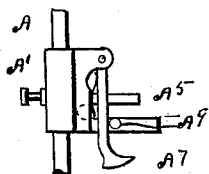


FIG. 13-

WITNESSES-

B. M. M. Brohan
H. M. Fowler

INVENTOR-

Baptiste Hilbert,
By Rufus B. Fowler, Atty.

UNITED STATES PATENT OFFICE.

BAPTISTE HILBERT, OF WORCESTER, MASSACHUSETTS.

LOOM FOR WEAVING PILE FABRICS.

SPECIFICATION forming part of Letters Patent No. 452,918, dated May 26, 1891.

Application filed February 5, 1883. Serial No. 84,033. (No model.)

To all whom it may concern:

Be it known that I, BAPTISTE HILBERT, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented a new and useful Improvement in Looms for Weaving Pile Fabrics, of which the following is a specification, reference being had to the accompanying drawings, illustrating those portions of a loom embodying my invention, and in which—

Figure 1 is a perspective view of the wire-actuating mechanism. Fig. 2 is an end view of the wire-driving and wire-holding carriages, showing the guide and wire bars in section. Fig. 3 is a view of the outer end of the guide-bar and wire bar or trough. Fig. 4 is a detail view, partly in section, of the inner end of the wire bar or trough and the sliding bar by which the said wire bar is operated, showing the swivel-joint by which the same are connected. Fig. 5 is a rear elevation of the wire-driving carriage, showing a portion of a wire-bar or trough. Fig. 6 is a top view of a portion of the wire mechanism. Fig. 7 is a front elevation of a portion of a loom. Fig. 8 is a perspective view of the wire box and in connection with Fig. 9 shows the device for controlling the wire-withdrawing latch, and Fig. 10 is a front elevation of a portion of the lay. Fig. 11 is a side view of a portion of the mechanism for operating the latch K, with the nearest loom side removed. Fig. 12 shows a front view of a portion of the mechanism for operating the latch K. Fig. 13 shows the under side of the carriage A'. Fig. 14 is a top view of a portion of a loom, showing the method of operating the detachable shuttle-box, and Fig. 15 is an illustrative diagram of the crank motions by which the lay and detachable shuttle-box are moved.

Similar letters and figures refer to similar parts in the several views.

My invention consists in the combination, with the wire box and wire-withdrawing mechanism, of a wire bar or trough having actuating mechanism, whereby a peculiar motion is imparted thereto, as hereinafter described, whereby I am enabled to increase the speed of the loom and decrease the "shed" or opening of the warp-threads, and also to insert long and slender wires with greater

steadiness and ease; in mechanism for driving the wire-actuating carriages, as hereinafter described; in certain devices for controlling the action of the wire-withdrawing latch, so as to cause the wire mechanism to skip the insertion of a wire at certain times; in the combination of the several wire-actuating devices supported upon the wire-driving carriage, and also in the means of interlocking the detachable shuttle-box and lay.

A is a horizontal guide-bar supporting the sliding wire-driving carriage A', which is made to traverse upon the guide-bar by the lever A², connected to said carriage A' by the link A³, and also connected by the link F' with the oscillating slotted lever F², actuated by the crank-pin f³ on the wheel F³, working in the slot of the lever, said wheel F³ being suitably connected with and operated by the driving parts of the loom by means of a bevel-gear 13, placed on the lower or picking shaft 12 and engaging a bevel-gear 14 on the shaft carrying the wheel F³, as shown in Fig. 14, so that the motions of the levers F² and A² shall be timed with the beats of the lay and shall cause the wire-driving carriage A' to traverse the guide-bar A, actuating the wire-holding carriage A⁴, so as to insert a wire in the shed at each alternate beat of the lay, as hereinafter described.

If the driving-lever A² were an ordinary lever pivoted at F as a fixed pivot, the motion of the carriage A' would obviously be retarded at each end of its passage. To obviate this retardation of the wire-driving carriage, I connect the lever A² to the extended breast-beam B by the link E and slot the lower end of the lever A², so that it can slide on the pin F, thus changing the pivotal point with reference to the lever and increasing the length of the lever at each end of the throw, thereby accelerating the motion of the carriage A'. The wires are supported while being withdrawn by the grooved wire bar A⁸, which I make L-shaped in its transverse section, the upper surface of the horizontal side having a longitudinal groove c arranged in a vertical plane to receive the wire, the vertical side of the bar serving as the way or guide for the wire-holding carriage A⁴, which incloses a portion of the bar and projects into a groove c', arranged in a horizontal plane in the bar, there-

by locking the carriage A^4 upon the wire bar, as shown in Fig. 2. The wire-driving carriage A' carries the wire-withdrawing latch A^7 , which as the carriage moves forward slides upon the front side of the first one of the wire heads d' , Fig. 1, in the wire box C and engages the head of the first wire by hooking into an opening d , Fig. 5, made in the wire head itself, and as the carriage moves back withdraws the wire from the woven fabric into the groove c in the wire bar A^8 . During the backward motion of the carriage A' the wire bar A^8 is in the position shown in Fig. 6 or parallel with the guide-bar A. As the carriage A' moves forward or inward toward the loom, the slotted plate A^5 , secured thereto and resting against the back of the wire head, Fig. 5, pushes the wire out of the wire bar into the open shed, the wire bar during the forward motion of the carriage A' having been made to assume a position forming a slight angle with the warp, as shown in Fig. 1. The carriage A^4 slides upon the wire bar and carries the retaining-latch G, which passes through a slot in the post A^6 , and whose hooked end has a lip extending downward and forming a recess g , which holds the wire head against the vertical side of the wire bar. The side of the wire bar A^8 is raised, making the transverse section of the bar L-shaped, not only for the purpose of holding the groove c' , but also to give a support to the side of the wire head and secure greater steadiness to the wire. The wire-holding carriage A^4 is moved by the slotted plate A^5 , which is attached to the wire-driving carriage A' , and, inclosing the slotted post A^6 on the carriage A^4 , allows the carriage A^4 to be moved to or from the carriage A' as the wire bar is carried toward or from the guide-bar A.

The wire bar A^8 is supported by its inner end resting on the shelf a' , formed on the wire box C, and its outer end on the shelf a , secured to the outer end of the guide-bar. The movement of the wire bar is produced as follows: The cam J, of a suitable form to give the desired motion of the wire bar, is placed on the lower or picking shaft of the loom, and through the arm H actuates the arm H' and H^2 , all being united and composing a three-armed lever pivoted upon the stud H^3 . The arm H' is longer than the arm H^2 , and a link a^3 connects the arm H' with the sliding bar B' , held in suitable guides on the loom-frame. A socket B^2 , formed in an arm b^3 , secured to bar B' , receives the pin B^4 , which is attached to the wire bar A^8 near its inner end. The pin B^4 , being capable of turning in the socket B^2 , forms a swivel-joint. The cam J in lifting the lever H will carry the sliding bar B' and connected inner end of the wire bar toward the guide-bar A to the position shown in Fig. 6, the retractile spring I, connecting the bar B' with the loom-frame, serving to withdraw the said end of the wire bar and hold the friction-roller on the arm H against the face of the

cam J. The shorter arm H^2 , by means of the link a^2 , actuates the arm b' on the rock-shaft B^3 , arranged parallel to the breast-beam B and guide-bar A, and through the arm B^{14} and link B^5 , connected with the outer end of the wire bar, a motion is given to said outer end of the wire bar toward the guide-bar when the arm H is raised by the cam J.

The respective motions of the two ends of the wire bar caused by the action of the cam J, as described, will cause it to assume a position parallel to the guide-bar A and also to the wires in the fabric and bring the wire groove c coincident with the first wire in the wire box C. As the cam J rotates, allowing the arm H to fall, spring b , coiled upon the rock-shaft B^3 , will actuate the rock-shaft and carry the outer end of the wire bar away from the guide-bar, the retractile spring I simultaneously carrying the inner end of the wire bar away from the guide-bar and bringing the wire bar into the position shown in Fig. 1. It will thus be seen that I impart a sliding motion to the wire bar to and from the guide-bar in a line at right angles to the guide-bar, the motion at the inner end being greater than that of the outer end, as the arm H^2 is shorter than the arm H' , and the motions of the two ends of the wire bar may be changed relatively to each other by varying the length of the arms H' and H^2 .

The action of the wire bar in relation to the wire-inserting and wire-withdrawing mechanism is as follows: During the backward or outward motion of the carriage A' on the guide-bar A and the carriage A^4 on the wire bar A^8 the wire bar occupies the position parallel with the guide-bar shown in Fig. 6, allowing the wire-withdrawing mechanism to withdraw one of the wires from the wire box into the longitudinal groove in the wire bar A^8 . As the carriages A' and A^4 begin their forward motion toward the wire box C the wire bar A^8 is carried away from the guide-bar by one motion of the entire bar, sliding on the shelves a and a' into the position shown in Fig. 1, the whole bar moving continuously and in the same direction, but the inner end moving farther than the outer end, and consequently faster. As the motion of the ends is synchronous, the bar is made to stand at an angle with the guide-bar, as in Fig. 1. The forward motion of the wire-carriage is continued and the wire inserted in the open shed, and simultaneously with the completion of the forward motion of the wire-carriage the wire bar is carried by one motion of the entire bar back to the position shown in Fig. 6, the inner end of the bar moving parallel with the wire box C.

It will be seen from the above description of the movement of the wire bar that during a portion of the sliding motion of the wire-carriages in the operation of inserting a wire the entire wire bar is carried by a single movement from a position parallel with the breast-

beam to a position at an angle therewith, the two ends of the wire bar moving synchronously and continuously.

By this peculiar motion of the wire bar, which is an essential feature of my invention, I am enabled to increase the speed of the loom, as the motion is continuous and less abrupt from one position to the other and as the outer end of the bar is carried away from the guide-bar the position of the wire as it enters the fabric is less oblique.

Looms have been used for weaving pile fabrics in which the wire bar has occupied, respectively, positions shown in Figs. 1 and 6; but the change has been produced by separate and detached motions of the wire bar.

It is sometimes desirable to cause the wire-inserting mechanism to skip the insertion of the wires for a period of the weaving. This I accomplish by the devices shown most clearly in Fig. 8, but which are mostly omitted from Fig. 1 to avoid confusion.

The latch K on the spindle D, journaled in suitable bearings, is placed so as to close the end of the wire box C and cover the side of the first wire head, so that the hooked-wire-withdrawing latch A' will slide upon the side of the latch K and the hook of the latch A' be prevented from engaging the opening d in the wire head.

In Fig. 6 the latch A' is shown as being held out by the latch K, the spring c' actuating the latch A'. So long as the withdrawing-latch fails to withdraw a wire no wire will be, of course, inserted at the next forward motion of the wire-driving carriage. Whenever the exigencies of the weaving require that the insertion of wires shall be omitted at regular intervals to produce a desired pattern, I operate the latch K by a lever L, attached to the spindle D and connected by the link L' to a lever L², pivoted at one end and actuated at the other or free end by pins or tappets in the tappet-wheel N, which has an intermittent motion imparted through the ratchet-wheel O, vibrating lever N, carrying the pawl h', and actuated by the sword N² of the lay through the slotted link N'. The spring h holds the lever L² against the tappet-wheel and maintains the latch K in the position shown in Fig. 8, except when raised by the intermittent motion of the tappet-wheel, thereby allowing the wire-withdrawing latch A' to engage with and withdraw a wire from the pile. The devices for operating the latch K are shown in detail and more clearly in Figs. 9, 11, and 12. In many kinds of weaving, however, the use of the latch K is only required in certain emergencies, such as "pick-outs," &c. In such cases I disconnect the latch K from the operating mechanism entirely, raising it permanently during the operation of weaving, so as to allow the action of the wire-actuating mechanism to go on unimpeded, and, when required, placing the latch in position to cover the wire head in the box C by the hand of the operator.

The withdrawing-latch A' is pivoted to carriage A' and vibrates in a horizontal plane, the wire head being disengaged from the latch as the wire bar is moved out from the guide-bar, thereby carrying the wire head away from the latch, which is held from following the wire head by a pin or stud A⁹ on the under side of the plate A⁵. The retaining-latch G is pivoted to the carriage A⁴ and projects down in front of the wire head, preventing the wire from being drawn out of the bar, and also extends down at the side of the wire head at g to hold the wire head against the raised side of the wire bar. As the latch G approaches the wire box, it is raised by the projection c⁴, passing on the inclined way c², Fig. 5, on the side of the wire bar. As the wire-holding carriage A⁴ moves back from the wire box C, the withdrawing-latch A', engaging the front wire head, as described, withdraws the wire head, holding it against the slotted plate A⁵, and as the projection c⁴ moves off the inclined way c² the latch G is permitted to fall in front of the wire head in the position, as shown in Fig. 5.

My improved wire mechanism may be used with a lay having either a fixed or a detachable shuttle-box; but I use, preferably, a detachable shuttle-box P', pivoted at the bottom of the loom-frame on the rod R R by the two independent swords N³ N³ and vibrated in a manner similar to the lay by a crank 1 on an independent shaft 2, driven from the crank-shaft 3 of the loom by gears 4 and 5. The throw of the crank 1 is somewhat less than that of the cranks 6 6 on the shaft 3, which actuate the lay, and the different crank-shafts 2 and 3 are so timed that at the extreme backward swing the lay and the detachable shuttle-box P' will correspond, so that the shuttle may be thrown across the lay; but as the throw of crank 1 is less than that of crank 6 the shuttle-box will fall behind in the forward swing or beat of the lay. Diagram Fig. 15 shows the position and paths of the two cranks 1 and 6. At the point 7 they cause the shuttle-box and lay to coincide; but the crank 1, taking the path 8, carries the shuttle-box only to position 9, while crank 6, taking the path 10, will carry the lay to point 11. Fig. 14 shows the position of the shuttle-box crank and also of the lower or picking shaft 12, which carries the cam J, and also a bevel-gear 13, which, through the bevel 14, drives the crank-plate F³. The picking-shaft 12 receives motion through the gear-wheels 15 16 from the crank-shaft 3, which is driven by the belt-pulley 17, or, as is common in case of looms of this kind, the belt-pulley may be placed on an independent shaft geared to the crank-shaft. The arrangement, however, of the main operating-shafts common to looms forms no part of my invention, as they are similar to those of other looms of this class and are capable of such modification as the skill of the loom-builder may suggest. In order to give increased steadiness and prevent

any lateral motion, I attach the box to the end of the lay by interlocking the overlapping surfaces, as at *m*, Fig. 10.

I do not claim any special method of actuating the shuttle-box, as any suitable and known method may be employed, my present invention relating to the mode of interlocking the box and lay.

I am aware that wire-sustaining bars or troughs have been in use having a motion toward and from the rigid guide-bar, and by which motion the wire-sustaining bar has been made to assume positions of varying angles to the fabric, such bars having been either pivoted at or near one end or supported upon arms attached to a rocking-shaft beneath the wire bar. In my improved loom the wire bar has a sliding motion and is supported by shelves *a a'*, and the motions of the outer and inner ends of the wire bar are synchronous, but unequal in extent.

I do not claim any special method of actuating the latch *K* by means of a pattern mechanism or any special form of pattern mechanism to be used for that purpose, as many ways are known and familiar to those skilled in the art of weaving; neither do I claim a slotted lever sliding on its pivot and hinged to the loom-frame for the purpose of actuating the wire-driving carriage.

What I do claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a wire-inserting and wire-withdrawing mechanism, of a rigid wire-supporting trough or bar and operating mechanism, substantially as described, for actuating the outer and inner ends synchronously, but unequally in extent, the motion of said bar being continuous from a position parallel with the breast-beam of the loom when a wire is withdrawn to a position at an angle with the breast-beam, at which time the operation of inserting a wire is completed, and then back again to a position parallel with the breast-beam, as described.

2. The combination, with a wire bar or trough, of a three-armed lever, mechanism, substantially as described, connecting two of said arms with the outer and inner ends of said wire bar, an actuating-cam whereby an oscillating motion is imparted to said three-armed lever, and a retractile spring applied to said three-armed lever to reverse its motion as actuated by said cam, substantially as described.

3. The combination, with the wire bar or trough, of the oscillating lever having arms of unequal length, the cam acting upon one of said arms, the sliding bar connected by a swiveled joint with one end of the wire bar, the rod connecting said bar with the longest arm, the spring acting to hold the first-mentioned arm in contact with the cam, and connecting devices, substantially as described, between the third arm and the other end of the wire bar, as and for the purposes set forth.

4. The combination, with a wire bar or

trough, of a lever having arms of unequal length, means acting upon one of said arms to vibrate the lever, and connecting devices, substantially as described, between the remaining two of said arms and the opposite ends of the wire bar, whereby a sliding motion toward and from the front of the loom is imparted to the latter, as set forth.

5. The combination, with a wire bar or trough, of a rock-shaft placed beneath the wire bar and provided with two radial arms, a link connecting one of said arms with one end of the wire bar, actuating mechanism by which the shaft is rocked in one direction connected with the other of said arms, substantially as described, a spring applied to said shaft by which its motion is reversed, and wire-bar-actuating mechanism, substantially as described, connected with and actuating the other end of the wire bar, as and for the purposes set forth.

6. The combination, with a wire bar or trough, of a rock-shaft provided with two arms attached to said shaft, a link connecting one of said arms with one end of the wire bar, a link connecting the other arm with one arm of a pivoted three-armed lever, a pivoted three-armed lever, one of whose arms is actuated by a cam, an actuating-cam, a spring acting to hold the cam-actuated arm of said lever against the cam, and connecting devices, substantially as described, between the third arm and the other end of the wire bar, as and for the purpose set forth.

7. The combination, with a wire bar or trough, of a rock-shaft provided with two arms, a link connecting one of said arms with one end of the wire bar, a link connecting the other of said arms with one arm of a pivoted three-armed lever, a pivoted three-armed lever, a cam actuating said lever, a spring applied to said rock-shaft to rock it in one direction, a spring applied to said three-armed lever to reverse its motion as actuated by the cam, and connecting devices, substantially as described, between said three-armed lever and the other end of the wire bar, as and for the purposes set forth.

8. The combination, with a wire bar or trough, of a rock-shaft, an arm attached to said rock-shaft, a link connecting said arm with one end of the wire bar, a second arm attached to said rock-shaft, a link connecting said arm with one arm of a three-armed lever, a three-armed lever pivoted upon a stud held in the loom-frame, an actuating-cam actuating said three-armed lever in one direction, a sliding bar connected by a swiveled joint with one end of the wire bar, a link connecting said sliding bar with one of the arms of the three-armed lever, a spring to hold the third arm of the three-armed lever in contact with the actuating-cam, and a spring applied to said rock-shaft to reverse its motion, as and for the purposes set forth.

9. The wire trough or bar *A*^s, formed with a vertical wire groove *c* and a horizontal

groove *c'*, and a reciprocating carriage inclosing the upper edge of said bar and locked thereon by entering the horizontal groove *c'*, all combined and operating as described.

5 10. The combination of the fixed guide-bar A, a movable wire bar having connected means for actuating the same, a reciprocating wire-driving carriage sliding on the guide-bar, having connected means for actuating
10 the same, a slotted plate rigidly attached to said carriage and extending over the wire bar, a withdrawing-latch pivoted to said carriage, a wire-holding carriage sliding on the wire bar, a retaining-latch pivoted to said wire-
15 holding carriage, and a post on said wire-holding carriage passing through and capable of sliding in the slotted plate attached to the wire-driving carriage, all arranged and operating as set forth.

20 11. The combination, with a movable wire bar or trough, a reciprocating carriage adapted to slide thereon, and a wire-retaining latch pivoted to said carriage, of a cam-plate attached to the side of said wire bar and moving with it, said cam-plate lying in the path
25 of said pivoted retaining-latch, whereby the latch is raised and the wire released as the latch approaches the wire box, as described.

12. The combination, with the wire box and

a wire-withdrawing latch adapted to withdraw 30 the first of a series of wires in the wire box, of a latch or plate to cover the head of the wire to be withdrawn, and thereby prevent the wire-withdrawing latch from engaging with and withdrawing said wire, as described. 35

13. The combination, with a wire box and a wire-withdrawing latch having mechanism for actuating the same, of a latch or plate arranged to cover the head of the wire to be withdrawn and thereby prevent the wire- 40 withdrawing latch from engaging the same, mechanism connecting said latch or plate with the pattern mechanism, and pattern mechanism whereby the action of the wire-withdrawing latch shall correspond with the pattern to 45 be woven, all combined and operating substantially as described.

14. The combination, with the lay of a loom, of a detached shuttle-box, said lay and shuttle-box having their surfaces overlapping and 50 having interlocking notches on their overlapping surfaces, so as to prevent the lateral motion of the shuttle-box, substantially as described.

BAPTISTE HILBERT.

Witnesses:

CHARLES W. GILBERT,
S. B. I. GODDARD.