(No Model.)

B. HILBERT.

LOOM.

No. 561,110. Patented June 2, 1896.

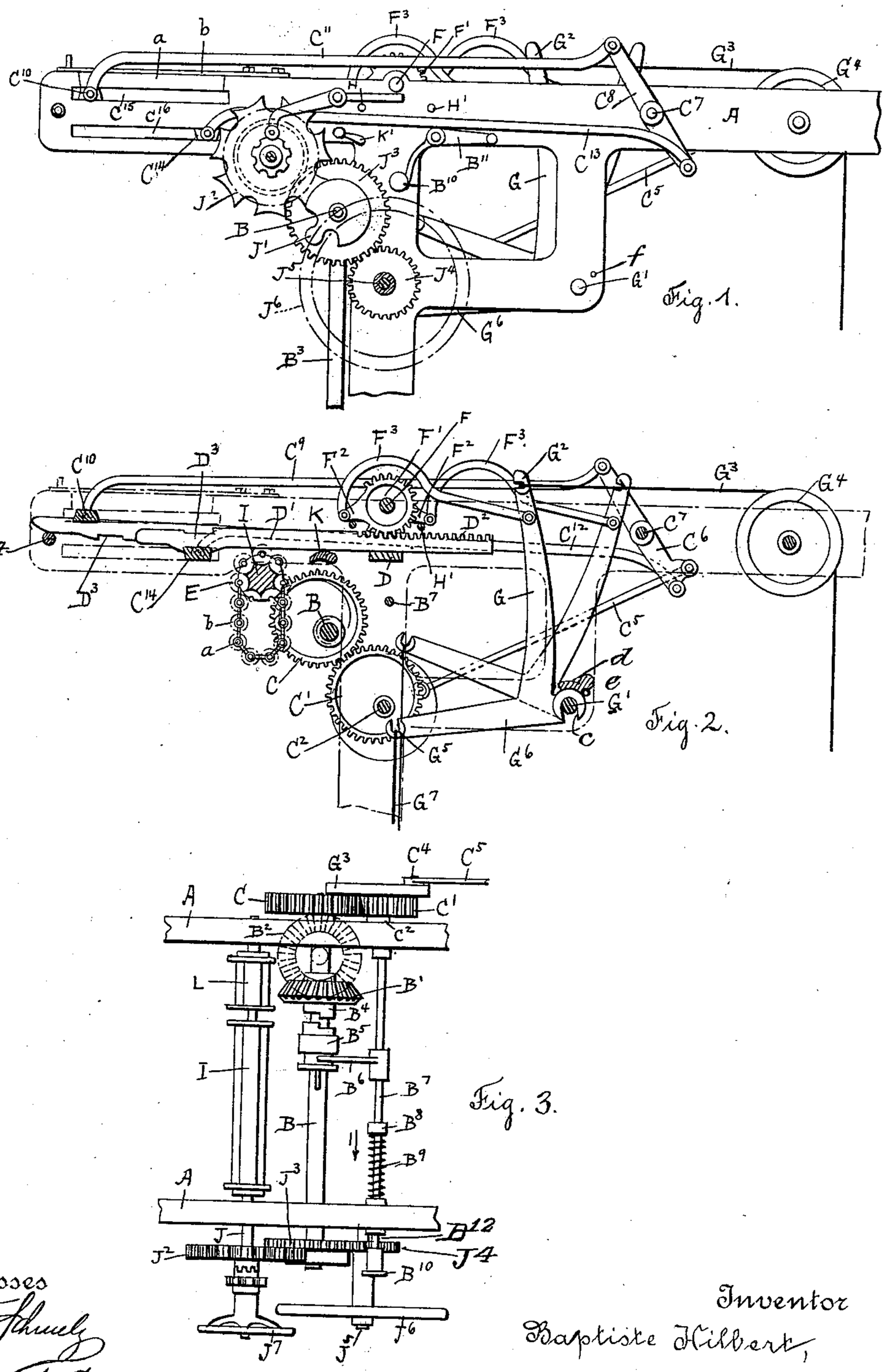

Fig. 1.

Fig. 2.

Fig. 3.

Witnesses
Chas F. Schmeltz
Clara A. Blake.

Inventor
Baptiste Hilbert,
By his Attorney
Rufus B. Fowler.

UNITED STATES PATENT OFFICE.

BAPTISTE HILBERT, OF WORCESTER, MASSACHUSETTS.

LOOM.

SPECIFICATION forming part of Letters Patent No. 561,110, dated June 2, 1896.

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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 the Shedding and Shuttle-Box Mechanism for Looms, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 represents a front view of so much of the mechanism as embodies my invention. Fig. 2 represents the operating parts arranged in their respective relative positions with the transverse shafts shown in sectional view and with the position of the framework indicated by broken lines, and Fig. 3 denotes a top view of the transverse horizontal driving-shaft with the connected driving-gears and with the clutching mechanism by which the shedding mechanism is connected and disconnected at will with the driving power.

Similar letters refer to similar parts in the several figures.

Referring to the drawings, A denotes a portion of the framework of a loom, showing that part in which the shedding mechanism is supported and in which is journaled the horizontal transverse shaft B, connected by the beveled gear B′, turning loosely on the shaft B, and a beveled gear B^2 on the vertical shaft B^3 with any of the rotating shafts of the loom, preferably with the crank-shaft by means of beveled gears upon the end of the crank-shaft and the lower end of the vertical shaft B^3, which are not, however, represented in the accompanying drawings, as their construction and arrangement will be well understood.

The beveled gear B′ is connected at will with the transverse driving-shaft B by means of clutch-teeth B^4 upon the hub of the beveled gear B^4 and the sliding collar B^5, provided with clutch-teeth arranged to engage the teeth B^4. The sliding clutching-collar B^5 has a spline connection with the shaft B, and is engaged by a fork B^6, attached to a sliding rod B^7.

The sliding rod B^7 has an attached collar B^8 with a spiral spring B^9 between the collar B^8 and the framework A, by which the sliding clutching-collar B^5 is normally held in engagement with the clutch-teeth B^4. When it is desired to disconnect the shaft B from the driving power, the rod B^7 is drawn in the direction of the arrow 1 by the knob B^{10} and the end of the pivoted lever B^{11} is inserted in the space B^{12} between the hub of the knob B^{10} and the frame A, thereby holding the clutching-collar B^5 out of engagement with the clutch-teeth B^4 and against the tension of the spring B^9.

Attached to the transverse shaft B is an eccentric gear C, arranged upon the back side of the framework and shown in top view in Fig. 3 and in elevation in Fig. 2. The eccentric gear C engages an eccentric gear C′, turning upon a stud C^2, held in the framework of the loom and carrying upon its side the crank-plate C^3, provided with a crank-pin C^4, which is connected by the link C^5 with the rocking arm C^6.

The oscillating arm C^6 is attached to a transverse shaft C^7, passing through the framework of the loom and having an oscillating arm C^8 attached to its front end. By the rotation of the crank-plate C^3 an oscillating motion is given to the shaft C^7 and arms C^6 and C^8. The oscillating arm C^6 upon the rear side of the loom is connected by a link C^9 with the sliding knife-bar C^{10}, and the oscillating arm C^8 upon the front of the loom is similarly connected by a link C^{11} with the sliding knife-bar C^{10}. In like manner the oscillating arms C^6 and C^8 are connected at their lower ends, by means of the links C^{12} upon the rear of the loom and C^{13} upon the front of the loom, with a sliding knife-bar C^{14}.

The sliding knife-bars C^{10} and C^{14} slide in slots C^{15} and C^{16} in the loom-frame placed side by side. Resting upon the fixed bar D and the pattern-chain E are a series of steel blades or jacks D′, provided with the gear-teeth D^2 and having notches D^3 D^3 upon their upper and lower sides, by which they are engaged by the sliding knife-bars C^{10} and C^{14}.

The sliding knife-bars C^{10} and C^{14} have a reciprocating motion back and forth in the slots C^{15} and C^{16}, the upper knife-bar C^{10} serving to move the jacks D′ toward the right and the knife-bar C^{14} serving to draw the jacks D′ toward the left, the operation of the sliding knife-bars being as follows: Whenever the jacks D′ rest upon the bars of the pattern-chain, their notches are engaged by the sliding

knife-bar C^{14} as it moves toward the left, causing all the depressed jacks to be carried along with the knife-bar C^{14} as it moves toward the left or away from the pattern-chain, until it approaches the end of its movement, when the ends of the jacks are carried upon a bar D^4, held in the framework of the loom and termed a "clearer-bar," the rounded end of the jack causing it to be raised as it passes onto the clearer-bar D^4 and thereby lifted out of engagement with the knife-bar C^{14}, allowing the knife-bar C^{14} to return without engaging the jacks D', which rest upon the bar D^4 and are supported in a plane between the two knife-bars C^{10} and C^{14}. As the knife-bar C^{14} moves back toward the pattern-chain the knife-bar C^{10} moves outward over the jacks, and if it is desired to move the jacks toward the right upon the return movement of the sliding knife-bar C^{10} a roll *b* is brought under the jack by the intermittent motion of the pattern-chain, causing the jack to be lifted and its upper notch engaged by the sliding knife-bar C^{10}. In this manner the jacks D' are engaged by either the upper or the lower of the reciprocating knife-bars and moved across the fixed bar D.

Held in the framework is a fixed shaft F, upon which are placed the segmental gears F', each of which is provided with a crank-arm F^2, to which is pivoted a link F^3, by which the crank-arm is connected with the upright arm G of a bell-crank having a rocking motion about the fixed shaft G'.

To the notched end G^2 of the vertical arm G of the bell-crank is connected the harness-strap G^3, passing over the guide-roll G^4, and being attached in the usual manner to the top of the harness-frame, and to the notched end G^5 of the horizontal arm G^6 of the bell-crank is connected the strap G^7, which is carried around suitable guide-pulleys upon the floor and attached in the usual and well-known manner to the under side of the harness-frame.

In operation an oscillating motion is imparted to the shaft C^7 and arms C^6 C^8 through the eccentric gears C C', by which a gradually-accelerated and gradually-retarded motion is imparted to the arms C^6 and C^8, and a suitable period of rest or "dwell" is secured. The sliding knife-bars C^{10} and C^{14} impart a reciprocating motion to the jacks D' as they are severally engaged by the knife-bars, and through the rack-teeth D^2 a reciprocating rotary motion is given to the segmental gears F', by which the crank-arms F^2 are thrown around the shaft F and brought alternately into contact with the rods H H'. The rods H H' are held in the framework of the loom and slightly below the shaft F, so that any strain exerted upon the crank-arms through the links F^3 will tend to draw the crank-arms more firmly against the rods H H', and thereby hold the segmental gears F' from rotating. The pattern-chain E is supported upon the rotating barrel I, carried upon a shaft J and driven from the shaft B by means of the spur J' and notched wheel J^2, constituting the well-known construction known as the "Geneva-stop motion." Upon the shaft B is placed a gear J^3, which is driven by a pinion J^4, turning loosely upon a stud J^5 and having connected with its hub a hand-wheel J^6, by which the pattern-chain may be turned by the operator when the shaft B is disconnected from the beveled gear B'.

The notched wheel J^2 has a clutched connection with the shaft J, carrying the pattern-chain, by which it is disconnected from the shaft J, which may then be turned by means of the hand-wheel J^6. The hand-wheels J^6 and J^7 are represented in Fig. 1 by broken lines. Whenever it is desired to bring all the threads in the warp into the same plane, the toothed jacks D' may be simultaneously raised, so as to be brought into engagement with the upper knife-bar C^{10} by means of the eccentric rotating blade K, journaled in the framework and operated by the lever-handle K', Fig. 1, thereby causing all the jacks D' to be moved toward the right and rotating all the gears F' toward the left. The shaft J, Fig. 3, also carries a barrel L to receive a shuttle-box pattern-chain, by which a separate series of toothed jacks can be brought into engagement with the sliding knife-bars C^{10} and C^{14}, by which segmental gears provided with crank-arms, as already described, and connected oscillating bell-cranks can be connected through intermediate mechanism with the shuttle-boxes.

The frame A above the slot C^{15} is made in a separate piece *a*, which is attached to a flat blade-spring *b*, having its end attached to the framework A in order to allow the movable portion *a* of the frame to be raised in case the sliding knife-bar C^{10} should be lifted by the jacks out of its normal position. The lifting of the sliding knife-bar C^{10} is liable to occur when the jacks are raised by the eccentric rotating blade K, and the sliding knife-bar C^{10} is moved by means of the hand-wheel J^6, causing the sliding knife-bar C^{10} to slide over the upper edges of the jacks before engaging D^3. Whenever this occurs, the sliding knife-bar C^{10} is necessarily lifted from its normal position, thereby raising the bar *a* and lifting the spring *b*, which returns the bar *a* to its proper position, as shown in Fig. 1, as soon as the sliding knife-bar C^{10} has entered the notch C^3 of the toothed jacks.

Each of the harness-frames is connected by straps G^3 and G^7 with the vertical arms G and horizontal arms G^6 of the bell-cranks, which are rocked about the fixed shaft G' by means of the angular motion of the crank-arms F^2 and connecting-links F^3, and by varying the length of the crank-arms F^2, making the crank-arm of the first or front segmental gear the shortest and gradually increasing the length of each succeeding crank-arm, I gradually increase the rocking motion of the bell-cranks from the front rearward, producing an "an-

gular shed" and allowing the vertical and horizontal arms G G⁶ to be of uniform length.

The bell-cranks to which the harness-straps G³ and G⁷ are attached are provided with hooked or open bearings *c*, allowing each of the bell-cranks to be individually lifted out of engagement with the shaft G′. When placed in position upon the shaft G′, as shown in Fig. 2, they are locked in position by a plate *d*, attached to a rotating spindle *e*, which is journaled in the framework of the loom at *f*, Fig. 1.

The spindle *e* is rocked in its bearings, raising the plate *d* out of contact with the bell-cranks and permitting them to be lifted off the shaft G′.

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

1. In a loom shedding mechanism, the combination of a series of pivoted levers operatively connected with the harness-frames, segmental gears capable of an oscillating movement through an arc greater than a half-revolution, radial arms projecting from said gears, fixed rods held by the frame of the loom in the path of said arms, whereby the oscillations of said gears are limited, a series of sliding jacks having teeth engaging said gears and notches adapted to be engaged by a pair of sliding knives, a pair of sliding knives engaging said toothed jacks, a bar held in the frame of the loom by which said jacks are raised out of engagement with one of said sliding knives, links connecting said oscillating gears with said pivoted levers, means for imparting a sliding motion to said knives, and a pattern mechanism for carrying said jacks into engagement with said knives, substantially as described.

2. The combination with the frame of the loom, provided with slots forming ways for a reciprocating knife-bar, and a reciprocating knife-bar moving in said slots, of detached bars forming one side of said slots and blade-springs attached at one end to the frame of the loom and at their opposite ends to said detached bars, whereby said bars are capable of yielding against the pressure of the knife-bar, substantially as described.

3. The combination of the shafts B³, and B, connecting-gears B′, and B², and clutching connection between said gears and said shaft B, eccentric gear C, carried upon said shaft B, eccentric gear C′, rotating upon a stud held in the framework and carrying a crank-plate G⁸, link C⁵, connecting said crank-plate and oscillating arms, oscillating arms, links connecting said oscillating arms with the reciprocating knife-bars, and reciprocating knife-bars engaging a series of jacks, and a series of jacks operatively connected with the harness-frames, substantially as described.

4. The combination of the sliding toothed jacks D′, segmental gears F′, having radial arms F², operatively connected with the harness-frames by intermediate mechanism, substantially as described, a pattern-chain-carrying shaft J, rotating shaft B, intermediate connecting mechanism, by which the rotation of the shaft B, is made to impart an intermittent rotary motion to the shaft J, substantially as described, a gear J⁸, carried upon the shaft B, and engaged by a driving-gear J⁴, provided with a hand-wheel J⁶, and a supporting-stud J⁵, all arranged and operating, substantially as set forth.

Dated at Worcester, in the county of Worcester and State of Massachusetts, this 26th day of April, 1892.

BAPTISTE HILBERT.

Witnesses:
RUFUS B. FOWLER,
K. M. CARROLL.