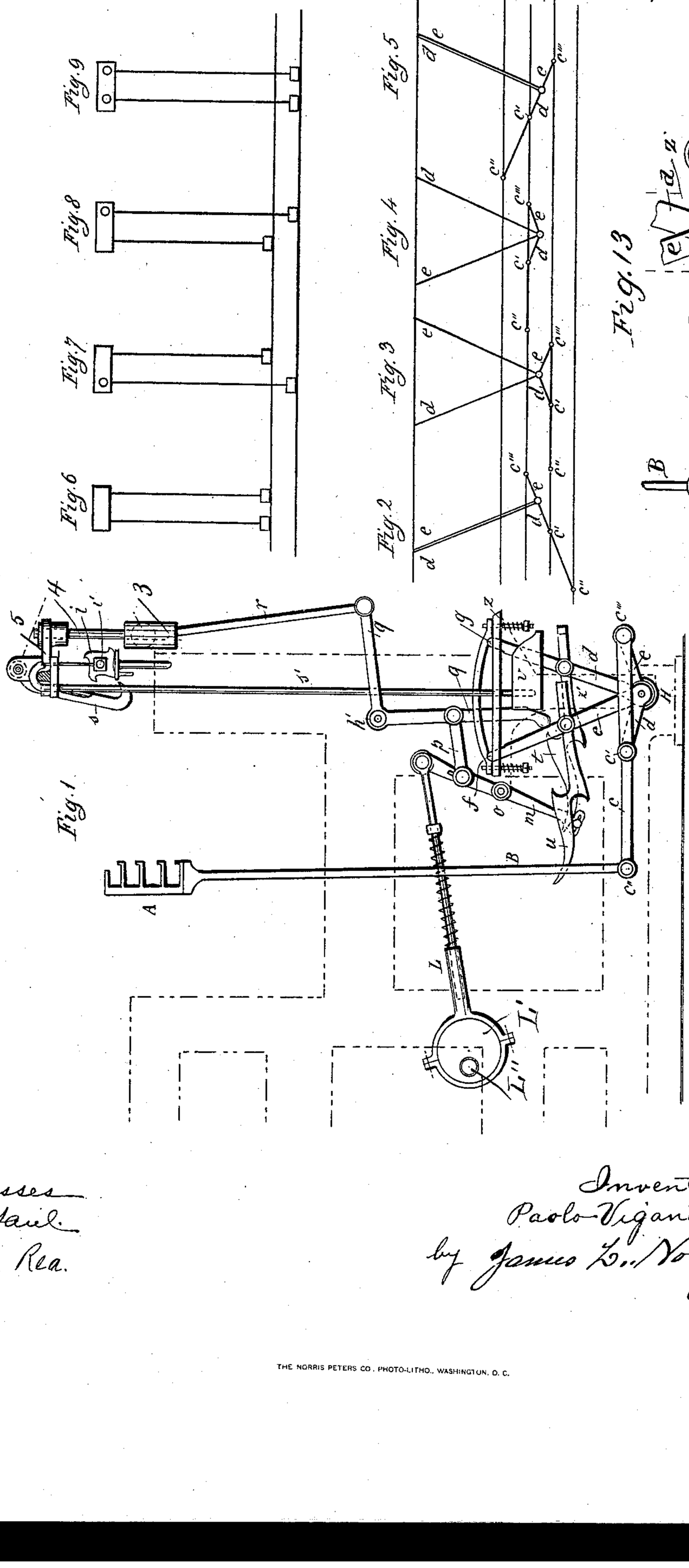
(No Model.)

2 Sheets—Sheet 1.

P. VIGANÒ.

SHUTTLE BOX OPERATING MECHANISM FOR LOOMS.

No. 591,308. Patented Oct. 5, 1897.



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

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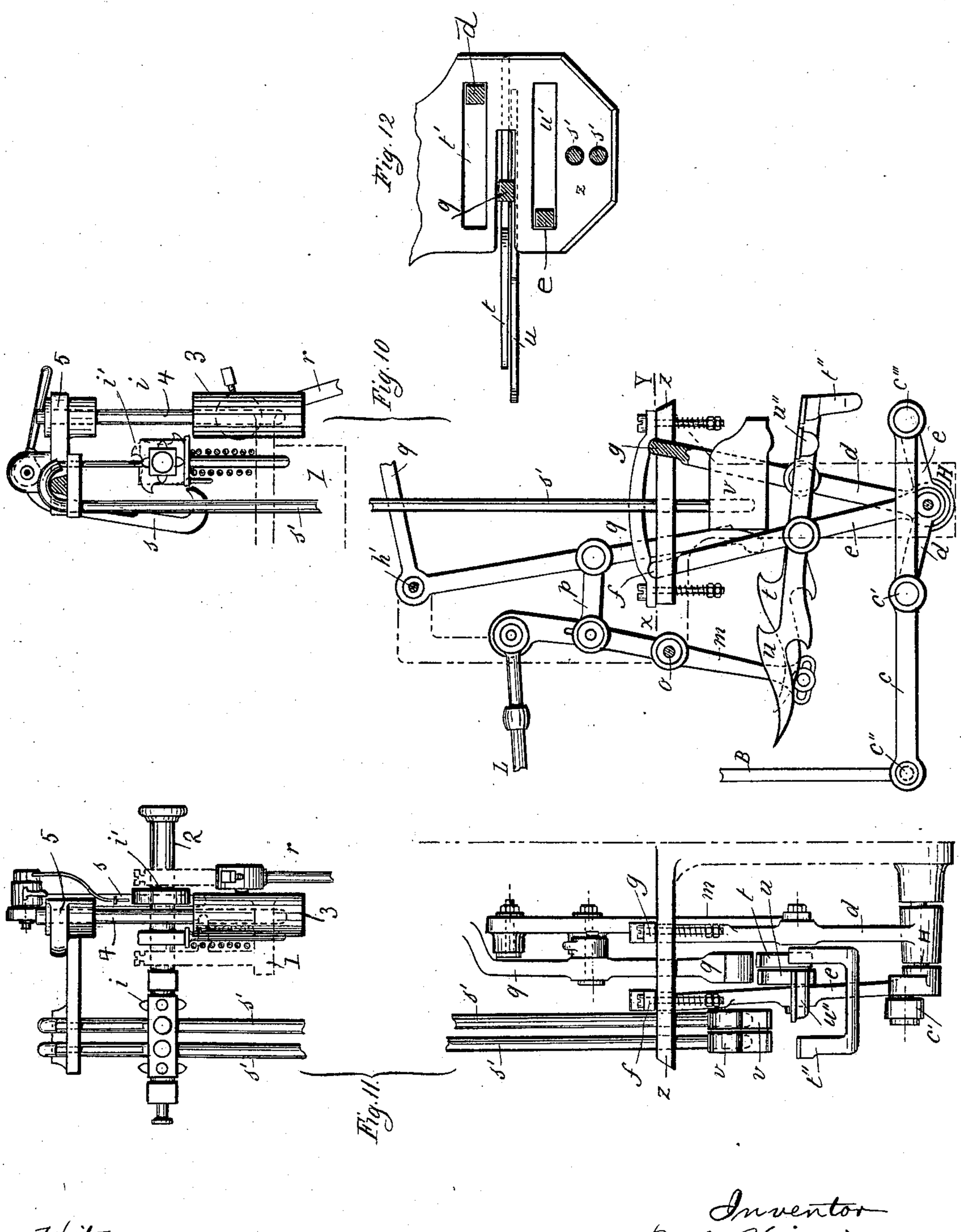

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UNITED STATES PATENT OFFICE.

PAOLO VIGANÒ, OF TRIUGGIO, ITALY.

SHUTTLE-BOX-OPERATING MECHANISM FOR LOOMS.

SPECIFICATION forming part of Letters Patent No. 591,308, dated October 5, 1897.

Application filed March 17, 1894. Serial No. 504,113. (No model.) Patented in Italy November 15, 1891, No. 30,769; in France February 9, 1892, No. 219,259; in Belgium February 10, 1892, No. 98,302; in Switzerland February 10, 1892, No. 4,883; in England February 13, 1892, No. 2,851; in Germany February 13, 1892, No. 70,288, and in Austria-Hungary March 14, 1892, No. 35,651 and No. 68,618.

To all whom it may concern:

Be it known that I, PAOLO VIGANÒ, cotton-weaver, a subject of the King of Italy, and a resident of Triuggio, Lombardy, in the Kingdom of Italy, have invented certain new and useful Improvements in and Relating to Shuttle-Box-Operating Mechanism for Looms, (for which I have obtained patents in Italy, dated November 15, 1891, No. 30,769; in France, dated February 9, 1892, No. 219,259; in Belgium, dated February 10, 1892, No. 98,302; in Great Britain, dated February 13, 1892, No. 2,851; in Switzerland, dated February 10, 1892, No. 4,883; in Austria-Hungary, dated March 14, 1892, [No. 35,651, Austria; No. 68,618, Hungary,] and in Germany, No. 70,288, dated February 13, 1892,) of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to looms which have several shuttles with their boxes adapted to move vertically and in which the change is effected by a jacquard mechanism substantially in the manner hereinafter described, and definitely pointed out in the claims following the description.

In the accompanying drawings, Figure 1 is a side elevation of part of a loom-frame provided with my improved shuttle-changing mechanism. Figs. 2 to 5 show in diagram the different positions of the rocking lever, to which is attached the rod carrying the shuttle-box. Figs. 6 to 9 show the arrangement of the holes in the jacquard-cards corresponding to the different shuttles which are to be set in action. Fig. 10 is a broken side elevation to a larger scale than that in Fig. 1, showing the parts having direct relation with the changing mechanism. Fig. 11 is a broken end view of the parts represented in Fig. 10. Fig. 12 is a section on the line $x\ y$, Fig. 10. Fig. 13 is a detail view illustrating the slotted connection between the lever c and the bell-crank lever e.

In the drawings the improved mechanism is supposed to be applied to a loom provided with four shuttles.

Referring to Figs. 1, 10, and 11, the numeral 1 indicates a pedestal or bracket (shown by dotted lines) mounted on the loom-frame. In said pedestal or bracket is journaled a shaft 2, on one end of which is fixed a jacquard-cylinder i, constructed in a well-known manner, and which supports the cards. On the shaft i are fixed a plurality of teeth i'. Formed with or fixed to the pedestal or bracket 1 is a vertically-slotted guide 3, in which is fitted to reciprocate a vertical rod 4, which is pivotally connected to a rod r, to be hereinafter described. On the upper end of the rod r is fixed a cross-head 5, to which is pivotally attached the upper end of a hook s, which is adapted to engage the teeth i' and impart to the cylinder i a step-by-step rotary movement.

The alternating upward movement of the hook s, causing the rotation of the cylinder i upon its axis, is effected by the eccentric-rod L, which is journaled on an eccentric L', mounted on a rotating shaft L'', as clearly shown in Fig. 1, by which the lever m is made to oscillate upon the fixed center o and to impart, through the medium of the link p, an oscillating movement to the bell-crank lever q, which turns upon the fulcrum h' and communicates a reciprocating movement to the rod r, connected with the aforesaid hook s through the medium of the intermediate connecting mechanism, hereinafter described.

An important feature of my mechanism relates to the action of the two bell-crank levers $d\ d\ e\ e$, which are both adapted to turn upon the same pivot H, fixed upon the lower portion of the loom-frame. These levers accomplish the change of the shuttles in one or the other direction, according as they are with their longer arms at one or the other extremity of two slots $t'\ u'$, Fig. 12, parallel to the plane of Fig. 1, these slots being formed in the plate z and situated in the vertical planes of oscillation of the two levers $d\ d$ and $e\ e$, respectively. The plate z is fixed upon the frame of the loom by means of descending arms z', and the length of the slots $t'\ u'$ depends upon the amount of the vertical displacement of the shuttle-boxes. Above each of these slots are secured to the plate z, by means of spring-bolts, bow-pieces provided with notches $f\ g$ at their extremities. With

these notches engage the upper ends of the longest arms of the levers *d d e e* when these reach the right-hand or left-hand extremity of their movement.

The rocking lever *c*, fixed at *c''* to the rod B, which acts upon the shuttle-box A, provided with four compartments in order to cause it to move upward or downward, is attached at *c'* and at *c'''*, respectively, by slotted connections to the extremities of the shortest arms of the levers *d d* and *e e*, adapted to oscillate upon the pivot H. As the levers *d d* and *e e* do not stop in an intermediate position, but pass with the upper extremity of their longest arms directly from the position *f* to the position *g*, or vice versa, the lever *c* may occupy alternately one of the four positions represented in Figs. 2 to 5, these positions being as follows:

First. The two upper extremities of both of the levers *d d e e* are on the left-hand side, Fig. 2—that is to say, at *f*, Fig. 1. Then the two shortest arms of the same levers are in the same line. The lever *d* is below and the lever *e* above. The point *c''* is also below and the rod B is at the lower extremity of its movement and presents the first shuttle to the action of the shuttle-driver.

Second. The upper extremity of the lever *d d* is on the left-hand side, Fig. 3—that is to say, at *f*, Fig. 1—and that of the lever *e e* on the right-hand side at *g*, Fig. 1. The rocking lever *c* is in a horizontal position *c' c'' c'''*, Fig. 3, and the rod B presents the second shuttle to the action of the shuttle-driver.

Third. The positions of the levers *d d e e* are inverted, Fig. 4. The upper extremity of the lever *e e* is on the left-hand side at *f*, Fig. 1, and that of the lever *d d* on the right side at *g*, Fig. 1. The rocking lever *c* is still placed horizontally and the rod B presents the third shuttle to the action of the shuttle-driver.

Fourth. In the fourth position, Fig. 5, the two levers *d d e e* have both their upper extremities on the right-hand side—namely, at *g*, Fig. 1. The shortest arm of the lever *d d* is turned upward. The shortest arm of the lever *e e* is turned downward, and these two arms are in the same line which coincides with the direction of the rocking lever *c*, the extremity *c''* of which is in the highest position, so that the rod B presents the fourth shuttle to the shuttle-driver.

It remains to set forth the manner in which the levers *d d e e* are operated by the chain of cards actuated by the cylinder *i*. At half the length of the longest arms of the two levers *d d e e* are pivoted the two bars *t u*, which by reason of their weight tend to bear upon a pin at the lower extremity of the lever *m*. The bars are provided with two noses. By means of the nose below a projection on the lower end of the lever *m* as it oscillates from the left to the right hand side tends to push the longest arms of the levers *d d e e* to the right-hand extremity of the slots in the plate 2. The lower extremity of the lever *q* when oscillating in the opposite direction to that of the lower end of the lever *m* acts upon the upper nose of the two bars *t* and *u* and tends to push the longest arms of the levers *d d e e* to the left-hand extremity of the slots in the plate *z*.

Two rods *s'*, Figs. 10, 11, and 12, take part in the alternating upward movement of the mechanism for actuating the hook *s* and carry weights *v* at their lower extremities. The rods *s'*, bent above, bear upon the cards of the pattern, which are moved by the cylinder *i*. If the card in action has two holes, the rods *s'* with their counterweights *v* do not encounter any obstacle whatever and descend, bearing upon the heel-pieces *t'' u''* of the shortest arms of the two bars *t u*, raising their longest arms and causing the upper noses of these bars to engage with the terminal point of the lever *q*, which has the defect of displacing the longest arms of the two levers *d d e e* to the left-hand extremity of the slots *t' u'* in the plate *z* and consequently setting the first shuttle in action, Fig. 2. If, on the other hand, the card presents only one hole, there is only a single rod *s'*, which descends, and a single bar whose longest arm is raised and pushed in the above-described manner. According as the hole is on the right or on the left hand side the lever *d d* or the lever *e e* will be displaced. The arrangement of the holes in the cards is represented in Figs. 6 to 9.

The card shown in Fig. 6 corresponds to the position of the levers *d d e e* in Fig. 5 and to the setting in action of the fourth shuttle.

The card shown in Fig. 7 corresponds to the position of the levers *d d e e* in Fig. 4 and the setting in action of the third shuttle.

The card shown in Fig. 8 corresponds to the position of the levers *d d e e* in Fig. 3 and the setting in action of the second shuttle.

Lastly, the card shown in Fig. 9 corresponds to the position of the levers *d d e e* in Fig. 2 and the setting in action of the first shuttle.

If two shoots of the same color are to be introduced, the same shuttle-box has to operate, in which case it is sufficient to let two cards with the same arrangement of holes follow each other.

What I claim is—

1. In a loom, the combination of vertically-movable shuttle-boxes, a jacquard mechanism, a rod carrying the shuttle-boxes, a rocking lever for raising and lowering said rod, two pivoted bell-crank levers attached at their shorter extremities to said rocking lever, bars *t* and *u* pivoted intermediate their ends to the longer arms of said bell-crank levers, mechanism for engaging said bars to rock the bell-crank levers in one direction, mechanism for engaging said bars to rock the bell-crank levers in the opposite direction, and two weighted rods arranged over the extremities of the said bars and controlled by the jacquard mechanism, said rods when dropped by the jacquard mechanism engaging the extremities of the bars *t* and *u* and throwing the latter out of engagement with

one of the operating mechanisms and into engagement with the other, substantially as described and for the purpose specified.

2. In a loom, the combination of vertically-movable shuttle-boxes, a jacquard mechanism, a rod carrying the shuttle-boxes, a rocking lever for raising and lowering said rod, two bell-crank levers pivoted upon a common center and pivotally attached at their shorter extremities to said rocking lever, bars *t* and *u* pivotally attached intermediate their ends to the longer arms of said bell-crank levers and provided with projecting hooks or noses, mechanism for engaging said hooks to rock the bell-crank levers in one direction, an oscillating lever *q* adapted to engage the hooks to rock the bell-crank levers in the opposite direction, and two weighted rods arranged over the free ends of the bell-crank levers and controlled by the jacquard mechanism and operating when dropped by said mechanism to oscillate the bars *t* and *u* and throw the hooks into the path of the oscillating lever *q*, whereby the bell-crank levers are thrown in the opposite direction, substantially as described and for the purpose specified.

In witness whereof I have hereunto set my hand this 26th day of December, 1892.

PAOLO VIGANÒ.

Witnesses:
CARILLA CATTINA,
CARLS BARFANÒ.