

J. KENNEDY.
SWIVEL LOOM.

No. 512,474.

Patented Jan. 9, 1894.

Fig: 1.

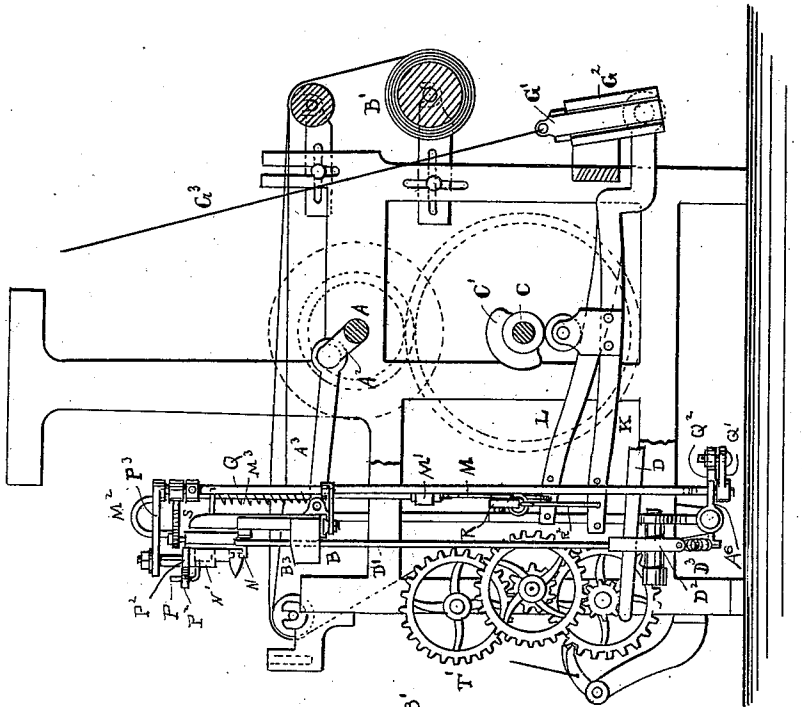
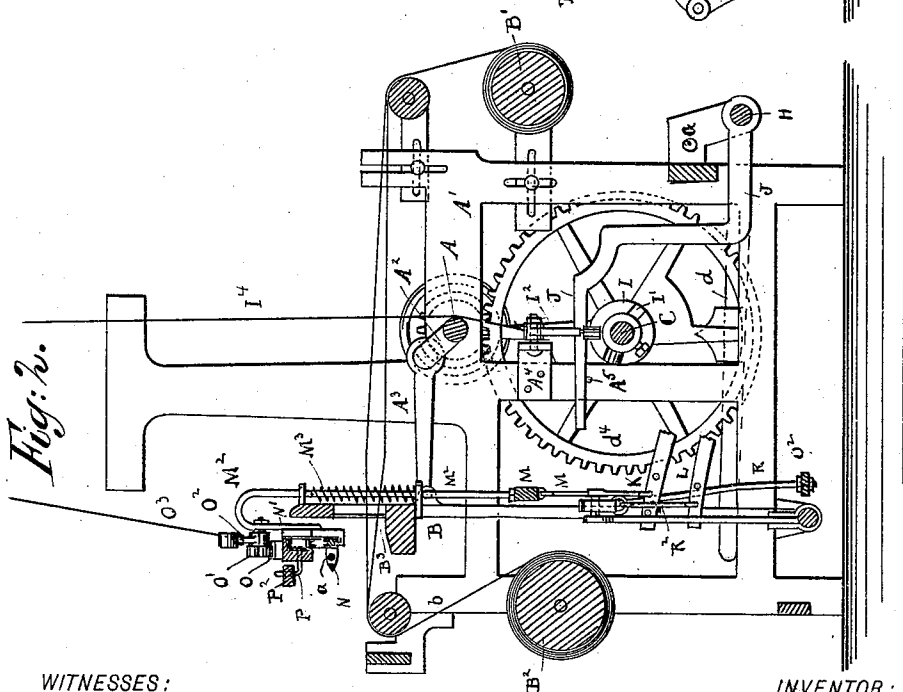


Fig: 2.



WITNESSES:

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INVENTOR:

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Fig. 3.

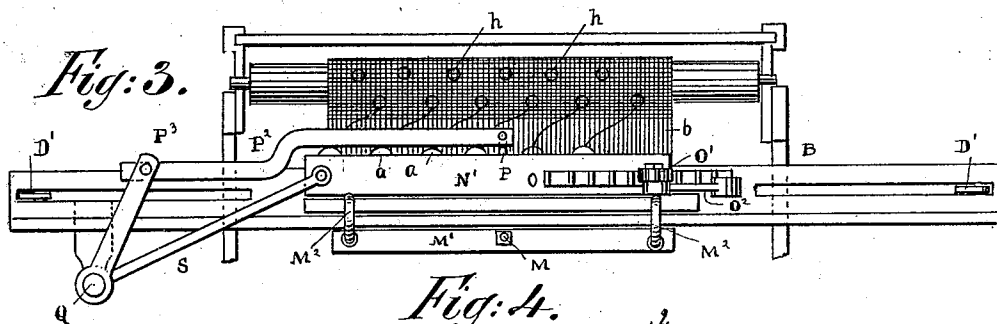


Fig. 4.

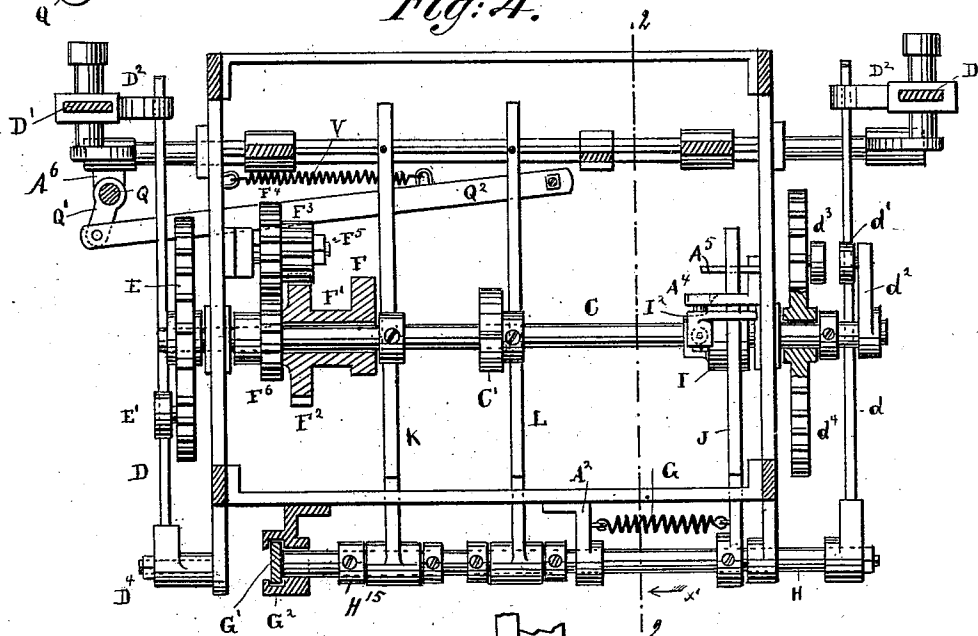
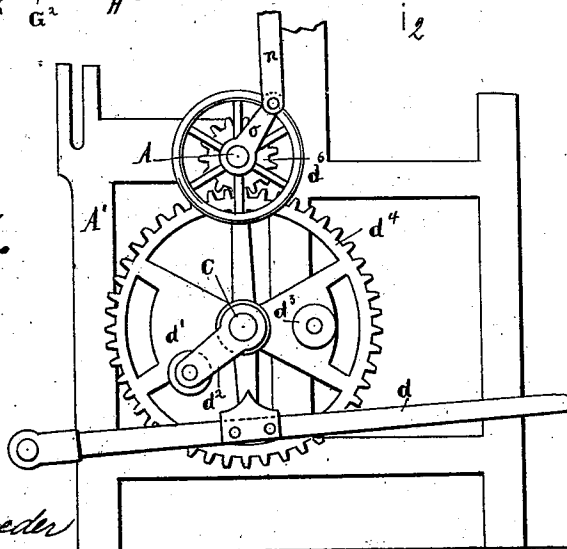


Fig. 5.



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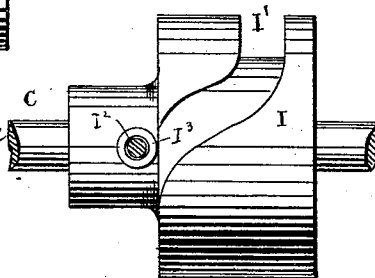
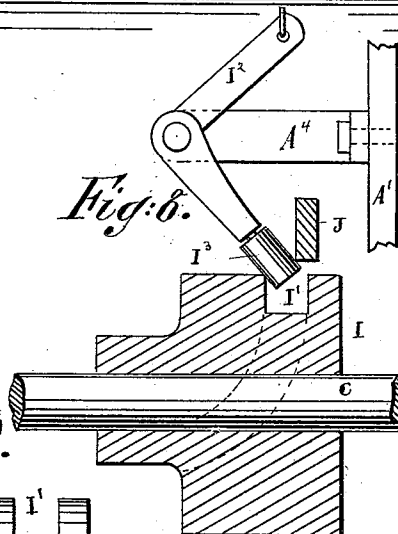
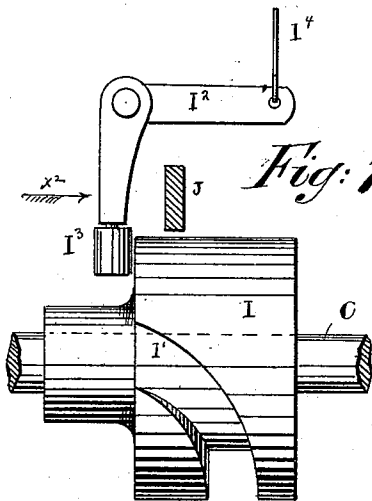
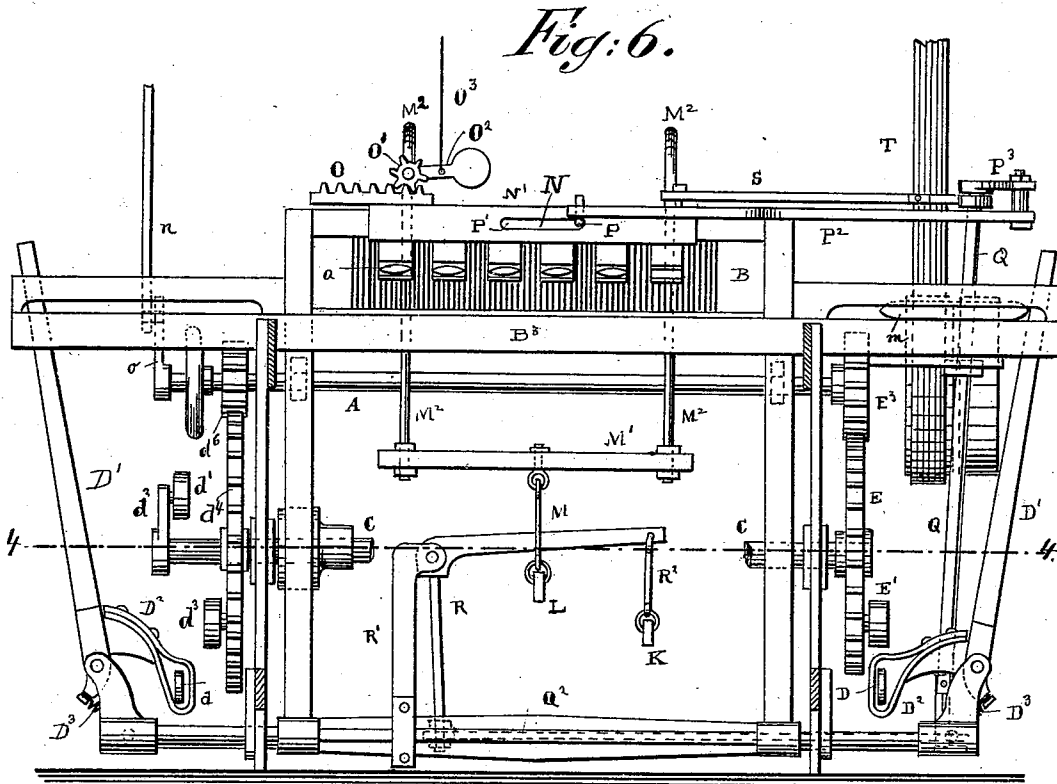
(No Model.)

3 Sheets—Sheet 3.

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WITNESSES:

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UNITED STATES PATENT OFFICE.

JOHN KENNEDY, OF PATERSON, NEW JERSEY.

SWIVEL-LOOM.

SPECIFICATION forming part of Letters Patent No. 512,474, dated January 9, 1894.

Application filed October 31, 1891. Serial No. 410,477. (No model.)

To all whom it may concern:

Be it known that I, JOHN KENNEDY, a citizen of England, residing at Paterson, in the county of Passaic, New Jersey, have invented certain new and useful Improvements in Swivel-Looms, of which the following is a specification.

This invention relates to improvements in the loom for which United States Letters Patent No. 435,565 were granted to me on the 2d day of September, 1890; and the object of my invention is to materially simplify the construction of the loom and also to provide new movements for the same.

The invention consists in the combination, with a loom-frame, lay, cam-shaft and picker-sticks, of a swivel-shuttle beam, treadles on a sliding shaft, which treadles are actuated by the cams on the cam-shaft, one of said treadles serving to raise and lower the swivel-shuttle beam and the other serving to operate the swivel-shuttles.

The invention also consists in the construction and combination of parts and details, which will be fully described hereinafter and finally pointed out in the claims.

In the accompanying drawings, Figure 1 is a side-view of my improved loom, parts being broken out and others being shown in cross-section. Fig. 2 is a vertical longitudinal sectional view, on the line 2 2, of Fig. 4. Fig. 3 is a plan-view of the lay, swivel-shuttle beam and cloth-beam. Fig. 4 is a horizontal sectional view, on the line 4 4, Fig. 6. Fig. 5 is an elevation of one side of the loom, showing the gearing, parts of the loom mechanism being omitted. Fig. 6 is a front-elevation of the loom, and Figs. 7, 8 and 9 are detail views of the cam for shifting the sliding-shaft.

Similar letters of reference indicate corresponding parts.

The loom represented is in general a swivel loom of the ordinary construction and has the usual driving-shaft A journaled in the frame A'. By means of the cranks A² and the connecting-rods A³, the lay B, of the usual construction, is operated. In the frame A' the cam-shaft C is mounted to rotate. The warp-beam B' is arranged at the rear end of the loom and the cloth-beam B² at the front. The picker-sticks D' D' are operated in the

usual manner by the levers D d and loops D² and springs D³, which picker-sticks serve to throw the fly-shuttle m over the shuttle-race B³ provided on the lay B. The lever D is pivoted to the frame A', as shown at D⁴, Fig. 4, and is acted upon by an anti-friction roller E', that projects from the side of a cog-wheel E rigidly mounted on one end of the cam-shaft C. The other lever d is mounted to swing on one end of a sliding-shaft H, which will be described hereinafter, and is acted upon either by an anti-friction roller d' mounted on the end of a crank d² fixed to one end of the cam-shaft C, or by an anti-friction roller d³ mounted on a pin projecting laterally from the outer face of the cog-wheel d⁴ loose on the cam-shaft C adjacent to the crank-arm d². On the cam-shaft C the cam C' is rigidly fixed. Another cam F is connected rigidly with the sleeve F' adapted to rotate on the cam-shaft, on the opposite end of which sleeve a cog-wheel F² is formed, that is engaged with the pinion F³ of twice its diameter made integral with the cog-wheel F⁴, said cog-wheel F⁴ and pinions F³ being mounted on a stem F⁵ projecting inward from the frame A', and said cog-wheel F⁴ engaging a cog-wheel F⁶ keyed on the cam-shaft C. The cog-wheel d⁴ mounted loosely on the cam-shaft has four times the diameter of the pinion d⁵ engaged therewith and fixed on the driving-shaft A and by means of which pinion the cog-wheel d⁴ is driven from the driving-shaft, so that the wheel d⁴ makes only one revolution for every four revolutions of the cog-wheel d⁵. The sleeve F' revolves around its axis in exact conformity to the cog-wheel d⁴; that is, it makes one revolution to every four revolutions of the driving-shaft, while the cam-shaft C makes two revolutions to every one revolution of the sleeve F' and the cog-wheel d⁴, for the reason that the cog-wheel E³ fixed on the main shaft A and engaging the cog-wheel E fixed on the cam-shaft has only one-half the diameter of the cog-wheel E. By this arrangement of the speed of the cog-wheels E and d⁴, the sleeve F' and the cam-shaft C, the fly-shuttle and the swivel-shuttle are so operated in point of time as to move across the loom alternately without interfering with each other.

At the rear end of the loom a slide-shaft H

is arranged in suitable bearings, which shaft is drawn in the direction of the arrow x' , Fig. 4, by a spiral spring G fastened to a bracket A² of the loom-frame A' and to an arm J fixed on the shaft H to move with the same in the direction of the length of said shaft, which arm is substantially Z-shaped (Fig. 2). Between collars on the slide-shaft H two treadles K and L are mounted to swing or rock, one of which, the treadle L, is adapted to be acted upon by the cam C', adjacent to which it is arranged, and the other, the treadle K, is adapted to be acted upon by the cam F, adjacent to which it is arranged. A slide-bolt G' is guided in a suitable guide G² and is connected by a cord G³ with a Jacquard movement of any desired construction. Said Jacquard movement is not shown, as its construction has no bearing whatever on this case. The spring G serves to press one end of the shaft H against said bolt G' when the same is in its lowered position. On the cam-shaft C the cam-disk I is fixed, which is provided with the cam-groove I', the length of which corresponds to about one-half of the circumference of said cam-disk I, the ends of said groove being curved, as shown in Figs. 7, 8 and 9. An angle-lever I² is pivoted on a bracket A⁴ of the loom-frame above said cam-disk I and is provided in one end with the anti-friction roller I³, and the other end of said angle-lever is connected by a cord I⁴ with the Jacquard. The upper free end of the Z-shaped arm J extends over the top of the cam-disk I and rests upon a pin A⁵ projecting from one side of the frame, on which pin it can slide laterally. (See Figs. 2 and 4.) When the cord I⁴ is pulled upward the anti-friction roller I³ is brought against one side of the cam-disk I and when it arrives at the groove I' passes into the same and is shifted laterally, as indicated by the arrow x^2 in Fig. 7, and acting on the upper end of the arm J moves said arm and with it the slide-shaft H in the inverse direction of the arrow x' , Fig. 4, thereby bringing the spring G in tension and moving that end of the shaft H at the bolt G' in the inverse direction of the arrow x' , Fig. 4, such a distance that the bolt, which rested upon the shaft, can drop and extend across the end of the shaft, thus locking the shaft H and the parts thereon in the position shown in Fig. 4, which is the position for normal weaving. By the time that the anti-friction roller I³ on the lever I has passed through the groove I', the lever will have been brought back to the position shown in Fig. 7. The free end of the treadle L is connected by a link M with the cross-bar M' attached to the lower ends of two rods M² guided to slide vertically in brackets on the lay and pressed upward by springs M³ surrounding the said rods. The upper ends of the rods M² are bent downward and carry the swivel shuttle beam N' containing the swivel shuttle actuating rack N of the usual construction. On the top of the beam N' a rack O is fixed, with which is engaged

a pinion O' that is pivoted on the curved upper end of one of the rods M², said pinion being provided with a weighted arm O² to which is connected the cord O³. When the Jacquard O³ pulls the cord upward the pinion O' is rotated until its arm O² has passed the center, when the weighted end of the arm causes it to swing down to complete the semi-circular movement of the pinion O. Thereby the rack O and with it the beam N' containing the swivel-rack are shifted to the right or left on the lay, as may be necessary. Normally the cord O² is sufficiently slack to allow the box N' to be raised or lowered without moving the rack O. The Jacquard mechanism lifts sufficiently on the cord O³ to take up the slack and thereafter to operate the rack O.

From the swivel-shuttle actuating rack a pin P projects through a longitudinal slot P' in the front of the beam N', and with said pin P one end of a connecting-rod P² is connected, the other end of said connecting-rod P² being connected to the end of a crank P³. Projecting from the upper end of a shaft Q, the lower end of which is swiveled on the bracket A⁶ of the loom-frame. Said swivel-shaft Q is provided at its lower end with a crank Q', connected by a connecting rod Q² with the lower end of an elbow-lever R pivoted on the standard R' of the loom-frame, the upper end of said elbow-lever R being connected by a link R² with the free end of the treadle K on the shaft H. The connecting rod Q² is normally under the influence of a spring V which is secured at one end to the said rod Q² and at the other end to the frame of the loom. A link S connects the upper end of the swivel-shaft Q with the box N' containing the swivel-rack.

T is the driving-belt for the machine and T' the gearing for rotating the cloth-beam in the usual manner as the weaving progresses. a are the swivel-shuttles; b represents the fabric and h the figures on the same.

o is a crank on the driving-shaft, which by means of the connecting rod n operates the Jacquard mechanism.

The operation is as follows: The loom is supposed to be in motion and performing plain weaving with the several parts in the positions shown in Fig. 4 at which time the fly-shuttle m , under the action of the rollers E' d' , the levers D d , the picker-sticks D' D' and springs D³, throws into the fabric the full number of picks or wefts, the swivel-shuttles a being raised and at rest. The picker rollers E' and d' are arranged on their respective wheels diametrically opposite to each other so that the picker sticks D' are alternately actuated, there being one pick for each revolution of the driving shaft A and two for each revolution of the cam shaft C, since the latter shaft revolves with one-half the speed of the driving shaft. The picker rollers E' and d' are so placed on their respective wheels that, and as the wheel d' carrying the roller d' revolves with only one-

half the speed of the wheel E carrying the roller E⁸, said rollers will strike in unison at every two revolutions of the cam shaft C to which the wheel E is secured. As the plain weaving proceeds and a figure or figures *h* are to be woven into the fabric by the swivel shuttles *a* according to the pattern, the Jacquard or other suitable pattern mechanism pulls up the cord G⁸, whereby the bolt G' is pulled upward sufficiently to release the end of the sliding-shaft H, which is drawn by its spring G in the direction of the arrow *x'*, Fig. 4, being limited in its movement by the collar H¹⁵ on said shaft abutting against the guide *g*². The treadles K and L and arm J are moved with said shaft in the direction of the arrow *x'* and thereby the treadles K and L are brought in position to be acted upon by cams C' and F, and the arm J is brought to the left-hand face of the cam I, Fig. 7. The picker-stick lever *d* is moved in the same direction and out of the path of the roller *d'* into the path of the roller *d*³ on the wheel *d*⁴. Under these conditions the picker stick actuated by the roller E' is given one pick for every two revolutions of the driving shaft, while the picker stick actuated by the roller *d*³ is actuated in unison with the other picker stick at every two revolutions of the wheel carrying the roller E', as hereinabove explained. The treadles K L having been placed in engagement with the cams C' and F by the moving of the shaft H, the treadle L pulls down the cross-bar M', whereby the beam N' containing the swivel-shuttle actuating rack N and swivel-shuttles *a* is lowered and the said swivel-shuttles are brought into such position that they can pass in between the warps which have been suitably separated by the jacquard acting on the harness. The cam F depresses the treadle K, and thus by the elbow-lever R, connecting-rod Q² and crank-arm Q', the shaft Q is turned and by means of the crank arm P³ and connecting-rod P² the swivel-shuttle actuating rack is moved in the direction of the length of the rack and a pick is thus made by the swivel-shuttles. When the treadle L is released by the cam C' the springs M³ raise the swivel-shuttle beam to permit the fly-shuttle to be thrown and the spring V serves for throwing the swivel-shuttles back. The several picks are now made successively as follows:

As has been heretofore explained, when the picker stick lever, at the left of Fig. 6, is under the roller *d'* the right and left hand picker sticks are alternately actuated, that is, there are two picks of the fly shuttle *m* for each revolution of the shaft C. When however the shaft H is shifted and the left hand picker stick lever comes beneath the roller *d*³ then both picker sticks are actuated in unison at every second revolution of the shaft C, while the right hand picker stick alone is actuated at each revolution of said shaft, the left hand picker stick remaining at rest for every alternate revolution of the shaft C. The fly shut-

tle, in this position, let us suppose, is thrown from left to right when both picker sticks are actuated in unison. It then remains at rest at the right hand for one revolution of the shaft C or until the right hand picker stick is again actuated when it is thrown from right to left. At the next revolution of the shaft C the two picker sticks are again actuated in unison when the left hand picker stick throws the shuttle from left to right. It will thus be seen that the fly shuttle makes one pick, is then at rest for one pick and then again makes another pick, or in other words instead of there being two picks for each revolution of the shaft C there is but one pick. While the fly shuttle remains at rest, the swivel shuttles are lowered and are moved from left to right or right to left to weave the figure desired. When the figures have been woven into the fabric the cord I⁴ is pulled upward by the jacquard and the roller I³ pressed in the direction of the arrow *x*² against the side of the cam I, so as to enter the cam-groove I'. The elbow-lever I² is brought by the cam-groove I' into the position shown in Fig. 8 and acting on the cam J pushes the same in the inverse direction of the arrow *x'*, Fig. 4, whereby the shaft H is moved in the same direction and the spring G brought in tension. The bolt G' drops and locks the shaft H in place. By said movement of the shaft H the treadles K and L are brought out of engagement and the picker-stick lever *d* is again brought in position to be acted upon by the roller *d'* on the end of the crank-arm *d*² of the cam-shaft C. The loom is now adjusted for plain weaving and when figures are to be woven the bolt G' is again pulled upward by the jacquard and the above operation is repeated. As shown in Fig. 3, the figures *t* are arranged alternately in different longitudinal lines of the fabric, and when the figures are thus arranged the beam N' must be shifted every time a transverse row of figures has been produced, so that the several transverse rows will alternate. Every time a transverse row of figures *h* has been woven the cord O³ operated by the jacquard throws the weighted lever O² and the same by means of the rack O and pinion O' shifts the beam N' once to the right and the next time to the left, and so on. As the connecting rod or link S connects the beam N' with the upper end of the shaft Q, said shaft is inclined in one direction or the other as the beam is shifted, so as to at all times maintain the proper relation between the swivel-shuttle actuating rack and the crank P³.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The combination, with a loom-frame, lay, cam-shaft and picker-sticks, of a shaft mounted to move lengthwise, a picker-stick lever mounted on said sliding shaft, a picker-stick lever pivoted to the loom-frame, flexible con-

nections between the picker sticks and their levers treadles mounted to rock on said sliding shaft, cams on the cam-shaft for operating said treadles, a swivel-shuttle beam connected with one of said treadles and mechanism for operating the swivel-shuttles operated from the other treadle, substantially as set forth.

2. The combination with a loom frame, lay, cam-shaft, picker-sticks, picker stick levers and flexible connections between said levers and picker-sticks, of cams on said cam shaft, two treadles actuated by said cams, a swivel shuttle beam and swivel rack, spring controlled rods connected at their upper ends to the swivel shuttle beam and adapted to raise the same, a link and cross bar connecting the lower ends of said rods with one of said treadles, a swiveled rocking shaft, crank arm and connecting rod operated by the other treadle, a crank on said shaft connected to said swivel rack in the swivel beam and a connection between the upper end of said swiveled rocking shaft and the adjustable swivel shuttle beam, substantially as described.

3. The combination, with a loom-frame, lay, picker-sticks, picker-stick levers, and flexible connections between said levers and picker sticks, of a cam-shaft, cams on the same, a sliding shaft, treadles on the same and on which sliding shaft one picker-stick lever is

mounted, an arm on said sliding shaft, which arm projects over a cam on the cam-shaft, a lever adapted to be acted upon by the cam and to act on the arm of the sliding shaft, a swivel-shuttle beam adapted to be raised and lowered from one treadle, and means for actuating the swivel-shuttles from the other treadle, substantially as set forth.

4. The combination, with a loom-frame, lay, picker-sticks, picker-stick levers, and flexible connections between said levers and picker sticks, of a cam-shaft, a sliding shaft, treadles on the same and on which sliding shaft one picker-stick lever is mounted, an arm on said sliding shaft, a grooved cam on said cam-shaft, over which cam the said arm extends, a pivoted elbow-lever adjacent to the grooved cam and adapted to be acted upon by the same and to act on the arm of the sliding shaft, a swivel-shuttle beam adapted to be raised and lowered by one treadle, and means for operating the swivel-shuttles from the other treadle, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

JOHN KENNEDY.

Witnesses:

OSCAR F. GUNZ,
CHARLES SCHROEDER.