(No Model.) 2 Sheets—Sheet 1.

G. F. HUTCHINS.

SWIVEL LOOM.

No. 497,428. Patented May 16, 1893.

Fig. 1.

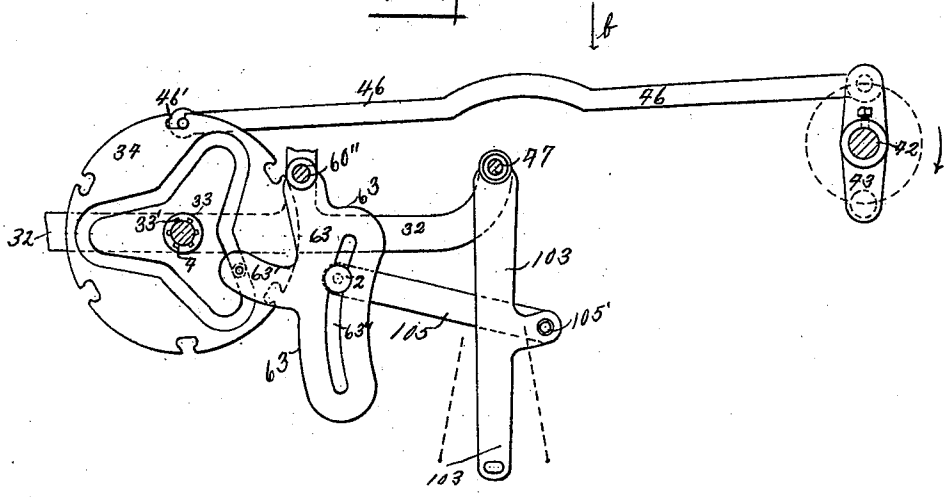
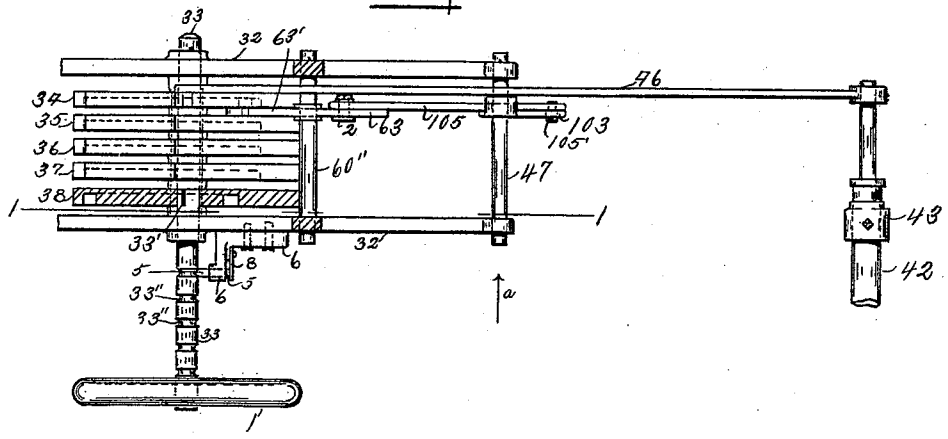


Fig. 2.



Witnesses
Irving H. Veny.
Wm. A. Morse.

Inventor
George F. Hutchins.

By his Attorney
John C. Dewey

(No Model.) 2 Sheets—Sheet 2.

G. F. HUTCHINS.

SWIVEL LOOM.

No. 497,428. Patented May 16, 1893.

Fig. 3.

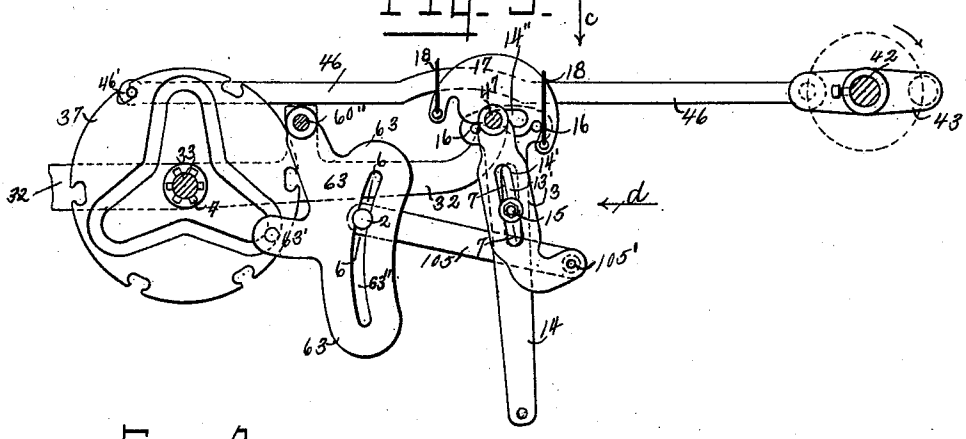


Fig. 4.

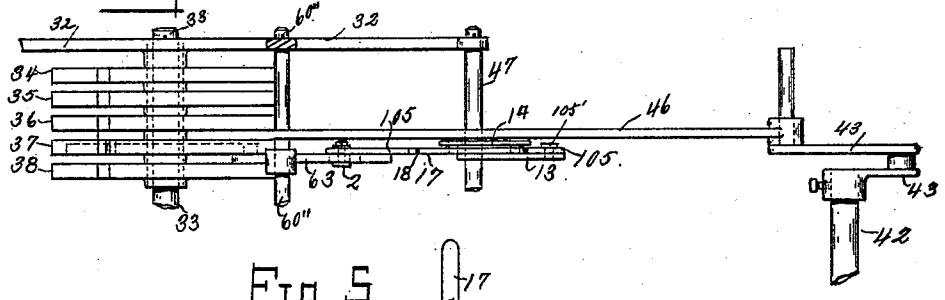


Fig. 5.

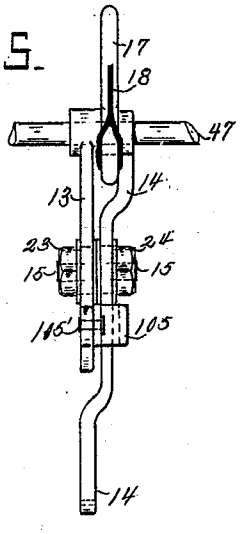


Fig. 6.

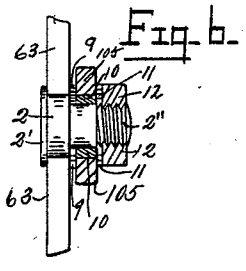
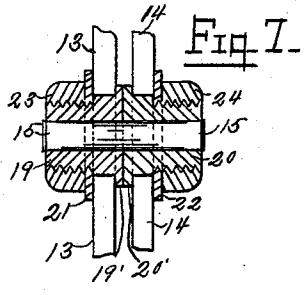


Fig. 7.



Witnesses
Irving H. Very.
Wm. A. Morse.

Inventor
George F. Hutchins.

By his Attorney
John C. Dewey

UNITED STATES PATENT OFFICE.

GEORGE F. HUTCHINS, OF WORCESTER, MASSACHUSETTS, ASSIGNOR TO THE KNOWLES LOOM WORKS, OF SAME PLACE.

SWIVEL-LOOM.

SPECIFICATION forming part of Letters Patent No. 497,428, dated May 16, 1893.

Application filed January 28, 1893. Serial No. 459,975. (No model.)

To all whom it may concern:

Be it known that I, GEORGE F. HUTCHINS, a citizen of the United States, residing at Worcester, in the county of Worcester and State of Massachusetts, have invented certain new and useful Improvements in Swivel-Looms; and I do hereby declare that the following is a full, clear, and exact description thereof, which, in connection with the drawings making a part of this specification, will enable others skilled in the art to which my invention belongs to make and use the same.

My invention relates to swivel looms, and more particularly to the cam mechanism for operating the swivel shuttles, and the swivel shuttle rail, shown in my patent No. 474,170, of May 3, 1892.

The object of my invention is to improve upon the construction of the shaft upon which are loosely mounted the five cams shown in said patent, and also to improve upon the construction of the vertical levers, and to provide a compound lever mechanism, to give an additional longitudinal movement to the swivel shuttle rail, to cause the spots or figures to be woven in staggering or diagonal rows in the direction of the length of the fabric.

In the patent referred to, the shaft upon which the cams are loosely mounted is fast in its bearings, and in picking out each cam is moved by the hand of the attendant, to cause the swivel shuttle mechanism to have a reverse movement.

In my present improvements the shaft upon which the cams are loosely mounted, is adapted to move longitudinally in its bearings, and also to rotate, and is provided with means for engaging and turning any one of the cams, independently of the others, to reverse the swivel shuttle mechanism. In my said patent the cam and lever mechanism shown and described is adapted to weave the rows of spots of figures in regular lines or rows, in the direction of the length of the fabric.

In my present improvements I provide a compound lever mechanism, and a supplemental cam device, by means of which I can give an additional longitudinal movement to the swivel shuttle rail so as to weave in the spots or figures in staggering or diagonal rows in the direction of the length of the fabric.

My invention consists in certain novel features of construction of the cam shaft, and the compound lever mechanism above referred to, as will be hereinafter described.

I have shown in the drawings detached portions of the cam operating mechanism shown in said patent, with my present improvements applied thereto, sufficient to illustrate the nature of my invention.

Referring to the drawings:—Figure 1 is a side view of the cam mechanism, taken on line 1, 1, Fig. 2, looking in the direction of arrow *a*, same figure, and showing a compound lever mechanism similar to the compound lever mechanism shown in Fig. 17 of my patent above referred to. Fig. 2 is a plan view looking in the direction of arrow *b*, Fig. 1, one of the cams being shown in section. Fig. 3 shows my improved compound lever mechanism, for giving a longitudinal movement to the swivel shuttle rail to weave the spots in diagonal rows in the direction of the length of the fabric. Fig. 4 is a plan view of the mechanism shown in Fig. 3, looking in the direction of arrow *c*, same figure; the front cam, left off in Fig. 3, is shown in this figure. Fig. 5 is, on an enlarged scale, an edge view of the compound lever mechanism, looking in the direction of arrow *d*, Fig. 3. Fig. 6 is a detail of the bolt connection, on line 6, 6, Fig. 3. Fig. 7 is a detail of the bolt connection, on line 7, 7, Fig. 3.

I have designated the several parts of the mechanism shown in the drawings, corresponding to the parts of the mechanism shown in said patent, by the same letters of reference, so that the arrangement and connection of the parts with reference to the other parts of the loom will be more readily understood.

For a detail description of the construction and operation of the swivel loom, of which my present improvements form a part, reference is made to the patent above referred to.

In the accompanying drawings, 32 is the frame for supporting the cam and lever mechanism. A shaft 33, which in my said patent is fast in said frame, is in this instance loosely mounted in bearings on said frame, and pro-

vided with a hand wheel 1, preferably at its front end, and is adapted to have a longitudinal motion and also a rotary motion in said frame. On said shaft are loosely mounted the five cams 34, 35, 36, 37, and 38, which operate, through intervening mechanism, the swivel shuttle racks and the swivel shuttle rail, as described in said patent. The swivel shuttle cams are operated from the shaft 42, through crank 43, and pawls 46, which engage with notches 46′ in the periphery of the cam, as described in said patent. Each cam is provided with a cam groove therein, in which travels a roll on a pin secured to an arm 63′, extending out from the vertical lever 63, hung on a rod 60″ on the frame 32 see Fig. 1.

I have shown in Figs. 1 and 2, a compound lever mechanism similar to the compound lever mechanism shown in Fig. 17 of my said patent before referred to, which mechanism is adapted to operate, through intervening connections, the racks which move the swivel shuttles. In said compound mechanism, shown in Figs. 1 and 2, one end of the link or connector 105 is adjustably connected with the lever 63 by a bolt 2, extending through a slot 63″ in said lever, see Fig. 6. The other end of the connector 105 is pivotally attached to a second lever 103, which is hung on a rod 47 on the frame 32, by a pin 105′. To the lower end of the lever 103 are attached the connectors or cords, not shown, leading to the swivel shuttle racks, to move the swivel shuttle racks, as fully described in said patent.

I will now proceed to describe my improvements relating to the movable shaft 33. The shaft 33 is adapted to be moved longitudinally in its bearings, and also to be rotated therein, as stated above, and is provided with a key 33′ which is adapted to engage the slots 4 within the hubs of the cams; in this instance there are six slots in each cam hub. The shaft 33 is also provided with circumferential grooves 33″, in this instance five, corresponding to the number of cams, and into said grooves is adapted to extend the spring actuated pin 5, loosely supported in an arm 6, bolted to the frame 32, as shown in Fig. 2. A spring 8, secured at one end, bears with its free end against the outer end of the pin 5. By means of the spring actuated pin 5, extending into one of the circumferential grooves 33″, in the shaft 33, said shaft will be held in whatever position it is placed, and the position of the grooves 33″ and the key 33′, relatively to each other, are preferably such, that when the key 33′ engages a slot 4 in one of the cams, the pin 5 will extend into one of the grooves 33″ in the shaft 33. By making the shaft 33 movable longitudinally, said shaft may be pushed in or out, to cause the key 33′ to engage with one of the slots in the cam which it is desired to rotate, and then the shaft 33 is rotated through the hand wheel 1, causing the cam with which it is engaged, (the pawl 46 having been first disconnected,) to rotate independently of the other cams, to reverse the swivel shuttle mechanism for picking out, or for any other purpose. The shaft 33 is preferably left in such a position that the key 33′ thereon, will extend into one of the slots in one of the cams, as shown in Fig. 2, and whenever said cam is rotated the shafts 33 will also be rotated, and the other cams will be retained in their proper position relatively to the cam connected with the shaft, by the operating pawls 46, so that the shaft 33 may be pushed in or drawn out, to allow the key 33′ thereon to engage freely with the slots 4 in any of the cams, as desired. The hand wheel 1 may be secured upon the rear end of the shaft 33, instead of upon the front end, as shown in Fig. 2, if desired, so that said shaft may be operated from the rear of the loom; but I prefer to have the hand wheel attached at the front of the shaft. I prefer to attach the connector 105 to the lever 63 in the manner shown in Fig. 6, in order to allow of a free pivot motion of the end of said connector, without binding the same to the lever. The bolt 2 has a flanged end 2′, which is adapted to extend over the edges of the slot 63″ in the lever 63, and is provided with a turned down end threaded portion 2″, upon which is mounted a washer 9, and a tube 10. A washer 11 extends upon the outside of said tube 10, as shown in Fig. 6, and a nut 12 is screwed on the threaded end of the bolt 2. From this construction, it will be seen that the connector 105 loosely supported on the tube 10, between the washers 9 and 11, is free to move independently of the screwing up of the nut 12, to secure the stud in the slot 63″, for the rigid tube 10 will prevent the binding of the washers 9 and 11 on the connector 105, and at the same time will furnish a bearing surface for the washer 11 to bear against when the nut 12 is turned up to draw the flanged end 2′ of the bolt 2 against the edges of the slot 63″ to secure the same in its adjusted position.

I will now proceed to describe my improvements in the compound lever mechanism shown in Figs. 3, 4, and 5, for giving a longitudinal movement to the swivel shuttle rail, at the end of each row of spots woven in the fabric, in addition to the longitudinal movement given to the swivel shuttle rail by the compound lever mechanism, shown in Fig. 1.

It will be understood that the compound lever mechanism shown in Figs. 3, 4, and 5, is only designed to be used with the cam which operates, through intervening connections, to move the swivel shuttle rail longitudinally.

The compound lever mechanism shown in Fig. 1 is designed to be used in connection with the cams which operate, through intervening connections, the swivel shuttle racks, and in case it is not desired to stagger the spots, the compound lever mechanism shown in Fig. 1 will also be used to move the swivel shuttle rail longitudinally; but where it is desired to stagger the spots, the compound le-

ver mechanism shown in Fig. 3 must be used, to give an additional longitudinal movement to the swivel shuttle rail.

In the compound lever mechanism shown in Figs. 3, 4, and 5, the connector 105, instead of being connected to the lever 103, as shown in Fig. 1, is connected to a supplemental lever 13, hung on the shaft 47, and said lever 13 is adjustably connected to the lever 14, corresponding to the lever 103 shown in Fig. 1, by a pin 15 extending through longitudinal slots 13′ and 14′ in said levers 13 and 14 respectively, and preferably in the manner shown in Fig. 7. The lever 14 is provided with a horizontal slot 14″ at its upper end, and is hung on the shaft 47, which extends through said slot 14″. The lever 14 is also provided with two pins 16, extending out from one side thereof, upon opposite sides of its pivot point, which pins are adapted to be engaged by the cam surfaces on the oscillating cam 17, loose on the shaft 47. Cords 18, secured at their lower ends to the oscillating cam 17, upon opposite sides of its pivot point, for operating said cam, lead up to the Jacquard mechanism.

The operation of the compound lever mechanism shown in Figs. 3, 4, and 5 corresponds to the operation of the compound lever mechanism shown in Fig. 1, as far as the same regulates the longitudinal movement of the swivel shuttle rail in weaving each row of spots, but said compound lever mechanism is adapted to give an additional longitudinal movement to the swivel shuttle rail at the end of each row of spots, when it is desired to move the shuttle rail so that the next row of spots will not be woven in the same straight line, in the direction of the length of the fabric, with the previous row of spots, but will be woven in a staggering or diagonal line, as shown in Fig. 8 of my said patent.

The supplemental cam 17 is operated through the Jacquard cords 18, at the end of each horizontal row of spots woven in the fabric, and the cam surfaces thereon, acting on the pins 16, cause the lever 14 to be moved on its pivot point independent of its connection with the lever 13, so that the opposite end of the slot 14″ will engage the shaft 47 instead of the end shown in Fig. 3, causing the lower end of the lever 14 to be moved, and through connections, not shown, to the swivel shuttle rail, the swivel shuttle rail to be moved longitudinally a certain fixed distance, independent of the movement communicated to the swivel shuttle rail through the regular cam and lever mechanism, shown in Fig. 1. By this additional longitudinal movement of the swivel shuttle rail, the same will be placed in a position to weave the next row of spots staggering, or diagonally, in the direction of the length of the fabric, relatively to the preceding row of spots. After the cam 17 has operated to move the lever 14, as above described, the swivel shuttle rail operates to weave in the spots or figures in the same manner as it is operated by the compound lever mechanism shown in Fig. 1, until the next row of spots is to be woven, when another movement of the cam 17 operates the lever 14 to give an additional movement to the swivel shuttle rail, and so on through the whole length of the fabric if desired.

By means of the compound lever mechanism shown in Figs. 3, 4, and 5, I am enabled to weave the spots or figures in staggering or diagonal rows, in the direction of the length of the fabric, with only one cam in the regular cam mechanism of my said patent, and without changing said cam, and also to weave twice the number of spots or figures in each horizontal row, as there are swivel shuttles in a row.

In order to adjustably attach the lever 13 to the lever 14, and at the same time allow of the free movement of the lever 14 on the lever 13, when the lever 14 is shifted by the operation of the cam, I prefer to attach the levers together in manner shown in Fig. 7. Two separate studs 19 and 20 are loosely supported on a pin 15, and are provided with flanged heads 19′ and 20′ at their inner ends, which extend over the edges of the slotted portions 13′ and 14′, in the levers 13 and 14; the flanged heads of the studs 19 and 20 butt against each other. The outer ends of the studs 19 and 20 are turned down and provided with screw threads. Washers 21 and 22 are mounted on the turned down portions, and bear against the outside of the levers 13 and 14, and nuts 23 and 24 are screwed on to the threaded portions of the studs, and secure the studs in the slots in the levers. The pin 15 is headed at each end to hold the studs 19 and 20 together. By loosening the nuts 23 and 24 the stud connection is free to move up or down in the slots in the levers, and the levers are free to move one on the other without loosening the nuts.

It will be understood, that the details of construction of some of the parts shown in the drawings and above described may be varied somewhat if desired.

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

1. The combination with a series of cams, loosely mounted on a shaft, and provided with a series of slots within their hubs, and pawls for operating said cams, provided with a pin adapted to engage notches in the periphery of the cams, and a series of levers operated by said cams, of the shaft upon which said cams are loosely mounted, said shaft adapted to be moved longitudinally through the hubs of said cams, and to be rotated in its bearings, and provided with a hand wheel at one end, and a series of circumferential grooves, and a key or projection adapted to engage one of the slots in the hubs of the cams, to turn the same, and a spring actuated pin adapted to

extend into one of the circumferential grooves in the shaft, to hold the same in position, substantially as shown and described.

2. In the cam operating mechanism of a swivel loom, the combination with a cam, a lever acted on by said cam, a second lever, and an adjustable connection between said two levers, of a third lever adjustably connected with the second lever mentioned above, and slotted at its upper pivoted end, and provided with two pins extending out from opposite sides of its pivot point, and a pivoted oscillating cam, operated by the Jacquard cords, and adapted to act on the pins on the last mentioned lever to give an additional movement to said lever, for the purpose stated, substantially as set forth.

3. In the cam operating mechanism of a swivel loom, a compound lever mechanism for communicating to the swivel shuttle rail a longitudinal movement in addition to the longitudinal movement communicated by the regular lever mechanism, consisting of a pair of levers adjustably connected together, one of said levers operated by the cam, in combination with a third lever adjustably connected with one of said pair of levers, and provided with a horizontal slot at its upper end, through which its supporting shaft extends, and two pins extending upon opposite sides of its pivot point, and a pivoted oscillating cam, operated by the Jacquard cords, and provided with cam surfaces adapted to engage said pins to give to the lever carrying said pins a movement additional to the movement communicated to said lever by the pair of levers and their operating cam, for the purpose stated, substantially as set forth.

4. The combination with a pair of levers adapted to move on each other, of means for adjustably securing said levers together, so that they will be free to move on each other, consisting of a pair of studs provided with flanged heads adapted to butt against each other, and screw threaded ends, and a washer and nut supported on the screw threaded ends, and a pin extending loosely through both of said studs, to support and hold the same in place, substantially as shown and described.

GEORGE F. HUTCHINS.

Witnesses:
JOHN C. DEWEY,
KATIE FARRELL.