

(No Model.)

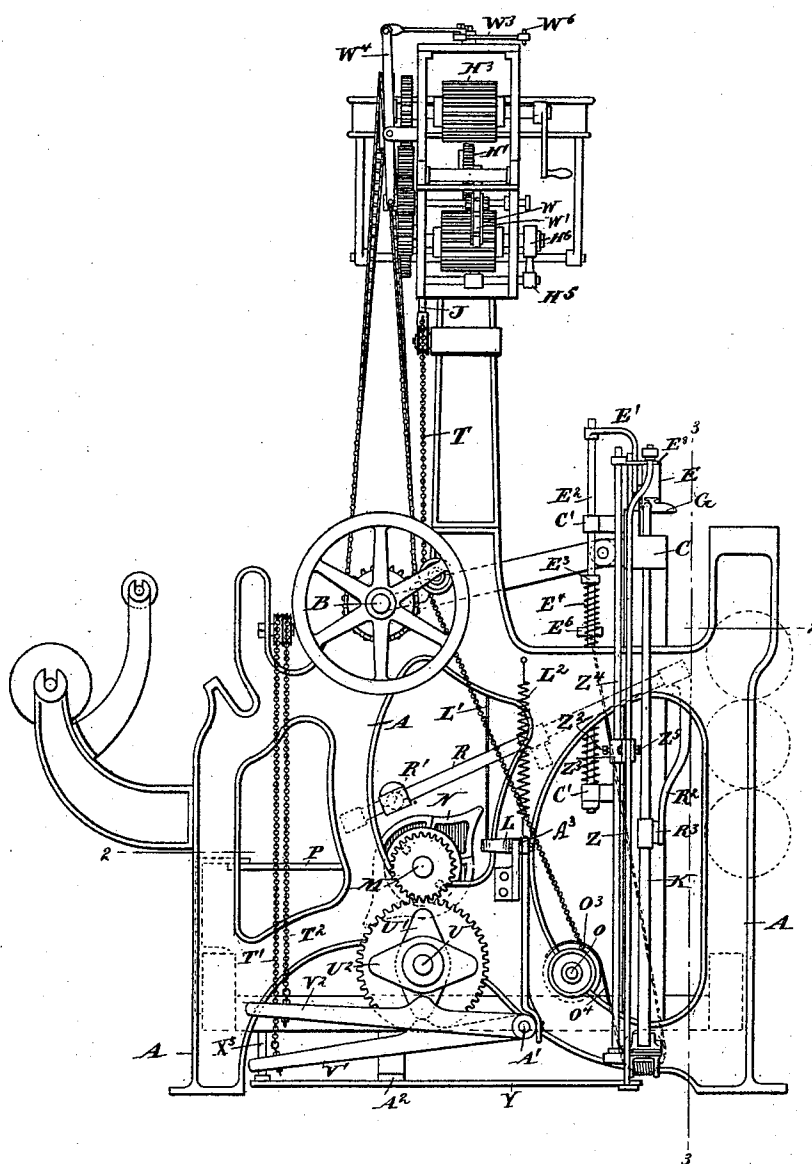
4 Sheets—Sheet 1.

T. SMITH & J. J. MINCHIN.
SWIVEL LOOM.

No. 499,400.

Patented June 13, 1893.

Fig. 1.



Witnesses:

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H. A. Johnstone.

Inventors:

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by their attorneys
Thos. D. Bates

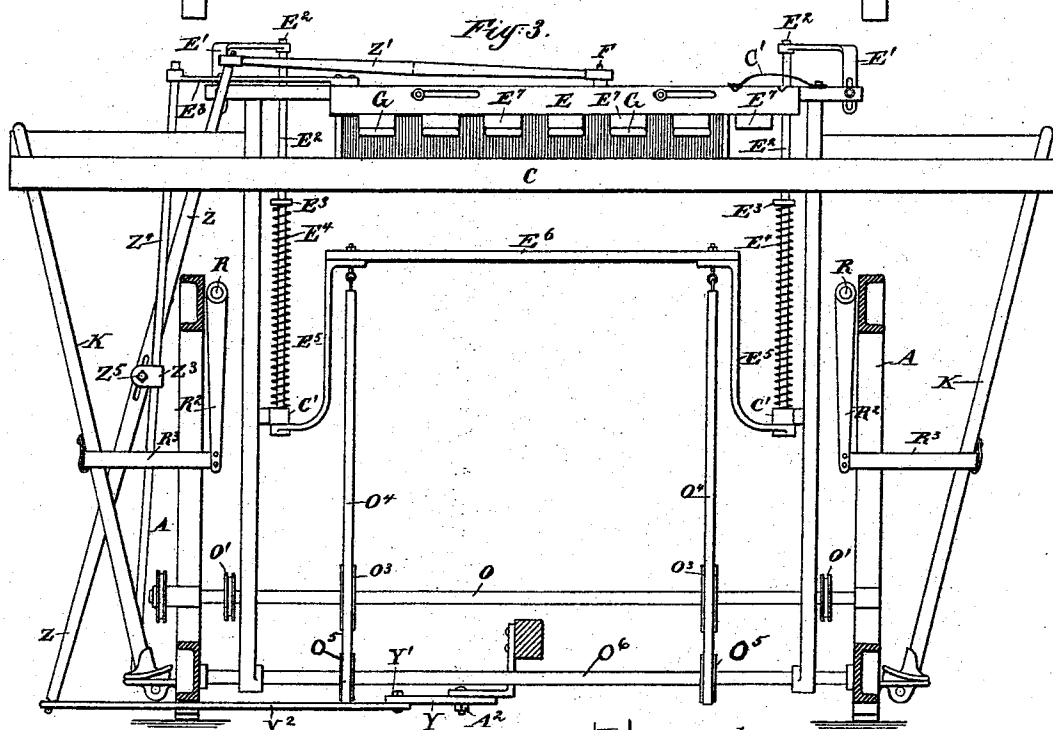
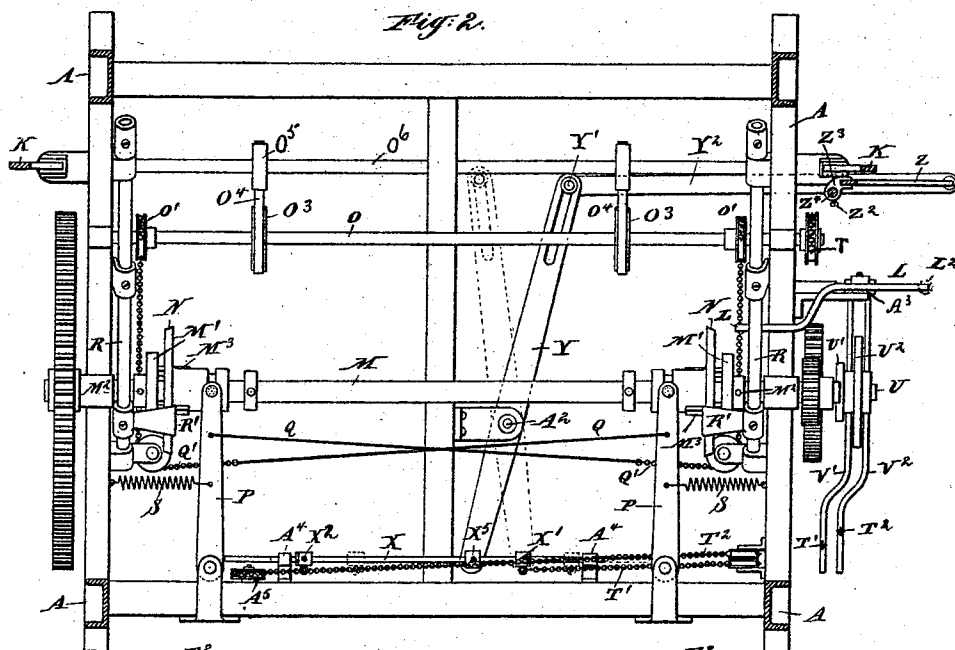
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T. SMITH & J. J. MINCHIN.
SWIVEL LOOM.

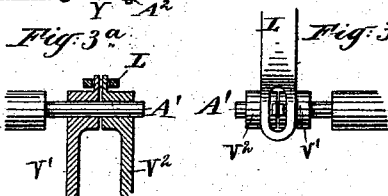
No. 499,400.

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36

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(No Model.)

4 Sheets—Sheet 3.

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SWIVEL LOOM.

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Fig. 4.

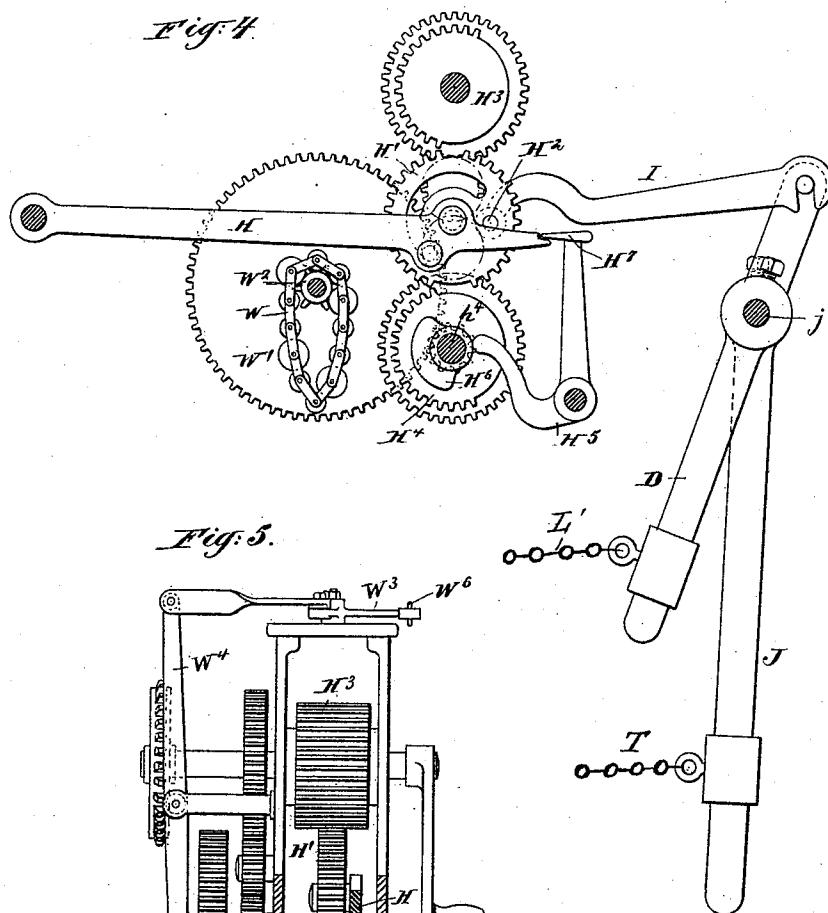
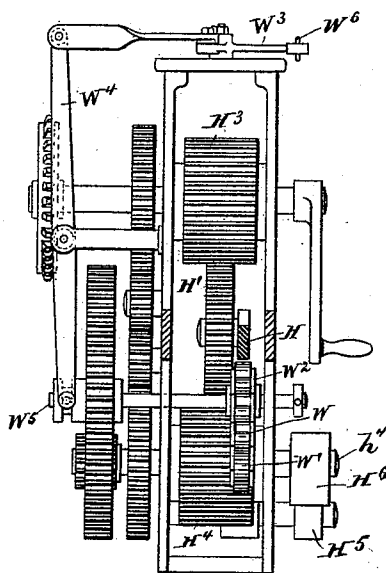


Fig. 5.



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(No Model.)

4 Sheets—Sheet 4.

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SWIVEL LOOM.

No. 499,400.

Patented June 13, 1893.

Fig. 6.

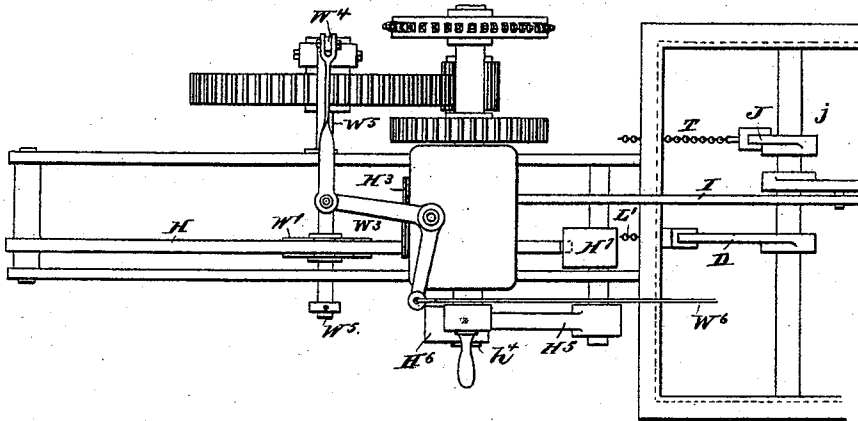
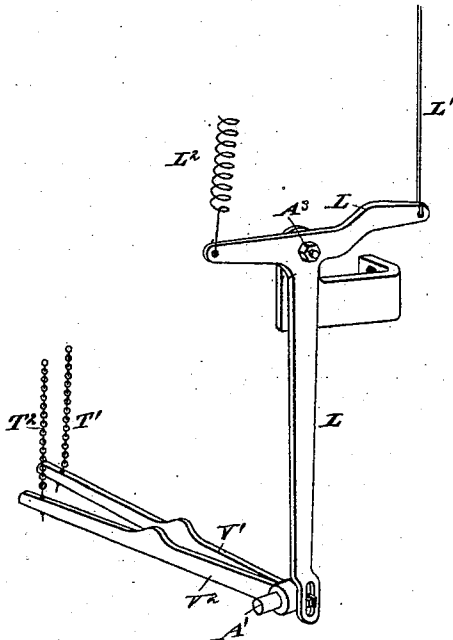


Fig. 7.



Witnesses
Charles R. Searle,
M. F. Boyle,

Thomas Smith.
John J. Minchin. Inventors
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UNITED STATES PATENT OFFICE.

THOMAS SMITH AND JOHN J. MINCHIN, OF PATERSON, NEW JERSEY,
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SWIVEL-LOOM.

SPECIFICATION forming part of Letters Patent No. 499,400, dated June 13, 1893.

Application filed February 13, 1892. Serial No. 421,380. (No model.)

To all whom it may concern:

Be it known that we, THOMAS SMITH and JOHN J. MINCHIN, both of Paterson, in Passaic county, in the State of New Jersey, have invented a certain new and useful Improvement in Swivel-Looms, of which the following is a specification.

The invention relates to that class of looms in which what are commonly known as swivel shuttles are used alternately with a fly-shuttle, to produce figures on a wide fabric. We have made important modifications in the details of such looms, by which difficulties incident to this work are overcome and the operation is made certain and rapid. We have improved the provisions for arresting the ground weaving at the proper intervals to allow the swivel weaving to be put in, the provisions for throwing the swivel-shuttles, and the head motion by which the Jacquard controls the several changes of condition at the required periods.

The accompanying drawings form a part of this specification and represent what we consider the best means of carrying out the invention.

Figure 1 is a side elevation of the main parts of a loom embodying our invention and showing also most of the parts in the head-motion. Fig. 2 is a plan view, showing the mechanism in the lower part of the loom, with a horizontal section of parts of the framing on the line 2—2 in Fig. 1. Fig. 3 is a front view, partly in vertical section on the line 3—3 in Fig. 1. The remaining figures are on a larger scale. Fig. 3^a is a horizontal section of a portion. Fig. 3^b is an elevation of the parts shown in Fig. 3^a. Fig. 4 is a vertical section partly in elevation showing the head-motion. Fig. 5 is an end view showing the same parts. Fig. 6 is a corresponding plan view, and Fig. 7 is a perspective view of certain portions detached.

Similar letters of reference indicate corresponding parts in all the figures where they appear.

A, is the fixed framing of cast iron or other suitable material. The lay C, is vibrated by links from cranks upon the crank shaft B, as usual. E, is a rack carried in the lay and raised and lowered as required, carrying with

it the rack-bar not shown, and swivel shuttles G, for effecting the swivel weaving at the periods required.

K are the picker-staffs for throwing the ordinary fly shuttle, not shown, for effecting the ground weaving. The two picker-staffs are moved inward simultaneously so as to throw the shuttle across from a shuttle-box from either side, whenever the proper moment has arrived and the proper mechanism is operated to effect the ground weaving.

M is the ordinary cam-shaft revolving as usual, once for each two revolutions of the crank shaft B. The shaft M carries within the frame near each side of the loom adjustable collars M', held in any required position by the pinching screws M². On each collar M' are two arms M³, extending parallel to the shaft M and imparting a corresponding rotary motion to a cam N, which is capable of being moved endwise on the shaft. Each cam N, is moved endwise by a lever P, urged in one direction by the constant force of a spring S, and urged at intervals in the other direction, inward, toward the central line of the loom, by a wire Q, and a connecting chain Q', which latter runs around idlers, and is wound partially around a pulley O' on a shaft O, which latter may be operated from the head motion. When the levers P P are liberated they are urged outward by the contractile force of the springs S, and the cams N are moved endwise outward on the shaft M and revolved by the parallel arms M³. Under these conditions they act on the rollers R' carried on arms fixed on the inclined shafts R, and impart a vigorous rocking motion to the latter. An arm R² rigidly set on the upper end of each inclined shaft R, connects by a flexible strap R³ to the proper point on the picker-staff or stick K, which drives the fly-shuttle, not shown. When the period arrives for arresting the ground weaving to allow one or more picks to be made with the swivel shuttles, the shaft O is partially revolved by the head motion, as will be described farther on, and each chain Q' is wound upon a pulley O'. This draws the levers P inward and moves the connected cams N so far inward that they can no longer actuate the rollers R'. So soon as the chains Q' are relaxed, the springs S again move the

cams N outward into a position where they can again resume their action on the rollers R', and again throw the fly-shuttle. If it is desired to make the action of the fly-shuttle earlier or later, in either direction or both directions, it is necessary simply to slacken one or both pinching screws M², and turn the corresponding collar or collars M' forward or backward relatively to the motion of the shaft M, and again tighten their hold. The fly-shuttle will then be thrown in one direction or in both directions earlier or later according as the collars have been thus adjusted. The shaft O is revolved at the required periods by the alternate pulling and releasing of a chain T, which properly guided, extends up to the vicinity of the head motion, and is attached to a lever J, which is fixed to the horizontal shaft j, and is controlled by a link I, which connects an arm from the shaft j to a pin H², carried on the mutilated gear-wheel H'. The latter is capable of being raised and lowered, being pivoted on a lever H, which turns on a fixed center, and is urged downward by gravity, and, if necessary, by a spring, and is raised at the required periods. Above and below the wheel H', are mutilated gear-wheels H³ and H⁴ carried on shafts mounted in the fixed frame-work, and constantly revolved in opposite directions. Suppose the wheel H' to be now in the highest position, engaged with the upper wheel H³,—the effect of the mutilation of the gears is to release the hold as soon as the half revolution is effected, and thenceforward the wheel H' stands stationary until it is by another movement of the lever H lowered into engagement with the lower mutilated gear-wheel H⁴. When this occurs, it is actively revolved a half revolution in the opposite direction to the first, and is again allowed to rest. Each semi-revolution this wheel through the pin H² and link I correspondingly pulls the chain T, and partially revolves the shaft O in one direction, or relaxes it and allows it to be turned in the opposite direction by a spring or weight, not shown.

The same partial rotation of the shaft O performs also an important duty relatively to the swivel weaving, that of raising and lowering the rack-bar.

O³ are pulleys fixed on the same shaft O, on each of which is partially wound a strap O⁴ which runs under a guide pulley, and extends upward to a cross bar E⁶, the ends of which are extended downward by rigid arms E⁵, and take firm hold of the lower ends of straight rods E², extending up and down, guided in bearings C', fixed on the lay. Each rod is urged upward by a spring E⁴, abutting on the lowermost of the bearings C' and acting on a collar E³. The upper end of each rod E² is connected by a rigid bent arm E', to the corresponding end of the rack E. When the shaft O partially revolves in one direction, it draws down the rack into position for work. When the shaft O is revolved in the other direction,

it relaxes the strap O⁴, and allows the spring E⁴ to lift the rack up out of the way of the ground weaving.

There are two more motions required for the swivel weaving; one, the throwing of the swivel shuttles, which is effected by the lateral movement of the rack-bar; and another, the lateral shifting of the motion to the right or the left for the alternate rows of figures. Both these motions have been long known in connection with this class of looms, but we effect the first by peculiar mechanism. The throwing of the swivel-shuttles to the right and left at the required periods with the promptness required is effected by a pair of cams U', U², set a little distance apart on the extended end of a slow shaft U, mounted in fixed bearings and receiving motion by gearing from the cam shaft M. These cams are each two-pointed. They are set at right angles to each other as plainly shown in Fig. 1.

V', V², are levers set at a distance apart, corresponding to the distance between the cams U', U². They are free to turn independently and to be moved laterally on a stud A', set in the frame work, and constituting a part of the latter. The back ends of these levers operate chains T', T², which run over idlers, and thence downward under idlers, and thence laterally inward.

X, is a horizontal rod, mounted in bearings A⁴, near the base of the loom at the rear, and free to be moved to the right and left, to a limited adjustable extent.

X', X², are stops secured in adjustable positions on the slide X, and faced on the outer side with leather or analogous yielding material which will make a gentle contact at each movement with the inner face of the corresponding bearing A⁴. One chain T', connects directly to the stop X'. The other chain T², extends across the loom around the idler A⁵, and back again, and connected to the opposite stop X².

Y, is a lever extending forward and backward near the center line of the machine and turning on a fixed fulcrum A², while its rear end is connected to the transversely moving rod X by an arm X⁵. Each movement of the rod X, to the right or left correspondingly throws the front end of the lever Y, in the opposite direction.

Y' is an adjustable pin set in a slot near the front end of the lever Y. It connects by a link Y² with the lower end of the lever Z, extending up and down at the outside of the frame. The upper end of this lever Z, is connected by the link Z', to a vertical arm or pin F, fixed to the rack-bar. The rack-bar is not shown; but it will be understood that it is mounted in the rack E, and performs its usual long approved function of giving motion through a suitable train of small gearwheels to the small swivel shuttles G mounted in the shuttle carriers E⁷. (See Fig. 3.)

The axis of motion of each nearly upright lever Z, can be adjusted up or down as re-

quired to produce a considerable change in the extent of the motion of the rack-bar with a given amount of motion of the lever Y. To change the center downward and increase the motion of the rack-bar, and consequently of the swivel shuttles, the pinching screw Z^2 , is relaxed and the block Z^3 , is shifted downward on the rod Z^4 , and the pinching screw Z^5 is slackened, and the lever Z shifted upward relatively to the block Z^3 , when both screws are again tightened. A reverse adjustment will diminish the throw of the rack-bar.

Our invention allows a rapid action with little or no jarring or concussion. The stops X' , X^2 , being adjusted a proper distance apart, strike gently by their soft faces against their respective bearings A^4 , and thus contribute to arrest the motion of the parts. The center or block Z^3 , being adjusted up and down varies the extent of the throw of the rack-bar to any required extent, and the rack-bar when it has completed its motion to the right or left with the parts properly adjusted just reaches the proper extent of motion without any appreciable surplus force.

L is a T-shaped lever shown in edge view in Fig. 1, and in plan view in Fig. 2, turning on a fixed center A^3 , and turned in one direction at the required periods by a pull received from a chain or wire L' which connects with the lever D, operated by the head motion, and is turned in the opposite direction by a contractile spring L^2 connected to the fixed framing. Its lower arm is slotted, (see Figs. 3^a, 3^b), and engages with a projection on the hub of each of the levers V' V^2 and moves said levers. The levers V' , V^2 , are thus shifted outward and inward on the stud A' , at the required intervals, controlled by the head-motion. In the position shown in Fig. 2, the levers V' , V^2 , are idle and the swivel motions are at rest, the cam U^2 , playing idly between the levers, and the cam U' , playing idly in the position shown, between the lever V' , and the frame of the machine. This is the condition which obtains while the ground weaving is being effected. When the period arrives for the swivel weaving, the ground weaving is arrested by the action above described, and the levers are shifted promptly inward on the stud A' , to a sufficient extent to bring the lever V' , under the cam U' , and the lever V^2 , under the cam U^2 . In this position each revolution of the slow shaft U, alternately depresses the levers V' , V^2 , by the points of the cams U' , U^2 , with the result of throwing the swivel-shuttles to the right and to the left alternately. The combination allows any number of swivel picks to be put in; then, on the shifting of the levers again into the position shown in Fig. 1, the swivel weaving is again arrested and the ground weaving may proceed as before.

In weaving a figure, it is common to shift the condition of the loom alternately at very short intervals from the condition of ground weaving to that for swivel weaving and back

again. Our mechanism allows of putting in one pick, two picks, or any number of picks of ground weaving, and following with one pick, two picks or any number of picks of swivel weaving. After any number of picks of either swivel weaving or ground weaving, the parts will be left in the correct position to immediately resume work when required.

Our head motion involves the use of what is sometimes known as a pitch-chain to determine the rapidly recurring periods of alternate ground weaving and swivel weaving during the production of a set of figures, and to leave the loom free to weave ground weaving continuously during the periods between the termination of such series and the commencement of the next succeeding series. The jacquard—not shown—may control the action by moving the pitch-chain into the position to be effective when the period arrives to commence a set of figures, and by moving it again into the idle position when the figures are completed. Figs. 4 and 5 show this arrangement. W is the pitch-chain. It is carried on a continuously revolved sprocket-wheel W^2 , which latter is capable of being moved to the right and left, the pitch-chain going with it. A wire W^6 operated by the jacquard in the obvious manner, not shown, actuates a horizontal bell-crank lever W^3 turning on a fixed pivot set in the top of the framing of the head-motion (see Figs. 1 and 5), and this engages with a lever W^4 extending down and engaging between collars on the shaft W^5 which carries the sprocket-wheel W^2 . The revolution of the shaft W^5 is induced by the large gear-wheel W^7 fixed on the shaft W^5 , and engaged with a smaller gear-wheel H^3 fixed on the continuously revolved shaft h^4 . The revolutions of the shaft W^5 are so timed that the chain W is traversed one link for each revolution of the crank-shaft, and consequently for each beat of the lay. The links of the pitch-chain are connected by pins, on each of which pins may be mounted a roller W' . These rollers are distributed in the chain according as the picks of swivel weaving are required to be distributed in the production of a figure. Each roller W' is adapted to act on the lever H and to induce swivel weaving, provided the sprocket-wheel and the pitch-chain carried thereon are worked directly under such lever. When the sprocket-wheel and the chain are shifted out of position under the lever H, they are of no effect, the lever H remains down and the ground weaving proceeds continuously. But when the sprocket-wheel and the pitch-chain carried thereon are by the influence of the jacquard communicated through the wire W^6 shifted into position for work, the traverse of the roller W' and of the blank joints distributed between them, produces the required elevations of the lever H and the consequent introductions of the swivel yarns.

It will be understood, of course, that the cards in the jacquard are correspondingly

punched to effect the proper openings of the sheds.

There may be any required number and arrangement of the rollers W' and of the blank joints between them. According to the number and how they are distributed, the weaving will alternate during the production of the figures. Thus, if there are, as shown, twelve links in a chain, and each third link carries a roller W' , the weaving will change as follows: first, one pick of swivel weaving and then two picks of ground weaving, and so on, weaving two for one continuously until the figures are completed and the jacquard acting through the lever W^3 , and its connections again throws the chain W , out of action.

H^5 , is a lever turning on a fixed center and actuated by a cam H^6 , on the lower shaft h^4 . Its upper arm carries a knife H^7 , which releases the lever H , at the required periods to allow it to rise and sink, and then engages under or over such lever and holds it firmly in position up or down. This contributes to the firmness of support of the mutilated gear-wheel H' , carried on the lever H , and consequently to the certainty of action of the head motion.

The shifting of the whole series of swivel shuttles, and the moving mechanism therefor to the right and left, so as to produce the several lines of figures in joggled or alternated positions, is done by shifting the rack E , and its contents, and the connected upright bar Z^4 , to the right and left alternately it being held in each position by a spring C' carried on the lay engaging in a shallow notch in the rack as shown, in Fig. 3. This may be effected by the hand of the operator at any time during the period between the weaving of one set of figures and the next. It will be understood that the upright bar Z^4 , is hinged at the bottom, and tied to the rack-bar E by a horizontal bar E^8 , so that it may be shifted to the right and left, thereby carrying with it to the proper distance the center block Z^3 on which the lever Z turns. This arrangement provides that when the bar Z^4 is inclined to the right, as shown, the reciprocations of the rack-bar, and consequently of the swivel shuttles, will take place in the correct position to form the series of figures nearest the right side of the fabric. Then during the interval between the weaving of this set of figures and the next, the operator shifts the bar Z^4 , and with it the rack E , the proper measure to the left, thus properly shifting the position of the center of the lever Z , so that the next time the swivel weaving is commenced, the whole mechanism, including the entire series of swivel shuttles and the mechanism for supporting and operating them, will be worked precisely the same as before, but farther to the left so that the figures will properly alternate in position on the fabric.

We attach importance to our removable pitch chain $W W'$, engaged with the sprocket-wheel W^2 , and the whole arranged to be shifted

axially, for the reason, among others, that it facilitates the changing of the condition of the weaving when required. To induce changes in the rapidly succeeding periods of swivel and ground weaving that occur during the production of a figure it is only necessary to take off a pitch chain $W W'$ and substitute a different one.

Modifications may be made in the details without departing from the principle or sacrificing the advantages of the invention.

Other means than the constant tension of the spring S , may be used to move the cams N , into the acting position. Other means than the springs E^4 , may be employed to raise the rack.

We claim as our invention—

1. In a loom for combined swivel and ground weaving, the combination of the cam-shaft M , collars M' secured thereto, and having projecting arms M^3 , the cams loose on said shaft, provided with apertures engaged by the arms, rock-shafts R carrying rollers R' , the picker-staffs K and connections between said rock-shafts and picker-staffs, the independent levers P , P , one for each cam, the shaft O having pulleys O' secured thereto, and flexible connections between said pulleys and the oppositely disposed lever P , springs S and connections T from the head motion for operating the shaft O at pre-determined times, substantially as herein described.

2. In a loom for combined swivel and ground weaving, the combination of the cam-shaft M , collars M' secured thereto, with provisions as the pinching screws M^2 , for adjusting them forward and backward relatively to the shaft, and having projecting arms M^3 , the cams N loose on said shaft, provided with apertures engaged by the arms, rock shafts R carrying rollers R' , the picker-staffs K , connections between said rock-shafts and picker-staffs, the independent levers P , P , one for each cam, the shaft O having pulleys O' secured thereto, and flexible connections between said pulleys and the oppositely disposed lever P , springs S and connections T from the head motion for operating the shaft O at pre-determined times, substantially as herein described.

3. In a loom for combined swivel and ground weaving, the combination of a cam-shaft M , the cams loose on said shaft, and adapted to be operatively connected therewith, rock-shafts R , carrying rollers R' , the picker-staffs K and connections between said rock-shafts and picker-staffs, the shaft O having pulleys O' secured thereto, a head motion, connections between the same and the shaft O , and means between the pulleys O' and cams for rendering the cams operative and inoperative, as required, substantially as described.

4. In a loom for combined swivel and ground weaving, the combination of the vibrating levers H , gears H' , H^3 and H^4 , and means for operating them, the swivel and fly shuttle-controlling mechanisms, the connections be-

tween said gears and said mechanisms, the single pitch-chain $W W'$, means for operating the same, a lever W^4 , controlled by the jacquard for throwing the chain into and out of action at intervals, whereby the chain shall act to determine the rapidly recurring alternations of ground and swivel weaving during the production of the figures, and shall be rendered ineffective during the long intervals of ground weaving between the figures, substantially as set forth.

5. In a loom for combined swivel and ground weaving, the combination of the vibrator lever H , gears $H' H^3 H^4$, and means for operating them, and connections between said gears and the swivel and fly-shuttle controlling mechanisms, the longitudinally movable shaft W^5 , spocket wheel W^2 thereon, single pitch-chain W, W' , carried on said wheel, non-elastic lever W^4 engaging therewith to impart the required longitudinal motion, and connections between said lever and a Jacquard mechanism to positively operate the same at pre-determined times, substantially as herein specified.

6. In a loom for combined swivel and ground weaving, the chains T', T^2 , and operating mechanism for drawing and relaxing them

alternately in combination with each other, and with the transverse slide X , attached to such chains stops X', X^2 fixed adjustably on said slide, and with the lever Y pivoted to said slide X , and connections therefrom to the rack-bar, adapted to serve substantially as herein specified.

7. In a loom for combined swivel and ground weaving, the chains T', T^2 , and operating mechanism for drawing and relaxing them alternately, in combination with each other and with the transverse slide X , attached to such chains and soft faced stops X', X^2 , fixed adjustably on said slide, and with the lever Y pivoted to said slide X , link Y^2 , upright lever Z , with provisions for adjusting the center thereof to vary the extent of the motion, and the link Z' , leading from this lever to the rack-bar, substantially as herein specified.

In testimony that we claim the invention above set forth we affix our signatures in presence of two witnesses.

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JOHN J. MINCHIN.

Witnesses:

JOSEPH FANNING,
THOS. M'INERNY.