2 Sheets--Sheet 1.

J. FISH.

Swivel-Shuttle Loom.

No. 169,248. Patented Oct. 26, 1875.

Fig. 1.

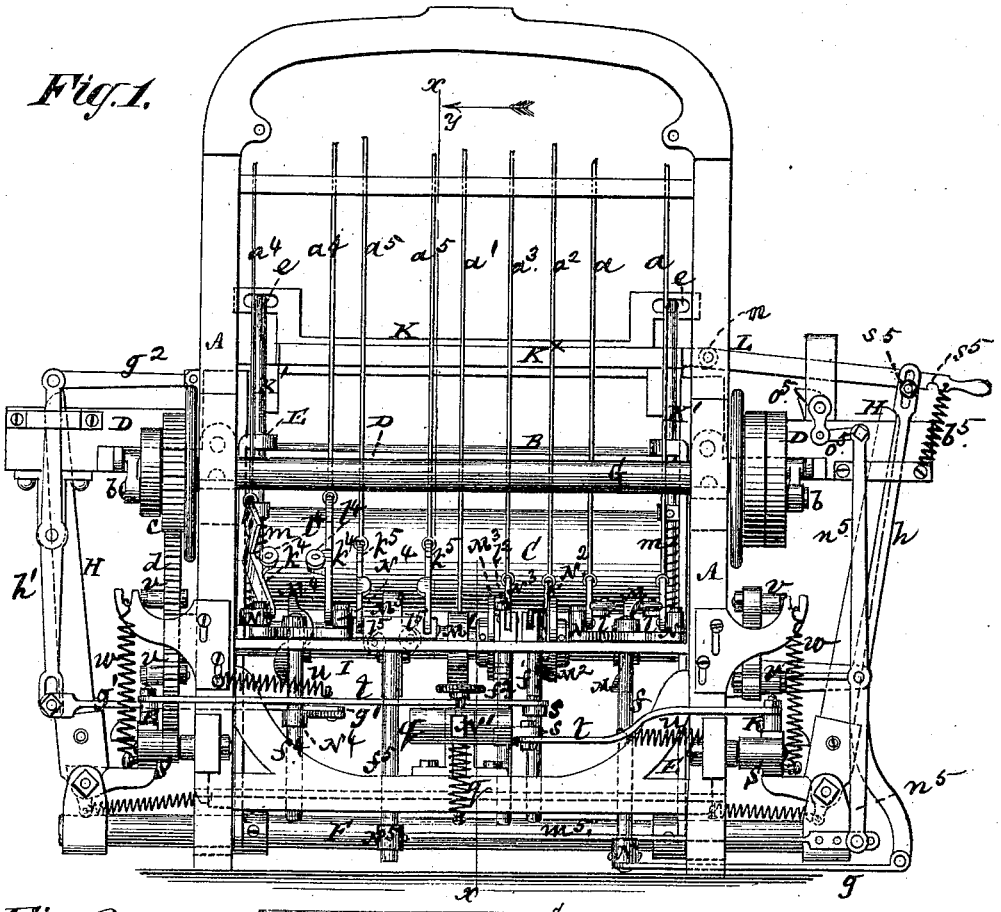
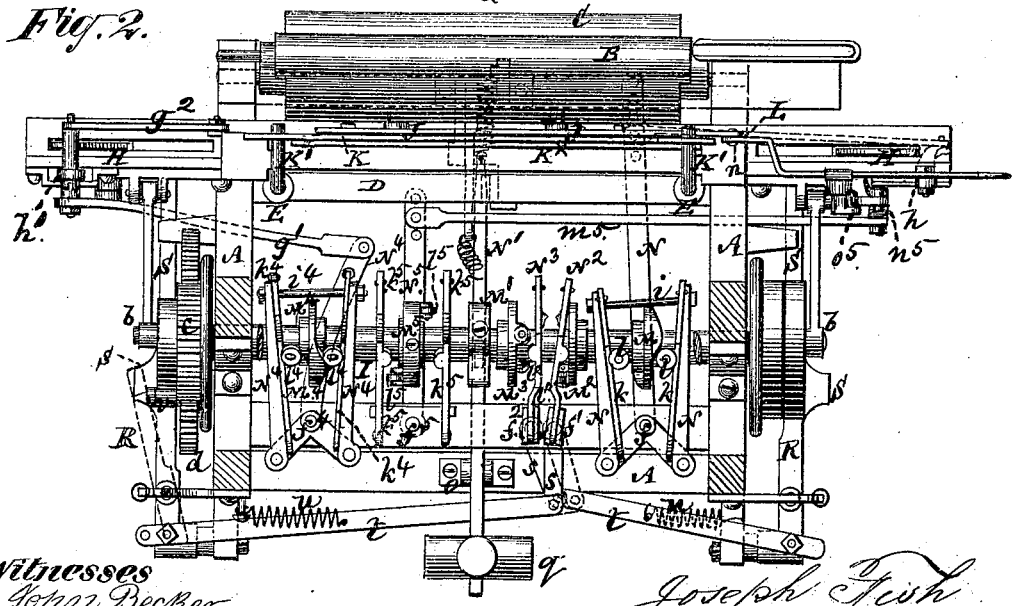


Fig. 2.



Witnesses
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Joseph Fish
by his Attorneys
Brown & Allen

2 Sheets--Sheet 2.

J. FISH.

Swivel-Shuttle Loom.

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Fig. 3.

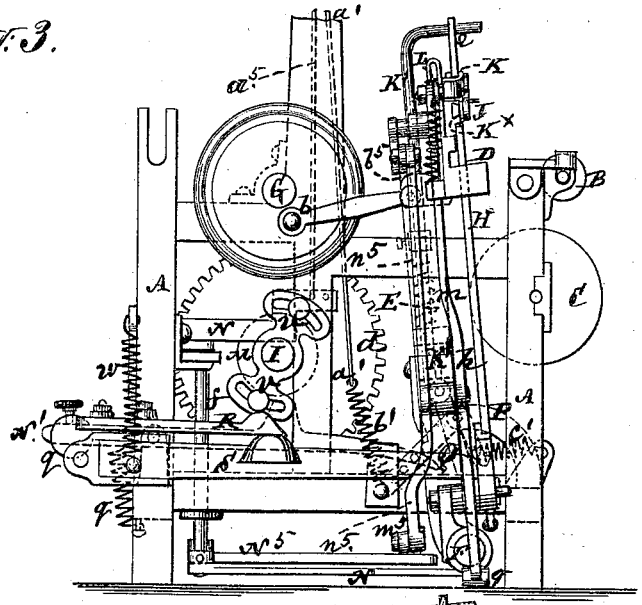


Fig. 4.

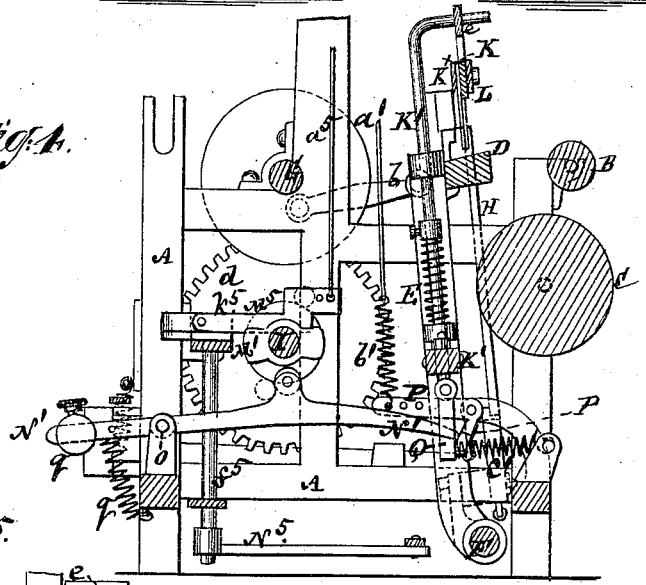
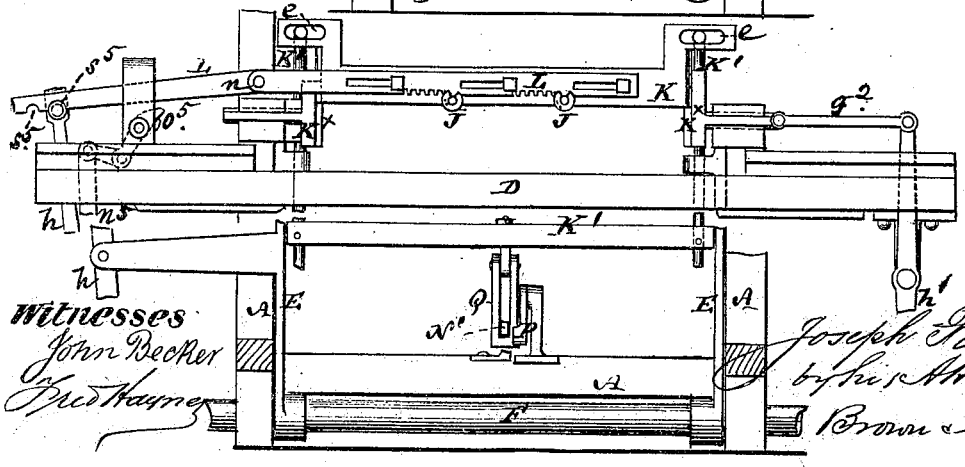


Fig. 5.



Witnesses
John Becker
Fred Haynes

Joseph Fish
by his Attorneys
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UNITED STATES PATENT OFFICE.

JOSEPH FISH, OF NEW YORK, N. Y.

IMPROVEMENT IN SWIVEL-SHUTTLE LOOMS.

Specification forming part of Letters Patent No. **169,248**, dated October 26, 1875; application filed July 13, 1875.

To all whom it may concern:

Be it known that I, JOSEPH FISH, of the city, county, and State of New York, have invented certain new and useful Improvements in Looms; and I do hereby declare that the following is a full, clear, and exact description of the same, reference being had to the accompanying drawings, which form part of this specification.

This invention relates mainly to that description of looms in which, in addition to the fly shuttle or shuttles for weaving the body of the web, swivel, or supplementary shuttles, are also employed to work figures of different colors or patterns in the body of the web while the latter is being produced. It will be found specially applicable to weaving broad silk with figures of a different color or colors and of various patterns, but it is not restricted to any particular width of fabric or material composing the same.

The main object of this invention is to produce a power-loom for work of the character hereinbefore referred to, which shall be more efficient, and shall provide not merely, as has heretofore been done, for the control by the jacquard-machine or pattern-controlling device of the figures to be produced in the body of the web while the labor of producing said figures is thrown upon the loom to the relief of the jacquard-machine or pattern mechanism, but which shall provide in a simple and practicable manner for driving the supplementary shuttles and for otherwise actuating them or such portions of their attachments as require to be operated by the loom itself without the intervention of the jacquard or pattern mechanism.

The invention consists in various novel combinations for thus operating said shuttles and their attachments, so that the weight or labor incidental thereto will be borne by one or more of the loom-shafts, and whereby a most perfect automatic action with provisions for all necessary adjustments of the figure-producing devices is obtained.

One part of the invention, which consists in the mechanism for controlling the operation of the fly-shuttles, is also applicable to all drop-box looms in which it brings the operation of such shuttles under the control of the jacquard-machine, and thereby dispenses with the use of a pattern-chain or other separate pattern mechanism device for controlling the operation of such shuttles.

Figure 1 represents a rear elevation of a power-loom, having my invention applied; Fig. 2, a partly sectional plan of the same; Fig. 3, a side view thereof; Fig. 4, a vertical transverse section on the line *x x*, looking in direction of the arrow *y*. Fig. 5 is a front view in part.

A is the main frame, B the breast-beam, which is shown of roller construction, and C the take-up roller of the loom. The harness and jacquard-machine or device for controlling the pattern, as also various other parts or devices which, separately considered, are not portions of this invention, are here omitted. D is the lay, having the usual race for an ordinary fly or body shuttle, and E E the swords thereof attached to a rocking shaft, F, below. G is the main shaft from which the lay is operated by crank or eccentric pins and rods *b*. H H are the picker-staffs for throwing the fly or body shuttle. I is a cam-shaft, which derives its motion by gears *c d* from the shaft G. This shaft not only actuates the picker-staffs of the body-shuttle, but also the various devices connected with the operation of the swivel or supplementary shuttles. Here it may be observed that when the swivel or supplementary shuttles are in gear, the loom works one pick of the swivel shuttle or shuttles and one pick of the fly or body shuttle alternately, as necessary in looms of the description here referred to, for the purpose of weaving the figure into or with the body of the web.

The swivel-shuttles J, of which there may be any number, according to the number of figures to be worked in the fabric widthwise of the warp, may be of the usual or any suitable construction, working on pivots attached to an upper slide or bar, K, of a vertically-moving frame, K′; or straight shuttles, operated by a suitable rack-and-pinion motion, through or by the same movements as are used to actuate the circular or swivel shuttles, may be substituted for the latter. These supplementary shuttles may be supplied with threads of varied colors.

L is the rack, by which the swivel-shuttles are operated. This rack is arranged to reciprocate on or along the front surface of the bar K, and the latter is slotted horizontally at *e e*, to provide for the skip or mock motion, when such is needed—that is, to provide for the horizontal or longitudinal movement at intervals of the bar K, or of a horizontal slide, $k^{\times}$, which carries it, and for the rack L and shuttles J, along with the bar or slide K, in order to vary the position of the figures on the body of the web. The revolving cam-shaft I has arranged on it a series of cams for producing the various motions connected with the swivel or supplementary shuttles J; subject to the control of the jacquard-machine or other pattern-controlling device. Thus M is a cam by which the rack L is reciprocated to give the necessary swivel motion to the shuttles J. This cam operates on a lever, N, which is fast to a vertical shaft, *f*, and which, according as it is thrown to the right or to the left by said cam, serves, by means of a rod, *g*, and lever *h*, to longitudinally move or reciprocate the rack L, as required.

The lever N may be variously constructed, either to operate in connection with a single or double cam; but such cam M is here shown as double—that is, with operating projections on its opposite sides or faces; and the lever N as composed of three arms—that is, two upper arms and one lower arm, the latter one of which is connected, by the rod *g* and lever *h*, with the rack, while the two upper arms of said lever or face bars *k k*, pivoted thereto and carrying friction-rollers *l l*, receive the motion from the cam. These upper arms may be hung on pivots, and be adjustable by means of a screw, *i*, to vary the distance apart of the rollers, which serve to give an easy and light action.

The contact of the lever N with the cam M is controlled by the jacquard-machine, and is only established when the rack L is required to be moved to the right or to the left to turn the swivel-shuttles J, as required. Thus, when such motion is desired to be broken or discontinued, the jacquard-machine is caused to lift, by means of rods or wires *a a*, the face-bars *k k*, with their attached rollers *l l*, to place the latter free from contact with the rotating cam M, or either face-bar *k* may be separately lifted for the same purpose. In this way the cam-shaft I of the loom does all the work by its cam M of driving the swivel or supplementary shuttles when the latter are required to be operated, the jacquard-machine simply raising or lowering the lever N, or its face-bars *k k*, to control the period of operation of the shuttles J. This, however, is not so important as that all the other operations connected with the supplementary shuttles, and more especially those heavier operations by which the frame K′ is lifted to put the supplementary shuttles out of working level or position, and to adjust the bar K longitudinally for producing a skip or mock motion, when required, are also effected by the loom, while the jacquard-machine has only the light work to perform of throwing certain levers into or out of position with cams on the shaft I for vertically or longitudinally adjusting the bar K, with its attached rack L and swivel-shuttles J, at the different periods required for such movements. The cams and levers used in producing these several additional operations may also be of varied construction, as, for instance, (or, at least, as regards certain of them,) hereinbefore described with reference to the cam M and lever N for reciprocating the rack L, and they will only here be described as represented in the drawing. M^1 is the cam on the shaft I, by which up and down motion is given to the bar K, or, which is the same thing, to the frame K′, carrying said bar or compound slide, or, rather, by which the downward action is given to said bar or slide K, with its longitudinally-sliding portion $K^{\times}$ and frame K′, as against springs *m m*, which give the upward movement. The cam M^1 also serves to retain the slide or bar K in its lowest position until the shuttles J have made a complete turn, said shuttles, and the rack L which drives them, moving up and down in common with the bar or slide K. The rack L may be jointed at *n* in part to prevent its up and down movement, together with the bar K and frame K′, being interfered with by its connection with its operating-lever *h*, and in part for a purpose which will be hereinafter described in connection with the skip or mock motion. N′ is the lever, having its fulcrum at *o*, and on the forward arm of which the cam M^1 operates to depress the slide or bar K, through its frame K′. Said cam M^1 or lever N^1, operated by it, as against the springs *m m*, is thrown in gear at the proper time by means of a bell-crank or lever, P, which is controlled through a rod or wire, *a′*, and return spring *b′*, by the jacquard-machine, so as to throw a hinged stirrup, Q, as against a spring, *c′*, into gear with the front end of the lever N^1, in order that the cam M^1, depressing the forward arm of said lever, will move down the frame K′ with its slide or bar K, rack L, and supplementary shuttles J, into working position of said shuttles with the warp, after which, and during the weaving of the body of the web between the figures or patterns worked therein, the rod or wire *a′* is dropped by the jacquard-machine, and the hinged stirrup Q is released by its spring from contact with the lever N^1, whereby the springs *m m* throw upward the frame K′, and its slide or bar K, with attached rack and shuttles J, to put the latter out of working line or level, and free from interference or alternate working, pick for pick, with the fly-shuttle.

A weight or spring, or both, *q*, applied to the back end of the lever N^1 serves to keep the latter up against the cam M^1, for the stirrup Q of the frame K′ to connect with when required. The frame K′ is guided in its up-and-down motion by passing through eyes on

the lay-swords E E, the springs *m m* being arranged around such up-and-down guiding portions of the frame.

It will thus be seen that the weight of the slide or bar K and its attachments is taken off the jacquard-machine.

The next operation that will be described is connected with the devices used to enable the picking motion—that is, the motion given to the fly or body shuttle—to be instantaneously arrested at intervals, so that said shuttle may not be crossing the loom at the time the circular or supplementary shuttles are working or making their pick. Thus on the shaft I are two cams, M^2 M^3, having roller-projections l^1 l^2, which, whenever either of two levers, N^2 N^3, are lowered through rods or wires a^2 a^3, connected with and controlled by the jacquard-machine, operate laterally on said levers, successively or otherwise, as required, and turning vertical shafts f^1 f^2, to which said levers are attached, cause swinging step or upper face-levers R R to be moved outward by means of cranks *s s* and rods *t t* from off the treadles S S, which operate the picker-staffs H H. This motion is against springs *u u*, which serve to keep the levers N^2 N^3 up against the cams M^2 M^3, and the step-levers R R to their places on the treadles S S, so that upon crank or eccentric pins *v*, on the two ends of the shaft I, coming round, they will act upon the step-levers R R to depress the treadles S S, as against springs *w w*, and operate the picker-staffs H H to throw the fly-shuttle. But when the cams M^2 M^3 act upon the levers N^2 N^3, then the step-levers R R will be thrown outward from off the treadles S S, so that the crank or eccentric pins *v* will pass over the treadles S S without operating them, thereby arresting the motion of the fly or body shuttle, as and for the purpose hereinbefore specified.

This completes the several operations, except when a skip or mock motion is needed to vary the position of the swivel or supplementary shuttles J widthwise of the warp, and so change the position, each successive row or otherwise, of the figures produced in the web. Said skip or mock motion, when applied to the loom, is also controlled by the jacquard-machine or other pattern-controlling device, but is not operated by it, but by the loom itself, so that the jacquard-machine is relieved of labor incidental to working the skip or mock motion. Thus on the shaft I of the loom is a cam, M^4. This cam operates on a lever, N^4, which is fast on a vertical shaft, f^4, and which, accordingly as it is thrown to the right or to the left by said cam, serves, by means of rods g^1 g^2, a lever, h^1, and the longitudinally-sliding portion $K^\times$, to longitudinally move to the right or to the left the slide or bar K through its slots *e e*, and the rack L and supplementary shuttles J along with said slide.

The lever N^4 is represented as of similar construction to that shown for the lever N—that is, it is composed of a lower arm which connects with the lever h^1, and of two upper pivoted arms connected by an adjusting-screw, i^4, and provided with pivoted face-bars k^4 k^4, having rollers l^4 l^4, against which the opposite faces of the cam M^4 act alternately; but this construction of the lever and cam, as hereinbefore observed, may be changed. Although the lever N^4 is thus operated by the cam M^4 on the loom-shaft I to shift to the right or to the left, as required, the slide or bar K with its attachments, which action constitutes the skip or mock motion, the contact of the lever N^4 with the cam M^4 is controlled by the jacquard-machine, and is only established when required by the action of the latter or other pattern-controlling device. Thus when the skip or mock motion is desired to be broken or discontinued, the face-bars k^4 k^4 are lifted by the rods or wires a^4 a^4, so that the rollers l^4 l^4 are free of the cam M^4 during the rotation of the latter, or either face-bar k^4 may be lifted for the same purpose. The lowering of either face-bar k^4 by the jacquard-machine through the wires a^4 controls the period of action for the skip-motion, by bringing the lowered face-bar into working contact with the cam M^4. Prior, however, to the skip or mock motion being established, it is necessary that the rack L should be temporarily disconnected from its operating lever *h*, and said rack afterward engage with said lever at a point or distance corresponding with the longitudinal shifting of the rack L and its attachments. For this purpose the outward extension of the rack L pivoted at *n*, as hereinbefore described, is made with two or more notches, s^5, at a suitable distance apart, and is held down by a spring, b^5, so that either one or other of said notches, after the rack has been shifted longitudinally, is made to engage with the lever *h*.

To lift the jointed outward-extended portion of the rack L out of engagement by its one notch s^5 with the lever *h*, in order to provide for engagement of the rack after being shifted longitudinally with the lever *h* by the succeeding notch s^5, there is arranged on the shaft I of the loom a cam, M^5, having rollers l^5 l^5 on its opposite sides or faces, and arranged to work against one or other of two pivoted arms, k^5 k^5, connected with vertical shafts f^5 f^5 of a lever, N^5. These pivoted arms are raised or lowered through wires a^5 a^5 by the jacquard-machine, to put them in or out of working contact with the cam M^5. When in working contact with said cam they serve to actuate to the right or to the left, as required, according to which arm k^5 is put in action, the lever N^5, that, by means of a rod, m^5, lever n^5, and a cranked lifter, o^5, operated by said lever against the pressure of the spring b^5, serves to lift the jointed extension of the rack L out of its one notched connection with the lever *h* till the cam M^4 of the mock motion has longitudinally adjusted the rack L with its attachments, as required. Of

course these several operations are all suitably timed by the jacquard-machine, and by the construction and arrangement of the cams on the loom-shaft I, to produce the necessary movements at their proper relative periods according to the pattern to be worked or work to be done; but the weight or labor consequent upon these different operations is thrown, without the intervention of the jacquard-machine, upon the loom, only the rising and falling levers which are worked by the same being controlled by the jacquard-machine or other pattern mechanism.

The mechanism hereinabove described for controlling the operation of the fly-shuttles, consisting of the movable step-pieces R R, the cams M^2 M^3, and the levers N^2 N^3 and their appurtenances, is applicable to all drop-box looms for effecting the control of the operation of the pickers on either side of the loom, as may be desired, by the action of the jacquard-machine, so that any desired number of picks in succession may be made from either side of the loom.

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

1. The combination, with the rack L, for driving the supplementary shuttles, of the cam M on the loom-shaft, and an interposed lever, N, connected with the rack, substantially as shown, and adapted to be controlled by the jacquard-machine, or other pattern-controlling device or mechanism, essentially as described.

2. The stirrup Q and bell-crank P, adapted to be controlled by the jacquard-machine or other pattern devices, in combination with the lever N^1 and cam M^1, for operating the bar or slide K, essentially as described.

3. The combination, with the movable step pieces or levers R R on the shuttle-operating treadles S S and crank-pins *v v*, of the cams M^2 M^3 and the operating levers N^2 N^3, adapted to be controlled by the jacquard-machine or other pattern device, essentially as described.

4. The combination, with the slide or bar K, which carries the supplementary shuttles, of the cam M^4 on the loom-shaft, an interposed lever, N^4, adapted to be controlled by the pattern mechanism and a suitable connecting device, all operating to move the slide longitudinally for the purpose of producing the skip or mock motion, substantially as specified.

5. The combination, with the rack L, by which the swivel or supplementary shuttles are driven, of the slide K, the lifter o^5, the cam M^5, the interposed lever N^5, adapted to be controlled by the jacquard-machine or pattern mechanism, and suitable connecting devices, essentially as described, and whereby the rack is disengaged when the skip or mock motion is being made, substantially as specified.

JOSEPH FISH.

Witnesses:
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