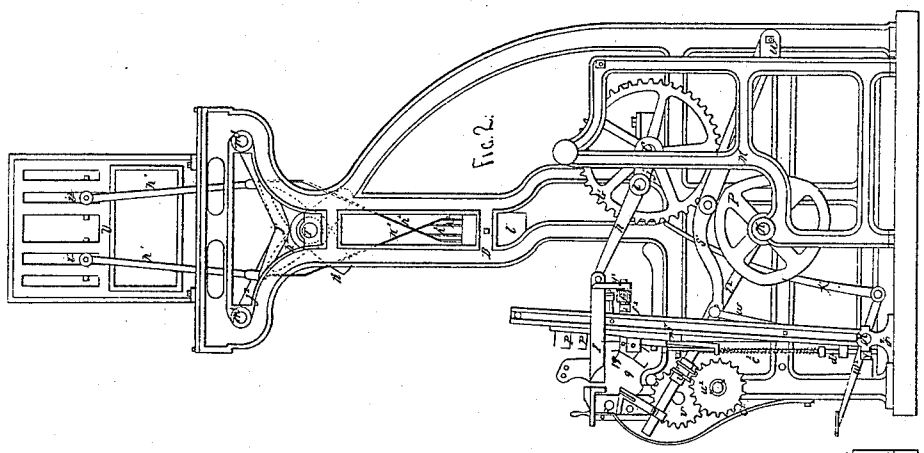
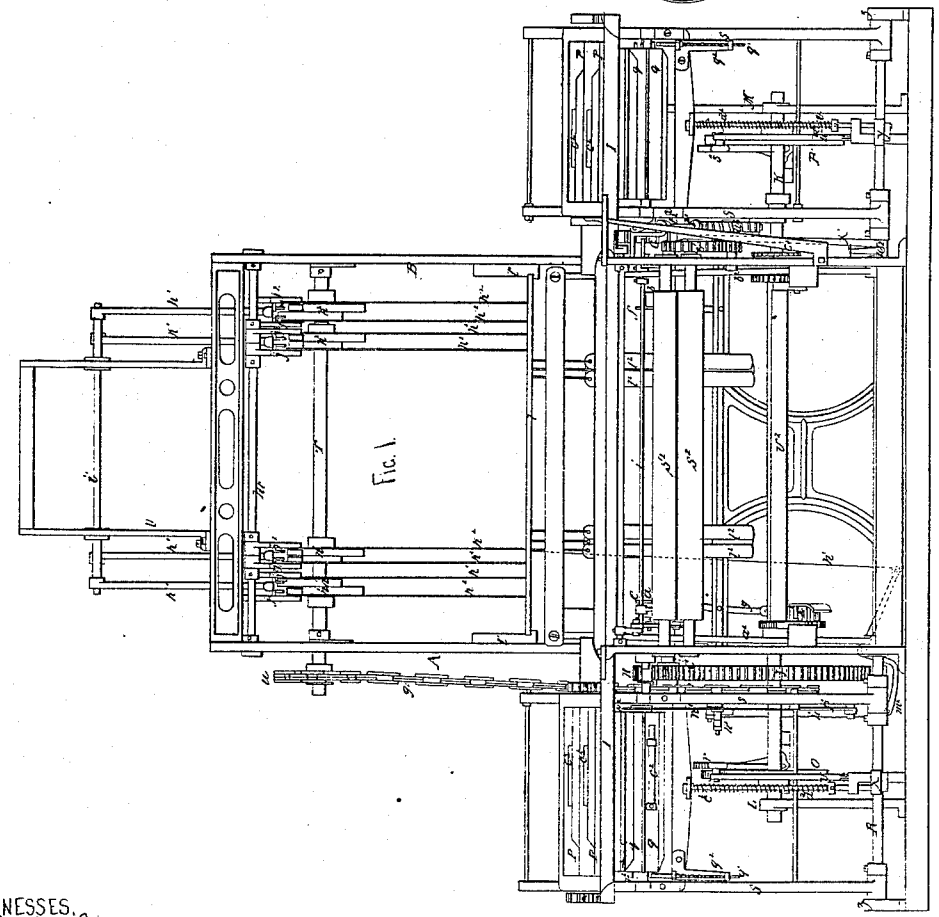
Sheet 1 - 3 Sheets.

W. & J. W. Markland.

Power Loom.

No. 97,106. Patented Nov. 23, 1869.





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Power Loom.

No. 97,106

Patented Nov. 23, 1869.

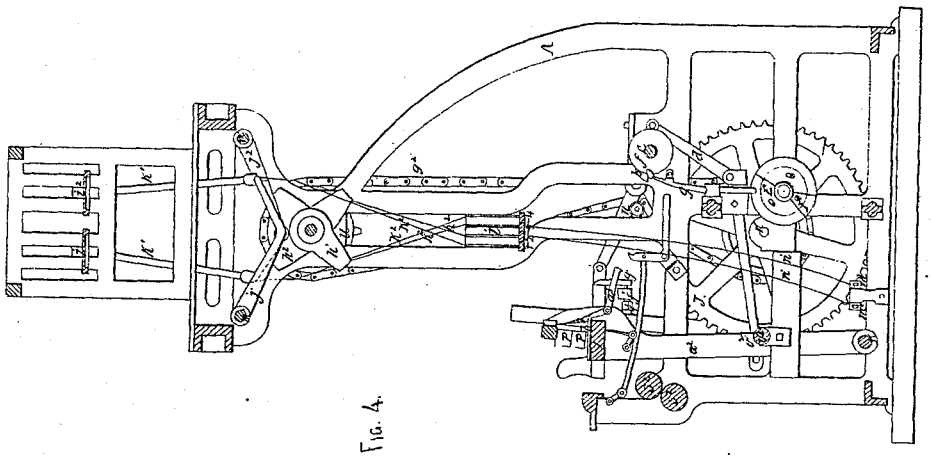
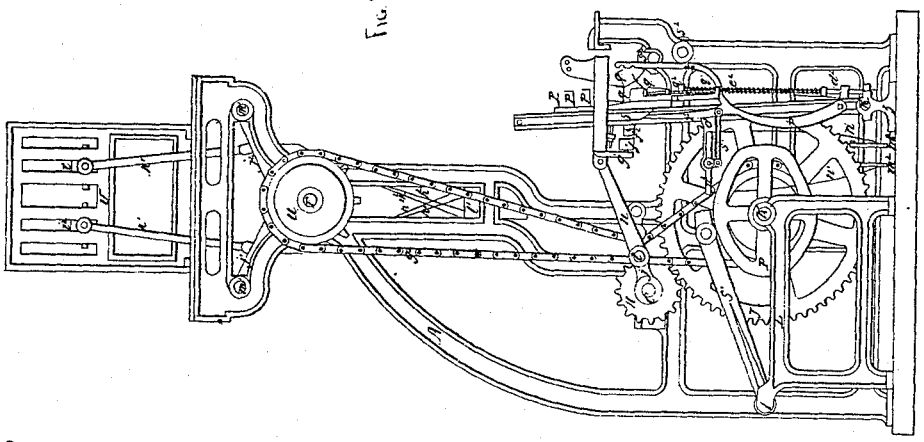


Fig. 4.

Fig. 3.



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Power Loom.

No. 97,106. Patented Nov. 23, 1869.

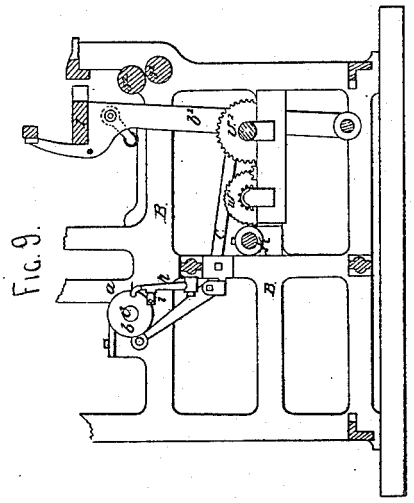

Fig. 9.

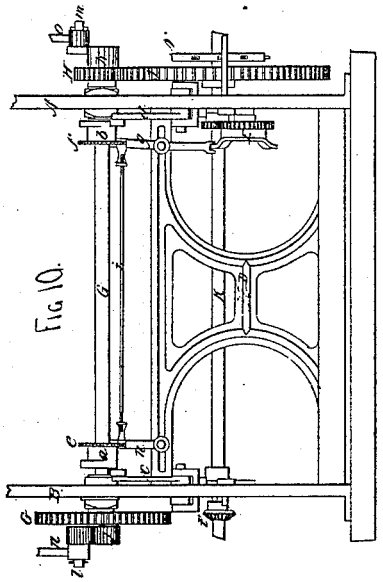

Fig. 10.

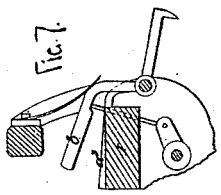

Fig. 7.

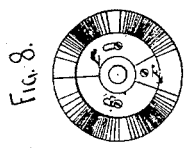

Fig. 8.

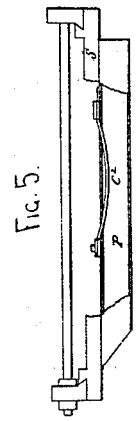

Fig. 5.

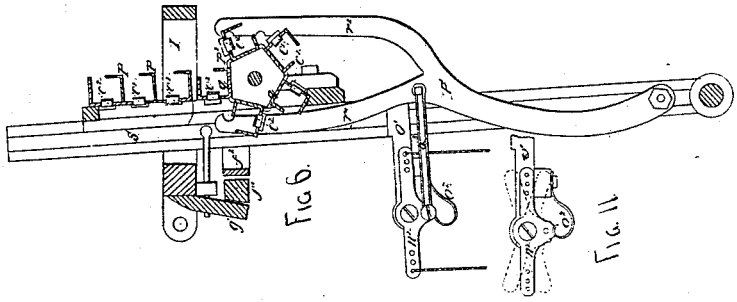

Fig. 6.

Fig. 11.

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UNITED STATES PATENT OFFICE.

WILLIAM MURKLAND AND JOHN W. MURKLAND, OF LOWELL, MASS.

IMPROVEMENT IN POWER-LOOM FOR WEAVING INGRAIN CARPET.

Specification forming part of Letters Patent No. **97,106**, dated November 23, 1869.

To all whom it may concern:

Be it known that we, WILLIAM MURKLAND and JOHN W. MURKLAND, both of Lowell, in the county of Middlesex and State of Massachusetts, have invented new and useful Improvements in Power-Looms for Weaving Carpets and other Figured Fabrics; and we do hereby declare that the following is a full and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Our invention is applicable to power-looms for weaving carpets and other figured fabrics; and it consists in an arrangement of levers for operating both the trap-boards and the journals, whereby the loom is simplified and rendered less complicated; also, in devices for revolving the cylinder-boxes during the ascending or descending movement of the shuttle-box frame; also, in the arrangement of the cylinder-boxes with the vertical-sliding boxes, the object being to bring the weight of the cylinder-boxes nearer the fulcrum of the shuttle-box frame, thus reducing the momentum at the swing of the lathe; also, in the arrangement of the shuttle-boxes within an independent frame in the lay, and in connection with suitable springs, whereby the boxes may yield at the beat of the lay to avoid unnecessary jar; also, in mechanism for operating the cylinder-boxes by means of the jacquard; also, in a device for reversing the lay-shaft when occasion requires, either in absence of the filling or breaking of the same, or other causes.

To enable others skilled in the art to make and use our invention, we will proceed to describe its construction and operation.

Figure 1 represents a front elevation of a loom with our improvement attached; Fig. 2 represents an elevation of the right-hand end. Fig. 3 represents an elevation of the left-hand end. Fig. 4 represents a central vertical section, looking toward the left-hand end. Fig. 5 represents a plan of the shuttle-box frame and shuttle-box, with parts broken out, showing the shuttle-box, spring, and binder combined. Fig. 6 represents a vertical section of the left-hand shuttle-box frame, looking toward the loom. Fig. 7 represents a vertical section of the top of the lathe, showing the yielding grate for the filling-fork. Fig. 8 represents a side elevation of the index-cam, showing its construction. Fig. 9 represents a central vertical section of a part of the loom, looking toward the left-hand end. Fig. 10 represents a part of a back elevation.

Similar letters in the different figures indicate corresponding parts.

A and B represent the sides of the main part of the frame of the loom. C is the lay-shaft. Located and sliding on this shaft C, between and close up to the sides A and B, are the cams *a* and *b*, which operate the picker-levers *c* and *d* alternately, or as occasion may require. These cams *a* and *b* are provided with collars *e* and *f*, the collar *f* working in the end of the lever *g*, which is pivoted at its center to the girt D, the lower end of said lever *g* connecting with the index-cam E, which is attached to the side of the loom by a stud.

Connected with the top of the lever *g* is the adjustable rod *i*, the other end of which connects with the arm *h*, the lower end of this arm *h* being pivoted to the girt D, the other end connecting with the collar *e* on the cam *a*.

The index-cam E is formed in three pieces, which are changeable, as shown in Fig. 8 of the drawings, they being so formed that the loom can be changed to weave shot and shot about or plain by changing the place of the piece F and placing it on the opposite side. On the right-hand end of this lay-shaft C is secured the spur-gear G. On the left-hand end is secured the pinion-gear H. Also secured to the extreme ends of this shaft C are the arms *j* and *k*, with wrist-pins *l* and *m*, which receive the connecting-rods *n* and *o*, the other ends of said connecting-rods *n* and *o* connecting, near each end of the loom, with the lathe I.

Connected with the pinion H is the gear J, which is secured to the shaft K near the outside of the frame A. N is the chain-wheel. Secured to the shaft K, near each end, inside of the stands L and M, are the cams O and P, which operate the shuttle-boxes *p p* and *q q* by means of the levers *v* and s^1, they being hinged at one end to the rods *t* and *u*, the other ends connecting with the sliding vertical rods *v* and *w* by link-joints. These vertical rods operate in sockets *x* and *y*, which are

secured to the lathe-shaft R, which rests in bearings formed in the frame sides A and B and stands *z z;* and to this shaft the lathe I is secured by means of the swords a^2 and b^2. Located at each end of the lathe I are the shuttle-box frames S S, the lower parts of which are attached to the lathe-shaft R. The top of these frames passes through an opening in the lathe-frame. These frames S S each contain a series of vertical and cylinder shuttle-boxes, *p p p p* and *q q q q*, the cylinder boxes *q q q q* being located underneath the vertical boxes *p p p p*, each of these boxes *p p p p* and *q q q q* being provided with steel-spring shuttle-binders c^2 c^2, formed in one piece, which serve a twofold purpose—viz., they stop the shuttle with but little jar to the filling, and hold the same firmly while in the boxes *p p* and *q q*. One end of these shuttle-binders c^2 c^2 c^2 is held firmly in a socket by means of a set-screw. The other end plays freely in a corresponding socket, as fully shown in Fig. 5. These vertical and revolving boxes *p p* and *q q* are caused to ascend or descend by means of the connecting-rods d^2 d^2, which are furnished with adjustable springs e^2 e^2. Located directly under the back part of each end of the lathe I are the horizontal girts f^2 f^2, they being attached to each side of the shuttle-box frames S S. These girts operate against springs f^1 f^1 near their center, which springs f^1 f^1 are secured to the projections g^1 g^1 on the back part of the lathe I, the object being to allow them to yield, so as to prevent the accustomed and usual jar at the beat of the same.

T is the cam-shaft, which is located near the top of the loom. On the left-hand side of the loom, and secured to the extreme end of the shaft T, is the chain-wheel U, over which passes the chain g^2, which connects with the chain-gear N. Secured to this shaft T, between the frame sides A and B, are the double cams h^1 h^1 and h^2 h^2, which operate the trap-boards i^1 and i^2 by means of the levers j^1 and j^2 and connecting-rods k^1 k^1. These levers j^1 and j^2 are connected with the journals Nos. 1, 2, 3, and 4 by suitable rods, straps, or chains k^2 k^2 k^2 k^2. Said journals Nos. 1, 2, 3, and 4 are guided at each end by guides l^1 l^1, which are secured to the inside of the frame sides A and B, and are furnished with weights l^2 l^2 l^2 l^2.

V^2 is the jacquard frame, which is secured to the top of the loom, and in which the trap-boards i^1 and i^2 operate. The levers j^1 j^1 and j^2 j^2 are connected to the shafts m^1 m^1, and their outer ends are provided with studs, which, during the movement of the levers, connect with the rods k^1 k^1, which are connected with the trap-boards i^1 and i^2 at each end. m^2 m^2 are levers, secured to the inside of the frame A near its bottom. One end of said levers m^2 m^2 connects with the trap-boards i^1 i^2 or the journals Nos. 1, 2, 3, and 4 by means of a cord, chain, or strap, n^1 n^1 and k^2 k^2, the other end being connected in a similar manner to each end of the cam-lever n^2. This cam-lever n^2 is provided with a stud, and is secured to the arm o^1, said arm projecting backward from the shuttle-box frames S S. Secured to the under side of this arm o^1 is a spring, o^2, which operates against the cam-lever n^2, as shown in Fig. 11 of the drawings, the red lines showing the different positions the cam-lever n^2 is placed in, and also the office of the spring o^2, which is to hold the lever n^2 firmly in those positions.

P^1 is the forked hook, connected to the shuttle-box frames S S at the bottom. The forked parts of these hooks r^1 and r^2 connect, as occasion requires, with the cogged or pin wheel p^2, located and secured to one end of the revolving boxes *q q*, which, after said boxes *q q* are operated upon by said hooks, are held in position by the hammers q^1 q^1, aided by the springs q^2 q^2. This forked hook P is connected near the junction of the forks r^1 r^2 by a stud and arm, s^3, to the cam-lever n^2.

The positive take-up motion, as shown in the drawings, is the usual and common device, consisting of pressure-rolls s^2 s^2, operated from the shaft *k* by bevel-gears t^1 t^1, diagonal shaft t^2, worm and worm-gears, and spur-gears, u^1, u^2, and v^1.

The cloth-roll v^2 is operated in the usual manner by a pawl attached to the sword b^2 of the lathe I, operating the ratchet w^1 at every beat of the same, which operates the roll v^2 by means of the intermediate gears, thus winding the fabric as fast as woven.

The last two devices described are commonly used. They therefore make no part of our invention, and consequently we make no claim to them.

The general operations of the loom and many of the devices represented in the drawings are similar to those of ordinary power-looms.

Such are the nature and perfection required in weaving carpets and other figured fabrics that where the filling-thread is disconnected in the warp, in whatever location, either by its being broken or exhausted from the shuttle, the succeeding thread of filling must be commenced in the same location of the warp where the end of the last thread was left. Hence the great necessity of an efficient, active, and simple device for restoring the entire action of the loom to that point—viz., the exact position or point where the last thread was left—which we accomplish by means of the treadle-lever w^2, hung or hinged to the lathe-shaft R, which we have located on the right-hand side of the loom, one end of this treadle-lever w^2 connecting with the pawl x^1, which operates the ratchet G, which gives the lathe I and parts connected with it a backward movement.

Ordinary filling-forks are usually so rigid and inflexible that they are oftentimes destructive, causing the filling-thread to be cut or broken at the point where the action of the fork comes directly in contact with it. To obviate this difficulty we add to the fork b^3 a

yielding grate, a^3, as fully shown in Fig. 7 of the drawings, the other parts, with connections, connecting the grate a^3 with the shipper c^3, as represented in different figures of the drawings, being the same as are now commonly in use. The grate a^3 not only yields and eases the action of the fork b^3, but entirely prevents the cutting and breaking of the threads at this point.

In the common arrangement of the revolving and vertical shuttle-boxes now in use, the revolving boxes are located so far from the fulcrum of the lathe-shaft that the momentum when passing the dead-points of the crank is so great, owing to the weight of the parts, as to produce great strain, and requires an unnecessary waste of power. To obviate this difficulty to a great extent, we locate the center of the revolving boxes $q\ q$ as near as possible to the fulcrum of the lathe I—viz., underneath the vertical shuttle-boxes $p\ p$ when at their greatest elevation—and by this arrangement we greatly decrease the momentum of the lathe I.

The spring-binder c^2 is formed of a single piece of steel, whereby its weight, and consequently the momentum of the boxes, are lessened.

The index-cam E in Fig. 8 is arranged for what we term "plain weaving," and during one revolution operates the picker-lever c and d eight times. First, the picker-lever c is operated upon twice in succession; then, by aid of the adjustable rod i, the picker-lever d is operated twice, and so on alternately; but for weaving shot about the section F of the cam E is placed on the opposite side, and the lever c is then operated upon three times in succession; then the lever d twice; thence back to the lever c once; then the lever d twice, thus making eight irregular throws while the cam E makes one revolution, and the operations in both of these cases are in harmony with the other motions of the loom.

By the arrangement and construction of this index-cam E we avoid the necessity of using an entire new cam for either of the above changes, or an extra number of surplus pieces, as are now in common use.

In weaving carpets, the first and second journals contain white warp, the third and fourth colored warp, the knot-cords operating the same passing through the trap-boards i and i^2 of the jacquard V, to which are secured the harnesses, these journals being connected with the trap-boards by the levers j^1 and j^2.

Their Operation.

The first or white journal and the back board, i^2, in the jacquard V rise together, while at the same time a portion of the harness contained in the third and fourth journals is raised, carrying up such portions of the colored warp as is required to form the figure. Then while the first journal and back board, i^2, are descending the third journal and front board, i^1, rise together, at the same time carrying up portions of the harness contained in the first and second journals, thus carrying up a portion of the white warp, which forms other parts of the figure. Then, while the third journal and front board, i^1, are descending, the second journal and back board, i^2, rise together, carrying up again such portions of the colored warp contained in the third and fourth journals as the figure or pattern requires. This operation is repeated and continued through the entire web, which constitutes the process of ingrain-carpet weaving. Therefore as the ordinary and common process in this department of the loom arrives and tends to the same object as ours, we deem any further explanation at this point unnecessary. Our object in this arrangement of connecting the trap-boards i and i^2 with the journals Nos. 1, 2, 3, and 4 by means of the levers j^1 and j^2 makes the action more direct, thus simplifying and rendering the same less complicated.

In order to produce the change which the jacquard V requires in the cylinder-boxes $q\ q$, the cam-lever n^2 transfers the action from the jacquard V to the cylinder-boxes $q\ q$ through the connecting devices, thus revolving the cylinder-boxes $q\ q$ by the action of all the boxes either in their ascending or descending movement. Thus while the vertical boxes $p\ p$ are making their regular changes (they being operated by the cams O and P) the cylinder-boxes $q\ q$ at the same time are making their necessary changes when required by the movement of the vertical boxes $p\ p$, aided by the cam-lever n^2, which engages the forked hooks r^1 and r^2 with the pin or cogged wheel $p^2\ p^2$ on either side, as demanded by the jacquard V, which action, with the ascending or descending movement of the vertical boxes $p\ p$, leaves the top cylinder-box in a proper range to be used. Thus we obviate by this arrangement the necessity of skipping over boxes, as would be the case if all the boxes were vertical.

Thus the object of the vertical and cylinder boxes $p\ p$ and $q\ q$, used and operated in connection with each other, is for the special purpose that one or more of the vertical boxes $p\ p$ may be used on one or more plies of the cloth, while the cylinder-boxes $q\ q$ are in all cases reserved for the shading of one ply, thus simplifying the working parts at this point, as there are no extra cams and levers applied for this purpose, consequently requiring less power to operate the same, and the parts less liable to get out of repair.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The levers $j^1\ j^2$, combined with and operating both the trap-boards and the journals, substantially as described.

2. The combination, with the sliding cylindrical boxes, of the stationary double-hooked pawl and lever n^2, controlled by the jacquard

for revolving such boxes, substantially as described.

3. The vertical and cylindrical boxes *p p* and *q q*, substantially as described, when arranged and operating with the lathe, as and for the purposes set forth.

4. The lay and its springs f^1 f^1, in combination with the shuttle-box frame S S, arranged within the openings of the lay I, for lessening the jarring of the boxes by the movement of the lay, as specified.

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JOHN W. MURKLAND.

Witnesses:
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