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H. SKINNER.

Looms for Weaving Piled-Fabrics.

No. 146,101. Patented Dec. 30, 1873.

Fig. 1.

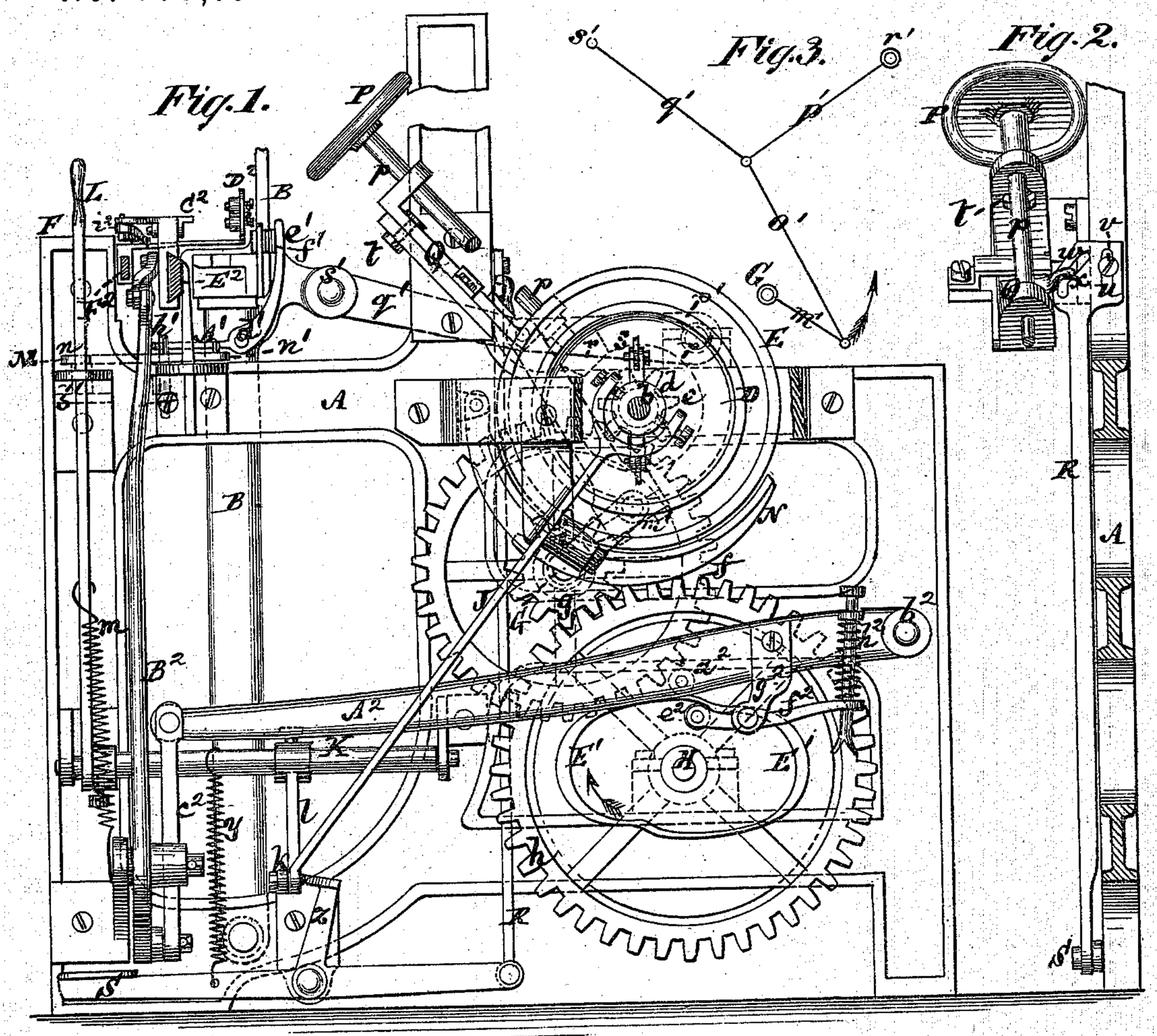


Fig. 3.

Fig. 2.

Fig. 4.

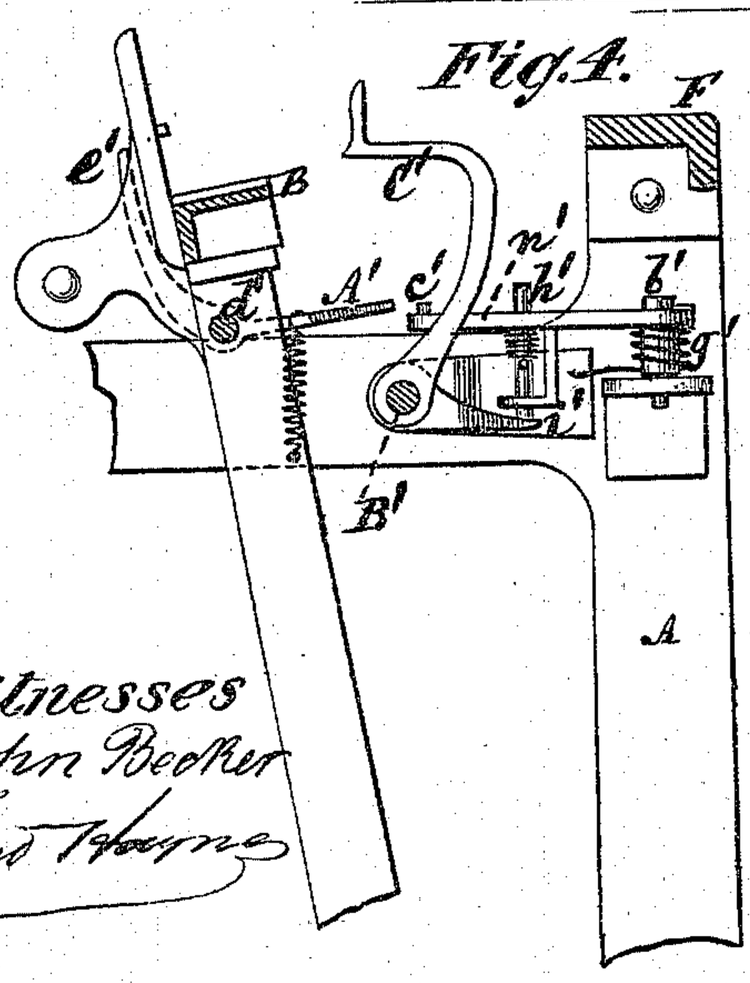
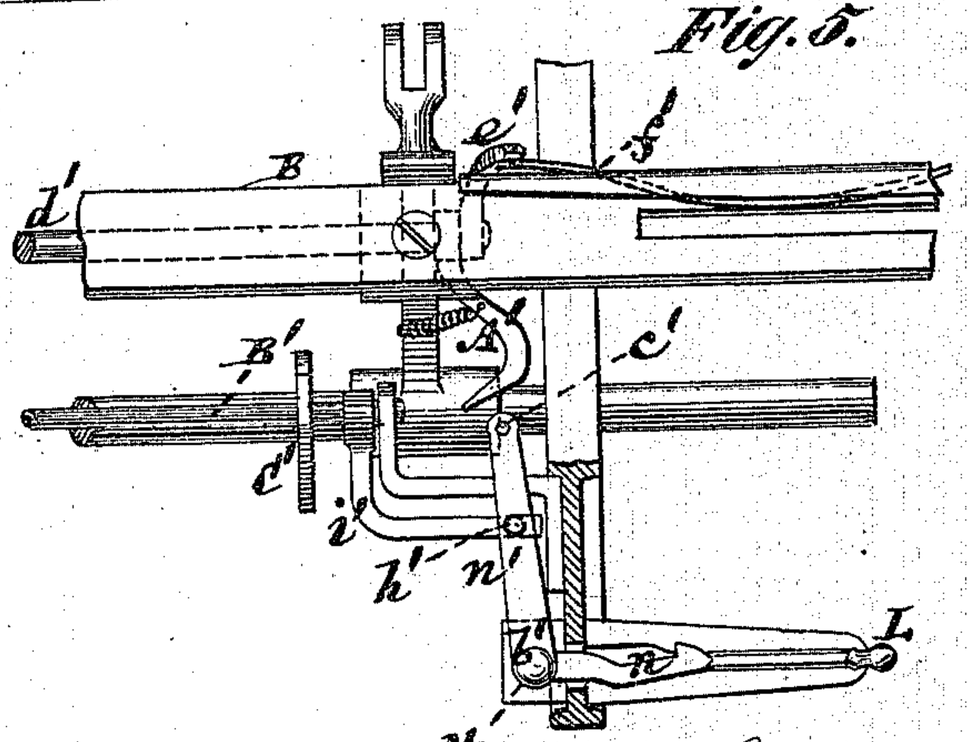


Fig. 5.



Witnesses
John Becker
Fred Haynes

Halcyon Skinner
by his attorneys
Brown & Allen

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Looms for Weaving Piled-Fabrics.

No. 146,101. Patented Dec. 30, 1873.

Fig. 1.

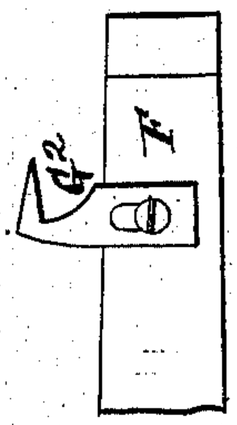

Fig. 8.

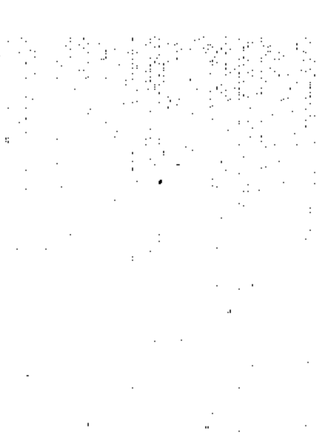

Fig. 10.

Fig. 9.

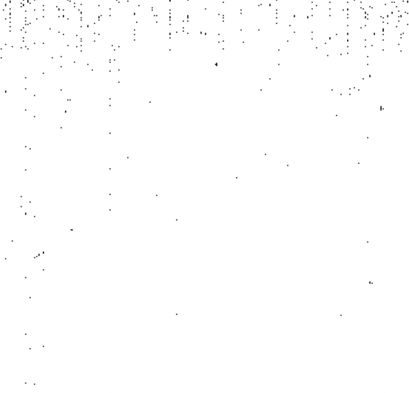

Fig. 6.

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Looms for Weaving Piled-Fabrics.

No. 146,101. Patented Dec. 30, 1873.

Fig. 11.

Fig. 12.

Fig. 13.

Fig. 14.

Witnesses.
John Becker
Fred Haynes

Halcyon Skinner
by his Attorneys
Brown & Allen

UNITED STATES PATENT OFFICE.

HALCYON SKINNER, OF YONKERS, NEW YORK.

IMPROVEMENT IN LOOMS FOR WEAVING PILED FABRICS.

Specification forming part of Letters Patent No. **146,101**, dated December 30, 1873; application filed November 12, 1873.

To all whom it may concern:

Be it known that I, HALCYON SKINNER, of Yonkers, in the county of Westchester and State of New York, have invented certain Improvements in Power-Looms, of which the following is a specification:

These improvements relate more particularly to that class of looms in which the pile is formed by inserting wires under a part of the warp during the operation of weaving, and then withdrawing them after the pile is firmly bound in by the weft; but certain portions of the invention may be applied to weaving any kind of fabric.

The invention, however, will here be shown as adapted to weaving Brussels or tapestry carpets, and in weaving which class of goods it is desirable to give two beats of the lay to each shot of filling, which is accomplished by the ordinary device of a toggle-joint for connecting the crank of the lay-operating shaft with the lay. Said crank, also the lay-frame, let-off, and take-up, likewise the harness-motion, may be constructed to suit the kind of work for which the loom is intended.

The invention consists in certain mechanism for releasing the brake from the driving-pulley, in combination with mechanism or devices for throwing the hand-operating wheel in and out of gear, as required. It also consists in a certain combination of a movable pin and arm connected with the rock-shaft which carries the feelers, the arm or lever for releasing the shipping-lever, and a knock-off device carried by the lay, for stopping the loom when the weft breaks or is expended from the bobbin, and whereby the same devices, or certain of them, also serve to stop the loom when the shuttle fails to box. The invention also consists in a combination, on the same main shaft, of duplicate flanges or disks, each provided with two picker-operating cams or points and a double wire-operating cam. This latter cam, also, is so constructed as to give two complete motions to the wire-carriers from one revolution of the shaft, and such cam-shaft is so geared or connected with the crank-shaft for operating the lay that a most effective action is obtained for the latter. The invention furthermore comprises certain novelties connected with devices for operating the wires, including wire-carriers and slides, constructed and combined so that their usual inconvenient disposition or arrangement above and partly over the shuttle-box when the lay is in its forward position is avoided; also, comprising a cam-piece on the breast-beam for drawing in the carrier with the wire toward the fell of the cloth, in combination with the wire-carriers, arranged to operate substantially as herein described.

Figure 1 represents a side view of a loom, in part, having my improvements applied; Fig. 2, a rear sectional view, in part, in illustration of the devices for operating the loom by hand; Fig. 3, a diagram in explanation of the action of the crank-shaft on the lay; Fig. 4, a transverse sectional view, in part, in illustration of the stop-motions; Fig. 5, a horizontal view of the same. Fig. 6 is a broken top view of the loom; Fig. 7, a plan of the cam-piece on the breast-beam; Fig. 8, a plan of the wire-carriers and outer portion of their slides; Fig. 9, a sectional front view of the same on the line *a* a**; Fig. 10, a rear view of the head of the jaw wire-carrier. Fig. 11 is a broken front elevation of the loom. Fig. 12 is a face view of the picker-cam action; Fig. 13, a front view of certain portions of the brake mechanism; Fig. 14, a sectional plan view of the brake devices, in part, with means for the control of the brake when the hand-wheel is applied.

Similar letters of reference indicate corresponding parts.

In the accompanying drawing, A represents the main frame; B, the lay; C C, the picker-staffs; D, the driving-pulley; E, the brake-wheel; F, the breast-beam; G, the crank-shaft for operating the lay; and H, the cam-shaft for actuating the pickers, the wiring-cams, and the harness-cams. The driving-pulley D is mounted loosely on a shaft, *b*, supported by a small frame, *c*, arranged to project from the side of the main frame. Said pulley is fitted with a conical recess on its one side, made to fit a conical projection on the side of the brake-wheel E, which is fast on the shaft *b*, the pulley having a sliding-clutch attachment, *d*, by which the pulley is forced against or drawn away from the brake-wheel, through which power is communicated to the loom, the brake-wheel E, or its shaft *b*, having fast on it a pinion, *e*, which gears with a spur-wheel, *f*, on

the crank-shaft G, that drives the lay, and the latter shaft communicating motion, by a pinion, *g*, and wheel *h*, to the cam-shaft H, operating the picker-staffs and wiring-cam.

Sliding motion is given to the portion *d* of the clutch, to throw the friction or driving pulley D in and out of contact with the brake-wheel, by a forked lever, J, arranged to enter a groove in the collar of the portion *d*, said lever having its fulcrum at *i*, and being connected at its lower end, by a link, *k*, to an arm, *l*, fast on a side rock-shaft, K, to which the upwardly-extending shipper or handle lever L, used to throw the loom in and out of gear, is attached. A spring, *m*, serves to throw said lever back or out, and thus release the clutch or driving pulley D from contact with the brake-wheel E, when said lever L is let loose or free from hold by a hook, *n*, of a bell-crank, M. N is the brake or shoe of the wheel E. This shoe works on a fixed pivot at its one end, and is pressed against the wheel E by an arm, *o*, of the forked lever J, so that as the forked end of the said lever moves the collar portion *d* toward the driving-pulley D, to engage the latter with the brake-wheel E, the arm *o* moves away from the wheel, and releases the brake from contact therewith. A reverse movement of the forked lever J puts on the brake.

For conveniently turning the loom by hand, as necessary at times, there is arranged at the side of the loom, and just above the lay, a crank or hand wheel, P, fast on an inclined shaft, *p*, which carries at its lower end a bevel-pinion, *r*, that gears into a wheel, *s*, on the driving-shaft *b*. The inclined shaft *p* has its bearings in a movable stand, Q, working on a pivot, *t*, whereby provision is made for throwing the pinion *r* in or out of gear with the wheel *s*, so that the hand-wheel may remain at rest while the loom is in operation. To throw the pinion *r* in or out of gear with the wheel *s*, there is arranged a sliding piece, R, having a guiding-slot, *u*, through which a pin, *v*, on a fixed standard or portion of the main frame projects, to cause the slide or sliding piece R to move in a direct line. This slide has also an inclined slot, *w*, (see Fig. 2,) in which plays or fits a pin, *x*, on the movable stand Q, so that as the slide moves up or down it causes the lower end of the movable stand to move in or out, to engage or disengage the pinion *r* with the wheel *s*. The slide R is extended downward to connect with a treadle, S, at the side of the loom. This treadle is controlled by a spring, *y*, which serves to keep the slide R down and pinion *r* out of gear with the wheel *s*. When the weaver wishes to operate the loom by hand, he presses the front end of the treadle down with his foot, which raises the slide and brings the pinion *r* into gear with the wheel *s*. As such working of the loom by the hand-wheel P, however, will only be resorted to when the lever L is let loose from the hook *n* of the bell-crank M, and the brake N applied to the wheel E, it will be necessary to release the brake, in order that the loom may be worked easily. To this end, the treadle S has an additional arm, Z, which extends up to and inside of the arm *l* on the rock-shaft K, and is provided with an inclined nose or projection, which bears against the arm *l*, so that when the treadle S is depressed it causes the inclined nose on the arm Z to force outward the arm *l*, and move the forked lever J just sufficient to release the brake N without bringing the driving-pulley D in contact with the wheel E, or without moving the lever L sufficiently to cause it to engage with the hook *n* of the bell-crank M. The loom may then be turned forward or backward by the hand-wheel P, and, as soon as the foot is removed from the treadle S, the pinion *r* is disengaged from the wheel *s*, and the brake N again applied to the wheel E. When the loom is in gear, or being driven by the pulley D, the handle-lever L is held by the hook *n* of the bell-crank M, which latter passes through a slot in the main frame, and is pivoted by a stud, b^1, on the inside of the frame. The other arm n^1 of the bell-crank extends parallel with the side of the frame, and has in its end a pin, c^1, against which the inclined face of the knock-off device A^1 strikes and unhooks the shipper or lever L whenever the shuttle fails to enter the box. The knock-off device A^1 is fast on a rock-shaft, d^1, from either end of which an arm, e^1, projects upward and rests against its contiguous shuttle-binder f^1, (see more particularly Figs. 4 and 5,) said binders governing the stop-motion in the usual manner. The hook *n* of the bell-crank M is kept pressed forward by the spring g^1, and the handle-lever L, when unhooked, is thrown outward by the spring *m*. In the arm n^1 or bell-crank M there is, in addition to the fixed pin c^1, a movable pin, h^1, arranged to slide freely up and down, with its bottom end resting on an arm, i^1, of a rock-shaft, B^1, which works in stands fixed to the frame on each side. This rock-shaft has two arms or feelers, C^1, which extend above the face of the lay, where they are bent over, so that their upper ends reach across the face of the lay to a little distance back of the reed, when the weft is beaten up. The feelers C^1 are held forward by a light spring, to meet the lay as it comes up, and when in this position the end of the arm i^1 is elevated, and the pin h^1, resting upon it, is held at such a height that, as the lay comes forward, the knock-off device A^1 will come in contact with it and unhook the shipper L and stop the loom; but if the weft-thread is in its place when the lay comes forward, it will press against one of the feelers and force it back sufficiently, before the knock-off device A^1 reaches the pin h^1, to depress the end of the arm i^1, and allow said pin to drop so that the knock-off A^1 shall pass above it, and the loom will continue in operation so long as the weft-thread is in its place, when the lay comes forward; but if said thread breaks, or is all run out from the bobbin, the pin h^1 will not be depressed, and the loom will stop. The picker-cams D^1 D^1 and wire-cams E^1 are all arranged

on the same shaft H, thereby insuring a smooth and steady motion, and avoiding much of the trembling and jerking occasioned by the backlash of the gearing, when said cams are placed on different shafts and connected by toothed wheels, as heretofore customary. This I accomplish by gearing the main cam-shaft H to run at the lowest speed required for those movements that have to be performed but once during one complete operation or series of changes of the loom, and, in addition, constructing the other cams to repeat their movements as often as may be required during that time. Thus, in tapestry-looms, the harness-cams make but one complete operation to four beats of the lay, the wire-cams make but two, and the picker-cams four, or two from each side.

In looms for weaving Brussels carpets, the additional cams for working the jacquard-cylinder and comber-board may be placed on the same shaft.

In the drawing there are shown two flanges or disks, F^1 F^1, keyed onto the shaft H, one near to each side of the loom, and on each disk are bolted two adjustable picker points or cams, D^1 D^1, those on the right-hand disk being opposite to each other, and at right angles with those on the left-hand disk, the points or cams on the latter disk being also opposite each other, so that the cams on the two sides of the loom act alternately, each side giving two picks for each revolution of the shaft H. The cams D^1 operate by striking against suitably-placed levers G^1, connected with the picker-staffs C by straps K^1, or in any of the different ways usually employed. The harness-cams may be placed on the end of the shaft H, outside of the frame, or in the center of the loom, and be connected with the harness by any well-known or suitable means.

Before describing the construction and action of the cam E^1, which gives the motion for inserting and drawing the wires used in forming the pile in the loom, to which my invention is shown applied, I would here call attention to the circumstance that, by the connection and arrangement, herein described, of the crank-shaft G and cam-shaft H, provision is made for driving the crank-shaft in the reverse direction to that usually done in double-beat looms, and thereby causing it to operate more effectually, or with greater ease, as regards lifting the lay. Thus the lay B is driven by the cranks m^1 m^1 of the shaft G, by or through the usual toggle-motion on each side, the same consisting of a rod or pitman, o', and levers p' q', the levers p' having a fixed fulcrum, r', while the levers q' are pivoted, at s', to the lay.

Now, by referring more particularly to the diagram in Fig. 3, which represents the position of these parts when the lay has commenced its forward movement, it will be seen that, by the crank-shaft G revolving in the direction indicated by arrow in said figure, the rod o' of either crank will be pushing in an approximately direct line with the lever q', to raise the lay to its vertical position, whereas, if the crank-shaft turned in a reverse direction, the rod o' at such period would be acting more forcibly against, or in line with, the lever p' and its fixed fulcrum r'. The cam E^1, which gives the motion for inserting and withdrawing the wires, is constructed to give two complete operations for each revolution of its shaft H, and is so placed in relation to the picker-cams D^1 D^1 as to insert a wire each time that the shuttle is thrown from the side on which the wire is inserted, and to withdraw one as the shuttle is thrown from the opposite side, so that two shots of filling or weft are thrown and driven up for each wire. The cam E^1 gives motion to the wire-carriers by acting on a roller, a^2, on a stud on a lever, A^2, which works on a stud, b^2, attached to the frame of the loom. The lever A^2 is connected with the lower arm of an upright bell-crank lever, B^2, by a link, c^2, having free or ball-and-socket joints at each end. The other arm of the bell-crank is connected with the wire-carriers C^2 D^2 by a link, d^2, (see more particularly Figs. 8, 9, and 10,) and gives the necessary in-and-out motion to the carriers as the lever A^2 is raised or lowered by the cam E^1. The weight of the lever A^2, link c^2, and lever-arm of the bell-crank B^2 tends to keep the roller a^2 in contact with the cam E^1, and give the carriers their inward motion; but as this might not be sufficient when the loom is running at a high speed, I construct the cam E^1 with a rim arranged to overhang its one side or face, thereby giving an inner surface, which acts on a roller, e^2, Fig. 1, in one end of a lever, f^2, which is pivoted on a bracket, g^2, attached to the main lever A^2, and a spring, h^2, applied to the opposite end of the lever f^2 to keep its roller e^2 in contact with the cam E^2, so that any tendency of the roller a^2 to leave the cam will be overcome by the spring h^2, and a smooth and equal motion throughout the operation will be produced. And here it may be observed that the inner and outer acting surfaces of the cam are such that the distance between the rollers a^2 a^2 will be uniform during the whole movement.

For inserting the pile-wires and withdrawing them, I employ two wire-carriers, one of which draws the wire and transfers it to the other, which reinserts it in the shed. I am aware that looms are in use in which two wire-carriers are employed, one of which works on a straight slide, and is provided with a hook for drawing the wire, and the other works on a curved slide, and is provided with a pair of spring-jaws, which receive the wire from the hook and return it to the fabric; but in such looms the construction and arrangement of the parts above referred to are such as to require the two slides to be placed considerably above the face of the lay, and the curved slide, which, in such previous arrangements, is the back or inner one, is made to extend directly over the end of the lay with the shut-

tle-box, thereby causing much inconvenience to the weaver, and delay in removing or replacing the shuttles, and in attending to other operations connected with the weaving.

By my improved construction and arrangement of the wire-carriers and their slides, said parts may be placed below the level of the face of the lay, and so that they in no wise interfere with the duties of the weaver. Thus, the hook-carrier C^2 works on a straight slide, E^2, placed in front of the lay, and so that, as the lay completes its forward stroke, it works close up to said straight slide, which, in my arrangement, is the back or inner one. Said carrier C^2 receives its motion in and out, or along the straight slide E^2, by the bell-crank B^2 and link c^2, as hereinbefore described, and is formed with a hook, which hook-shaped carrier, as it travels inward on the slide E^2, catches in the head of the wire, and, as it slides back or outward, draws the wire from the fabric and transfers it to the carrier D^2 to be reinserted. The carrier D^2 travels in and out conjointly with the carrier C^2, but works on a curved slide, F^2, placed in front of the straight one E^2, and receives its motion from the carrier C^2 by means of a connecting-link, i^2. Said carrier D^2 is constructed with an arm, K^2, which extends across the slide E^2, and is supported in a slot, l^2, Figs. 8 and 9, in the carrier C^2, in which it works freely. The inner end of this arm K^2 is turned up to form a support for the jaws m^2 m^2, Fig. 9, which work on pivots and are held together by a spring, n^2, that is attached to two pins projecting from the back of the jaws through slots in the upturned ends of the arm K^2. (See Fig. 10.) The front or outer faces of the jaws are curved and beveled, so that as the wire head is pressed against them by the action of the slide F^2 on the carrier D^2, causing the latter to move up against the hook-carrier C^2 as the two carriers move outward along their respective slides, the jaws m^2 m^2 are forced apart, and the head of the wire slips into a recess in them provided for it, where it is held by the spring n^2 with sufficient firmness to guide the wire in entering the shed, but readily slips from between the jaws when they move away from the cloth after inserting the wire. The curved form of the slide F^2 effects the necessary movement of the jaw-carrier D^2 relatively to the hook-carrier C^2, not only to cause the carrier D^2 to receive the wire from the carrier C^2, but, as the former carrier recedes from the latter during the inward movement of the two carriers, to bring the wire to its proper position in the open shed; and as the wire is driven up to its place in the cloth while its head is still held by the jaws, it is necessary that the carrier D^2 should yield to the motion of the lay as the latter comes forward, for which purpose the outer end of the slide F^2 is bolted to the slide E^2, and its inner end, which is free to yield, is supported in a slot in a piece projecting from the inner end of the slide E^1, and is so adjusted that its elasticity tends to keep it pressed toward the lay, so that, as the jaws m^2 m^2 approach the cloth, they shall be kept at a sufficient distance from the fell thereof, and as the reed drives up the wire, the carrier D^2 shall yield with, and be kept all the time in line with it.

As it is desirable that the wire when fully inserted shall be as near as possible to the last one woven in before the reed strikes it, I attach a piece or cam, G^2, on the breast-beam F, with its end bent over to form an inclined face, to guide the carrier D^2 as it approaches its innermost position, by pressing against the head of the link i^2, and thus draws it with the head of the wire in near the fell of the cloth, and prevents the wire from springing back in the shed when the lay is drawn back for the second beat.

As soon as the second beat is given, the carriers C^2 D^2 move away from the side of the cloth, the jaws slipping from the head of the wire just inserted, the hook on the carrier C^2 withdrawing the wire with which it is engaged, and transferring it to the jaw-carrier D^2, ready for reinsertion. As soon as the wire is drawn free from the cloth it is received near its point by a fork or other device, and carried over to a suitable position near the side of the open shed, to be again inserted. This may be done in various ways, which it is not necessary here to describe.

I claim—

1. The combination, with the treadle S and arms Z, l, and o of their respective parts, by which the brake is released from the wheel E, of the sliding piece R, the pivoted stand Q, operated by the latter, and hand-wheel P, with its shaft p and bevel-wheels r s, whereby the brake is simultaneously released with the putting of the hand-wheel into gear by the action of the treadle, substantially as specified.

2. The movable pin h^1 and arm n^1, in combination with the feelers C^1 and arm i^1, for arresting the motion of the loom when the weft breaks or is expended from the bobbins, essentially as herein described.

3. The arrangement, on the same shaft H, of the picker-operating cams D^1 D^1, carried by the disks or flanges F^1 F^1, and the double wire-operating cam E^1, for action in relation with the crank-shaft G, which operates the lay, substantially as specified.

4. The outer curved slide F^2 and inner straight slide E^2, arranged in front of the lay and below the shuttle-box, in combination with the wire-carriers C^2 D^2, all constructed to operate, in relation with each other, substantially as herein described.

5. The cam-piece G^2 on the breast-beam, in combination with the wire-carrier D^2, essentially as and for the purpose specified.

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