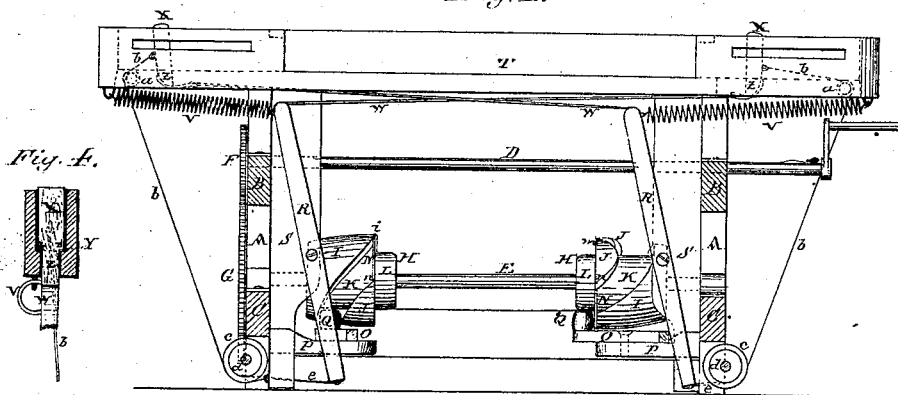
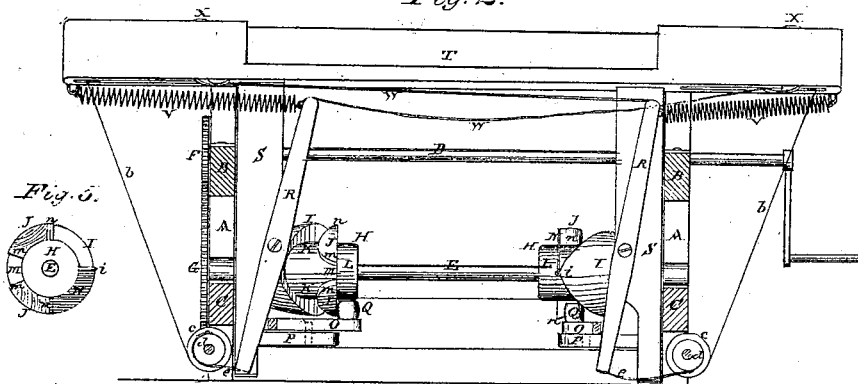


E. P. TERREL.  
SHUTTLE OPERATING MECHANISM FOR LOOMS.  
No. 110,171.                      Patented Dec. 13, 1870.

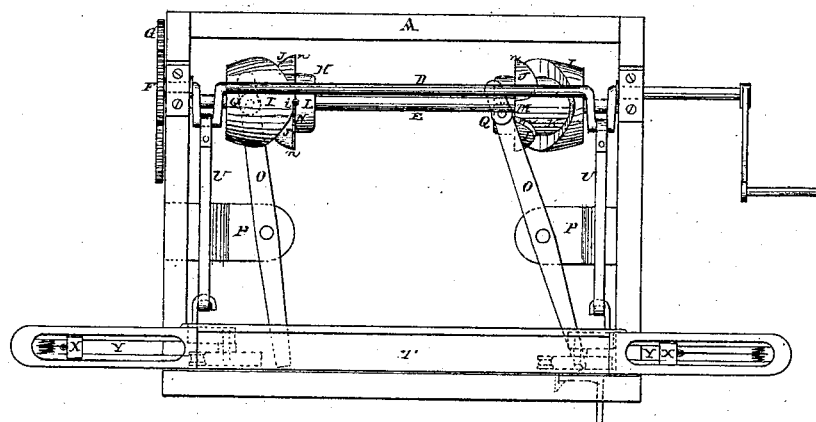
*Fig. 1.*



*Fig. 2.*



*Fig. 3.*



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# United States Patent Office.

ENOCH P. TERREL, OF WEST LIBERTY, OHIO.

Letters Patent No. 110,171, dated December 13, 1870.

## IMPROVEMENT IN SHUTTLE-OPERATING MECHANISMS FOR LOOMS.

The Schedule referred to in these Letters Patent and making part of the same.

*To all whom it may concern :*

Be it known that I, ENOCH P. TERREL, of West Liberty, in the county of Logan and State of Ohio, have invented certain new and useful Improvements in Looms; and I do hereby declare the following to be a full and correct description of the same, sufficient to enable others skilled in the art to which my invention appertains to fully understand and use the same, reference being had to the accompanying drawing which makes part of this specification, and in which—

Figures 1 and 2 are front elevations of my improvement in looms, showing different positions of parts;

Figure 3 is a plan or top view of the same; and

Figures 4 and 5 are detached views of parts of the same.

Like letters of reference indicate like parts in the several figures.

My invention relates to that class of looms known as power-looms; and

It consists—

First, in grooved cylinders, through which motion is imparted by means of levers, &c., to the pickers, and which are so constructed that the picking motion is the same whether these cylinders are revolved forward or reversed.

Second, in the construction, combination, and arrangement of the several parts of the operating mechanism together, and relative to each other, as will be hereinafter more fully described.

A in the drawing may represent the frame of the loom, which carries on cross-pieces, B, a crank-shaft, D, while directly below the same another shaft, E, has its bearings on cross-pieces C.

At corresponding ends, outside the frame, the shafts D E are provided with cog-wheels, F G, the wheel G being of larger dimensions than the wheel F.

Inside of the frame, and near each end, the shaft E carries a cylinder, H, which cylinders are provided with double-spiral cams I, which, with projections J, form cam-grooves K, the projections J being set at a sufficient distance from the inner ends of the cylinder to leave a space, L, at the said ends of the cylinder, while they are also set apart from each other to leave a space, M, between them.

The inner faces of these projections J conform in shape to the curve of the double-spiral cams so as to form the cam-grooves K, while their outer faces are parallel with the end of the cylinder, and their ends nearest the space M are rounded off, as shown at *m*, while their other ends terminate in a point, as shown at *n*.

At the point *i* of the spiral cams I are pivoted wings, N, extending over the periphery of the cylinders H a sufficient distance to overlap the points *n* of projections J as they swing to either side.

O are levers, pivoted on projections or lugs P, extending inwardly from cross-pieces C of the frame, a little forward of the bearings of shaft E.

These levers O move laterally, and carry on their rear ends rollers Q, which move in the cam-grooves K, by means of which latter the levers are operated, while their forward ends bear against the lower ends of vertical levers R without being attached to the same.

These levers R are pivoted to the upright S of the slay-board T, and move with the latter in its reciprocating movement, produced by the cranks of shaft D, to which it is connected by levers U.

To the upper ends of levers R are suitably secured springs V, their outer ends being fastened to the under side of the shuttle-boxes at their ends, while straps or cords W connect the upper end of each lever R with the lower end of the picker in the opposite shuttle-box.

These pickers X move in slots Y in the shuttle-boxes, and always retain a vertical position.

They are provided with downward projections Z, which pass through slots Y, the shoulders *z* of the pickers resting on the bottom of the shuttle-boxes, (see fig. 4.)

In the outer ends of slots Y of the shuttle-boxes are pivoted small rollers, *a*, over which pass cords *b*, attached with one end to the pickers X, and with their other ends to the periphery of grooved wheels *c*, pivoted under the cross-pieces C, in a vertical line under the shuttle-boxes when the slay-board is in its forward position.

At the forward side of these grooved wheels *c* are formed smaller wheels, *d*, to the periphery of which are attached cords *e*, secured with their other ends to the lower ends of levers R. The relative size of the wheels *c* and *d* is proportionate to the extent of the movement of the upper and the lower ends of levers R, respectively.

Having thus described the several parts of my improvement, I will now proceed to describe their operation.

Motion may be imparted to the crank-shank D in any suitable manner. This motion is transmitted to shaft E by means of the cog-wheels F G, and a reciprocating motion is imparted to the slay-board T by means of the cranks and levers U. As the shaft E, with its cylinders H, revolves, the rollers Q travel in the cam-grooves K; and as the spiral cams I are formed on their cylinders in opposite directions, (that is to say, in such a way that, when the point *i* of one cam, I, is in a vertical line above shaft E, the point *i* of the other cam I will be in a vertical line under shaft E,) it will be necessary to describe the operation of one cylinder only, as their alternate operation is alike.

The parts being in position, as shown in fig. 1, and motion being imparted to shaft D, the left roller Q is forced inwardly by means of the cam-groove K, thereby pressing the forward end of its lever O against the lower end of lever R, moving the latter outwardly, and its upper end inwardly, through which motion the left spring V is expanded and the cord W slackened, allowing the opposite picker to be moved to the outer end of its shuttle-box by means of its cord b, which is wound up on its wheel c, the same being revolved by the inward motion of its lever R, which unwinds its cord e. At the same time, by its inward movement, the lower end of the left lever R releases its cord e, thus leaving the cord b free to unwind from wheel c when the left picker is moved inwardly. As soon as the roller Q has reached the point i of cam I, its spiral movement ceases, for it presses the wing N against the point n of the nearest projection J, and passes over the wing on the space L. In fig. 2 the parts are shown at this point of operation. At the moment when the roller Q passes the point i of cam I, the right lever R moves the left picker forward, which carries with it its cord b, revolving wheel c, and winding up the slack of cord e on roller d, the left lever R being entirely inactive until the roller Q has passed projection J. As there is no wing over the space M between the projections J, the roller Q, which, until now, has kept the spring V expanded, as soon as it has passed the projection moves into the space M across the cam-groove K, against the narrow part of cam I, which thereby suddenly releases spring V, which at once forces the upper end of lever R outwardly. This movement of the upper end of lever R, by means of cord W, suddenly draws the right picker inwardly, thereby sending the shuttle across the slay-board, and at the same time throws the lower end of this lever R inwardly, winding up cord b on wheel c, by unwinding cord e from wheel d, and thus drawing the left picker to the outer end of the shuttle-box, this picker being free to move by reason of the inward movement of the upper end of the right lever R, which left the slack.

It will thus be seen that the inward movement of one picker and the outward movement of the other picker are simultaneous, and are effected by one lever alone at every movement, the other lever being entirely inoperative during this movement.

It will also be easily understood that, as the spiral cam on each cylinder H is double, that is to say, the same one way as the other, and as the cylinder H is provided with two projections, J, equidistant from point i of cam I, one extending to one side and the other to the other, the wing N being pivoted on point i, the center between the two sides of the cam, it will make no difference whatever in the operation of the picking motion in which direction the shaft E is moved, nor will any sudden change in the direction of the motion of said shaft in any way interfere with the continuous operation of the picking mechanism; for in all looms there are frequent stoppages, arising from various causes, on which occasions the reverse movement

is of great advantage. Suppose a case like the following, for instance: A thread breaks in the warp, (this occurs very often,) and it becomes necessary to stop the loom to mend it. The loom is stopped just as the slay-board is close up to the cloth, and the broken thread is, of course, just in front of the slay-board. The operator cannot get at the thread to mend it while the slay-board is in this position. It becomes necessary to push the slay-board back.

Now, if there is no reverse motion in the machinery, the only way in which this can be done is by still bearing it forward, and, when it has stopped close up to the cloth, you cannot give it sufficient motion to go beyond the dead-center, so as to return, as it would have done if the motion of the machinery in operation were not stopped; for, at this point, the ends of the pitman or levers attached to the cranks of shaft are on rising motion. The operator has, therefore, to pass round to the balance-wheel, or other wheels that operate the parts, and revolve them until the end of the pitman, attached to crank on shaft, passes the dead-center, when the slay-board can be pushed back. This is sometimes attended with some difficulty. If the loom is stopped when the end of the pitman comes to a dead-center, by jarring the slay-board that end can be made to drop and the slay-board can then be returned by reverse motion.

There are frequent stoppages in the operation of all looms from various other causes, in which case it is almost always necessary to move the slay-board either forward or backward in order to reach the difficulty. In all such stoppages the reverse movement is of great importance, and obviates many difficulties that would otherwise arise.

Having thus described my invention,

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

1. The spirally-grooved cylinders H, operating the levers through which the pickers are operated, when constructed substantially as described, so that no change in the direction of their revolution will in any way interfere with the continuous operation of the parts.

2. The cylinders H, provided with the double-spiral cams I, double projections J, and wings N, substantially as and for the purpose herein described.

3. The combination of the vertical levers R and their pickers, connected by cords, as described, so that the same lever which throws the picker forward in one shuttle-box retracts the picker in the other shuttle-box at the same time, the other lever being entirely inactive during this movement.

4. The combination of the cylinders H, constructed substantially as described, and levers O and R, with springs V, cord W b e, and wheels c d, to operate the pickers, substantially as set forth.

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Witnesses:

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