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Impromvement in Fancy-Looms

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L. J. Knowles.

Loom.

Patented Feb 24, 1863.

Witnesses

Inventor

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LUCIUS J. KNOWLES, OF WARREN, MASSACHUSETTS.

IMPROVEMENT IN FANCY-LOOMS.


To all whom it may concern:

Be it known that I, LUCIUS J. KNOWLES, of Warren, in the county of Worcester and State of Massachusetts, have invented certain Improvements in Looms for Weaving Fancy Checks and Stripes, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a perspective view of my loom; Figs. 2, 3, and 4, details to be referred to hereinafter.

The principal part of my invention has for its object the employment of cranks for the purpose of operating the heddles of looms, and also the drop-boxes of looms for weaving checks and figured goods, in order to avail myself of the advantages resulting from the employment of the crank as compared with the cam, and thereby to run the loom with greater rapidity and with a smaller expenditure of power than has heretofore been practicable; and my invention consists in the employment of cranks and toothed crank-wheels, operating in connection with revolving lifter and depressor wheels, and so arranged that the cranks may be turned to either the highest or lowest point of their revolution for the purpose of raising or lowering the heddles or the drop-box.

My invention also consists in certain details, which will be more fully described and pointed out hereinafter.

The lathe \( A \) is vibrated by cranks upon the driving-shaft \( B \), from which all the other motions of the loom are derived.

The heddles \( C \) are actuated as follows: Corresponding with each leaf of the harness is a standard, \( D \), which is pivoted at \( a \) to brackets or arms \( E \), attached to the frame-work of the machine. These standards are so formed or otherwise weighted as constantly to bear against a pattern-cylinder, \( F \), the pins \( b \) in which act upon the standards to throw them forward. To the top of each of the standards \( D \) is pivoted a toothed crank-wheel, \( c \), from the face of which projects a crank-pin, \( 1 \), upon which runs a small ring or socket, to which is attached the cords \( f \) and \( g \), the former, \( f \), being attached to the top, and the latter, \( g \), to the bottom of the heddles, the cords passing over suitable guide-wheels, as seen in the drawings. When the heddles are to be raised or lowered, the wheels \( c \) are caused to make a half-revolution, by which the pin \( 1 \) is brought up as far as the standard \( D \). When the pin \( 1 \) is at the highest point of its circuit, the heddles are down, and when the wheel \( c \) is revolved so as to bring this pin to the lowest point of its circuit the heddles are raised. The wheels \( c \) are caused to make a semi-revolution back and forth for the purpose of raising and lowering the heddles, as follows: The shaft \( B \) carries a wheel, \( k \), having teeth upon a portion of its periphery, which engage with a wheel, \( l \), upon a short shaft, \( i \), that runs in boxes 2 upon an attachment, \( G \), to the main frame. To the shaft \( i \) are also attached the bevel-wheels \( l \) and \( m \), which engage with similar wheels upon the shafts of the fluted or toothed rolls \( H \) and \( I \), which are thus caused to rotate intermittently in the direction of their arrows as the shaft \( B \) revolves, the teeth upon the wheels \( k \) and \( l \) being so proportioned that the rolls make one entire revolution for every revolution of the shaft \( B \), or for every beat of the lathe. The wheels \( c \) are caused to engage with one or the other of the rolls \( H \) and \( I \) for the purpose of opening the shed, as follows: Whenever the pins \( 3 \) of the pattern-cylinder \( F \) throw the tops of the vibrating standards \( D \) in, so as to engage the crank-wheels \( c \) with the cylinder \( I \), these wheels are caused to make a half-revolution, and the heddles connected with all the wheels thus revolved are raised. On the wheels \( c \) completing their semi-revolution, a blank space upon their periphery arrives opposite to the driving-roll, and the wheels, no longer driven, are prevented from going farther by the pins \( 1 \) coming in contact with the standards \( D \). These wheels cannot then again be revolved until the standards (no longer held by the pins \( 3 \)) are permitted to drop back upon the cylinder \( F \), where they are made to engage with the roll \( H \), by which they are revolved in a direction the opposite of that indicated by their arrow, Fig. 1, and the heddles are lowered.

To insure the engagement of the crank-wheels \( c \) with the lifting and depressing rolls \( H \) and \( I \), every alternate tooth of both the
wheels and the rolls is removed at the inter­
mediate point where they first come in con­
tact, and both the wheels and the rolls are so
adjusted upon their shafts that when they
are brought into contact with each other there
shall be no interference of their teeth. The
rolls H and I are caused to stop after each
revolution at exactly the same point by a
spring stop, p, which enters a notch in the
periphery of a wheel or disk, o, upon the shaft
of the drum J, and the crank-wheels c are so
arranged with respect to their standards D t
that the cranks shall not be driven beyond
their highest and lowest positions.

For the purpose of communicating an in­
termittent motion to the wheel k from the re­
volving wheel h without the jar or shock which
would be consequent upon a sudden engage­
ment of the two, and also for the purpose of
insuring the proper engagement of the teeth
of these two wheels, the following device is
employed: The wheel h is cut away upon one
end so as to form a projecting ledge, r, and
upon the shaft of the wheel k is a cam, s, which
is so arranged as to come in contact with
the ledge r near the center of motion, so
that the wheel k is started very gradu­
ally and acquires a motion equal to that of the
wheel h before the teeth of the two wheels
actually engage with each other. To prevent the
hed­
dle cords from being uselessly strained at the
time when the wheels c are in motion, the
guide-rolls t are carried by a frame, g, pivoted
at a, which is depressed at the time when the
wheels c are in motion by an eccentric, L, that
is connected with the frame q by a bar, M.

A device somewhat similar to that employed
for the purpose of actuating the heddles is
used for moving the shuttle-boxes. Stan­
ards D, carrying at their upper extremities
crank-wheels c, constructed and operating in
connection with the rolls H and I in a manner
precisely similar to the crank-wheels c, are
actuated by pins 5 upon the pattern-cylinder.
The wheels c which are revolved in one direc­
tion or the other by the lifter and depresser
rolls, also carry crank pins 6, which are con­
ected by rods T each with a lever, K, pivoted
to some stationary part of the machine. The
operation of this part of the mechanism is as
follows: The standards D being governed by
the pattern, the wheels c are revolved so as
to raise or lower their crank-pins, and to bring
them at rest above or below their center of
motion. A cord, v, attached to one end of
each of the levers K, passes round a roll on
the bar N, attached to the drop-box O.

The parts above described are so propor­
tioned to each other that when both the crank­
pins of the wheels c are in their highest posi­
tion the upper shuttle-box will be opposite
to the race. When one of the wheels c is re­
volved so as to bring its crank-pin down, the
drop-box will descend a distance equal to one­
half that through which the end of the lever
K moves, and the center shuttle-box will be
brought opposite to the race; but if both the
wheels are revolved so as to bring down their
crank-pins, the drop-box will be raised so as
to bring the lowest shuttle into position, so
that by the motion of one or both of the wheels
c either of the three shuttle-boxes may be
brought into use. Where three shuttles only
are to be used, the drop-boxes may be connect­
et together by cords or otherwise, so as to be
operated the one by the other, a cord, P, at­
tached to the bar N, passing over a guide­
pulley, w, on the lathe and over a similar pul­
ley at the opposite end of the loom, and is at­
tached to the bar N 2 of the other drop-box,
and thus as one box rises the other descends,
the highest box in one being always opposite
to the lowest one in the other. If five shut­
tles are to be used with three boxes upon each
end of the loom, the drop-boxes should be in­
dependent of each other, and be operated each
by a pair of wheels, c 2, and standards D, the
motions of the crank-pins being transmitted
to the other end of the loom by cords or in
any suitable manner. The pattern-cylinder
F is turned one-sixth of a revolution each
time the shaft B revolves, by a pin, z, project­
ing from the face of a wheel, y, on the end of
the shaft B, which engages with slots 7, in a
cup-shaped wheel, R, upon the shaft of the pat­
tern-cylinder.

It will be seen by an inspection of Fig. 2
that owing to the mutual connection of the
levers K with each other by means of the cord
w the drop-box is moved through a distance
equal only to one-half of the distance through
which the end of the lever K moves, and that
in order to carry the drop-box from one ex­
treme position to another it is necessary that
both the wheels c 2 be moved simultaneously,
and both of the levers K operated.

It is obvious that there are other methods
of arranging the levers K in connection with
the pulley and cord which communicate motion
from the crank to the drop-box which will not
differ essentially from that described above.
For example, a single lever, K, may be em­
ployed, one end of which is hinged to the bar
N, the other carrying a roller, up over which a
cord passes, the ends of which are attached
to the ends of the rods T. It is also evident
that the cranks which operate the shuttles
and the heddles may be actuated by other
mechanism than that described—as, for ex­
ample, by ratchets moving upon centers.

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

1. Operating the heddles by means of cranks
capable of being turned independently of each
other to the opposite extremes of their throws,
as indicated by the pattern-chain or its equiv­
alent, substantially as described.

2. Operating movable shuttle-boxes by
means of cranks so arranged as to be turned
independently of each other from one extreme
of their throws to the other, under the direction of a pattern-chain or its equivalent.

3. The rotating lifter and depresser cylinders, operating as set forth, for the purpose described.

4. The crank-wheels c c', constructed and operating substantially as described, for the purpose specified.

5. The gear k and segmental gear-wheel h, in combination with a rotary lifter and depresser cylinder, for the purpose set forth.

6. The cam s upon the shaft of the wheel k, in combination with the ledge y upon the segmental gear h, for the purpose described.

7. Loosening up the harness-cords by means of the vibrating guide-rolls or their equivalents, for the purpose described.

8. Connecting the drop-box with the mechanism by which it is operated by means of a cord and pulley, substantially as described.

Witnesses:

SAM. COOPER,

N. W. STEARNS.

LUCIUS J. KNOWLES.