2 Sheets--Sheet 1.

J. H. GREENLEAF.

Needle-Looms.

No. 151,384. Patented May 26, 1874.

fig. 1

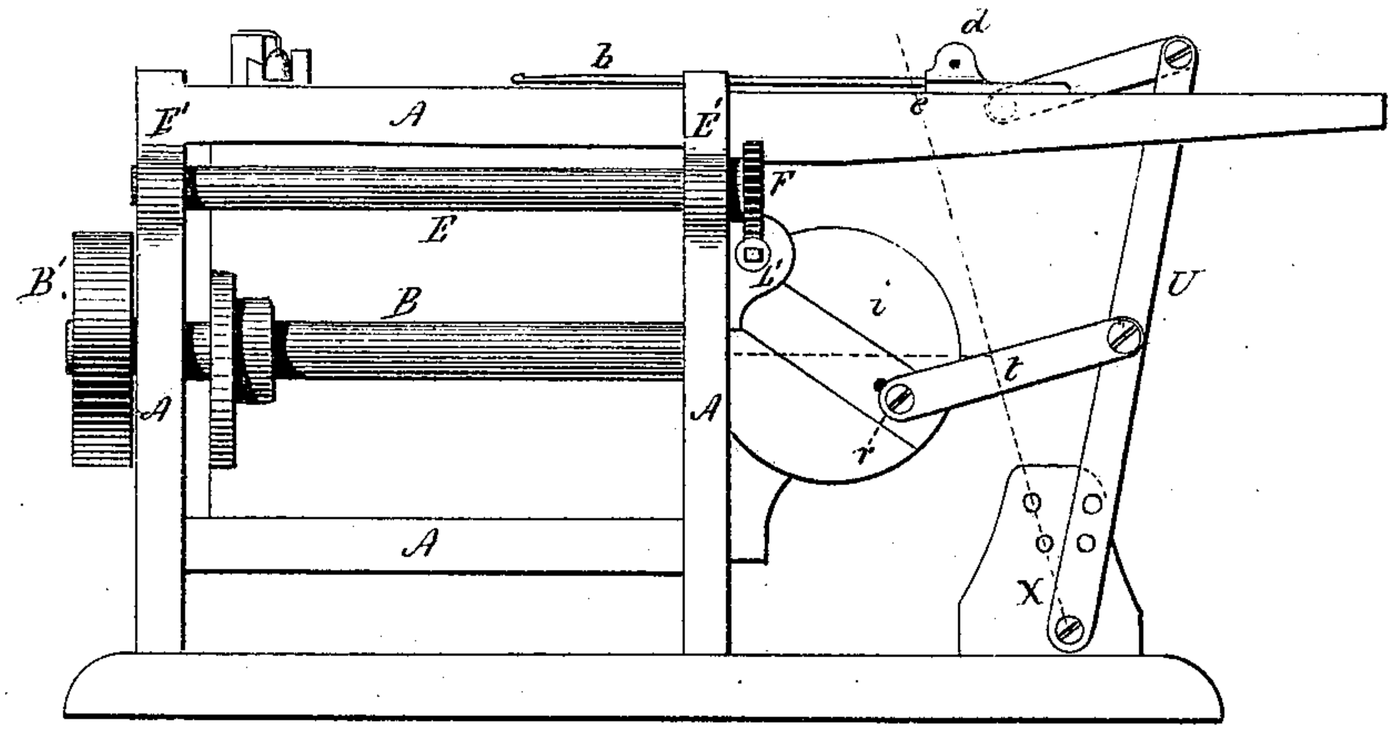


fig. 2.

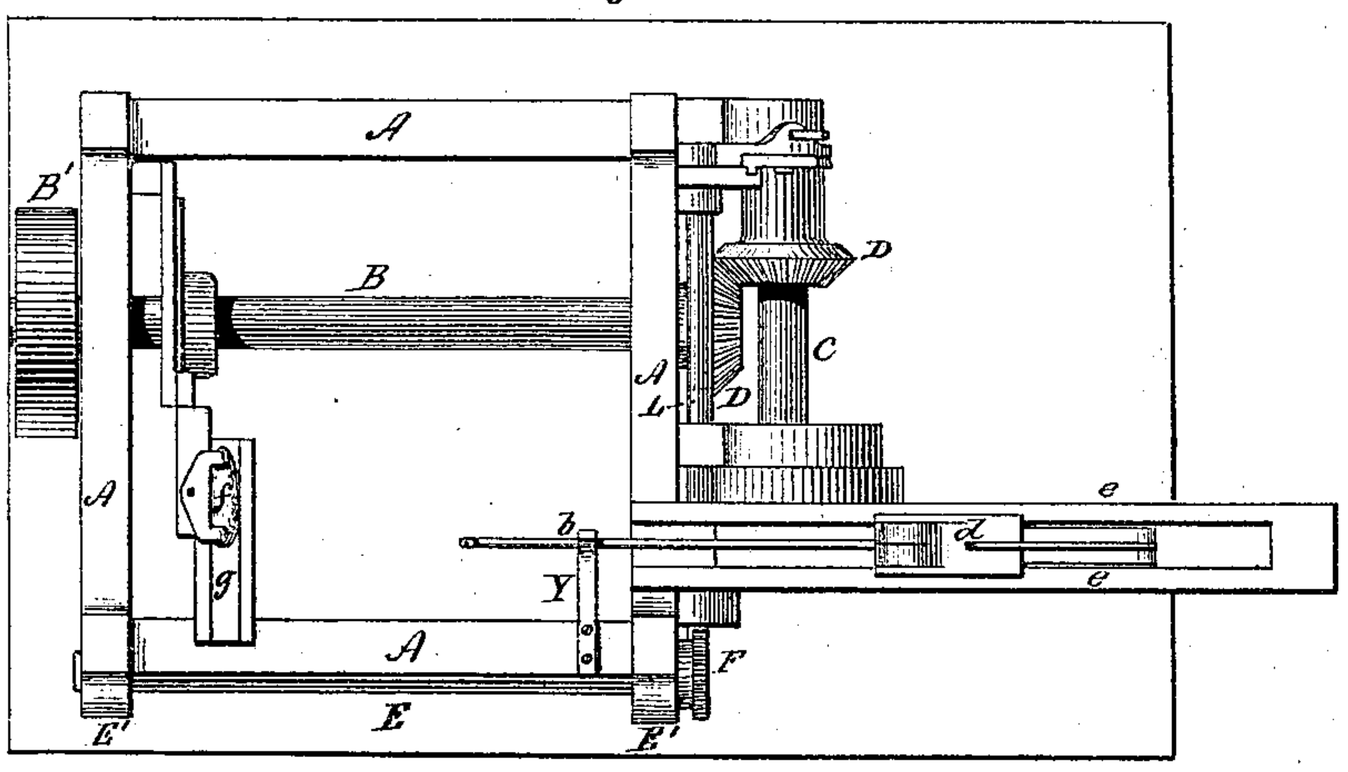
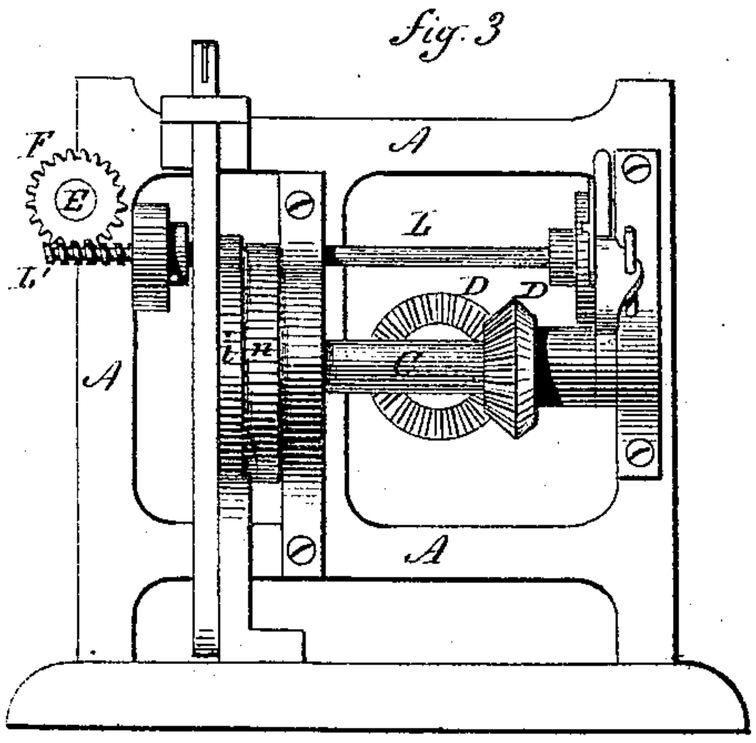


fig. 3



Witnesses.

J. F. Shumway

C. J. Tibbetts

Joseph H. Greenleaf
Inventor

By Atty's

John C. Edwards

2 Sheets--Sheet 2.

J. H. GREENLEAF.

Needle-Looms.

No. 151,384. Patented May 26, 1874.

fig. 4

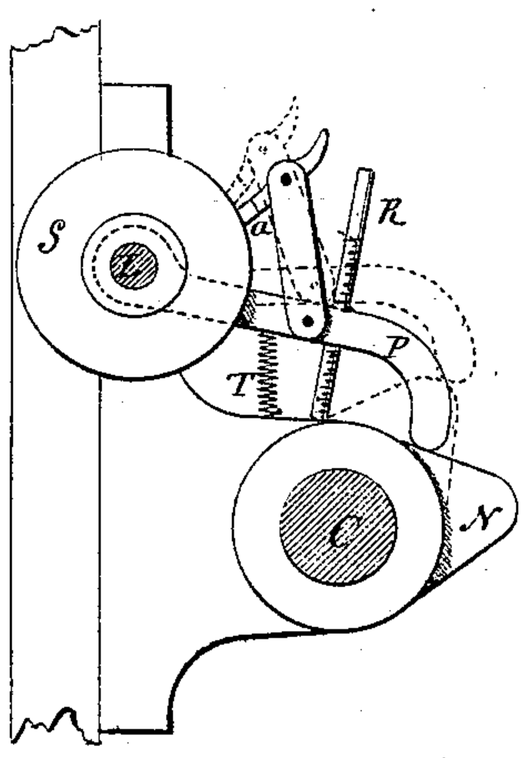


fig. 8.

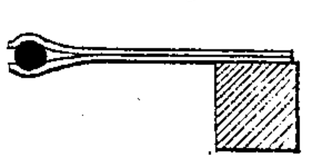


fig. 6

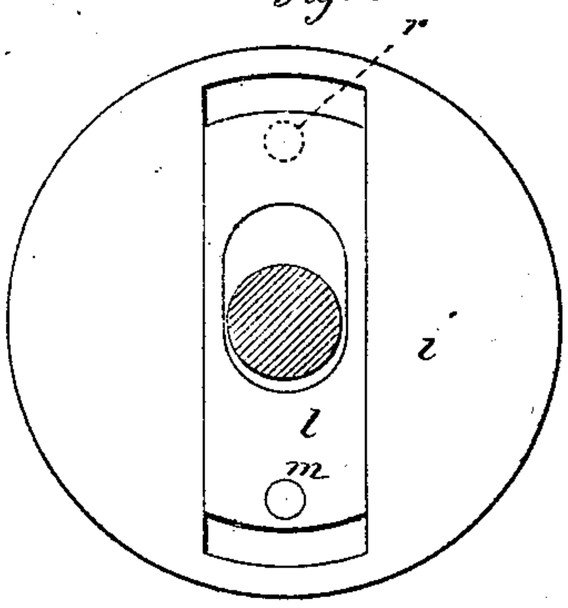


fig. 7

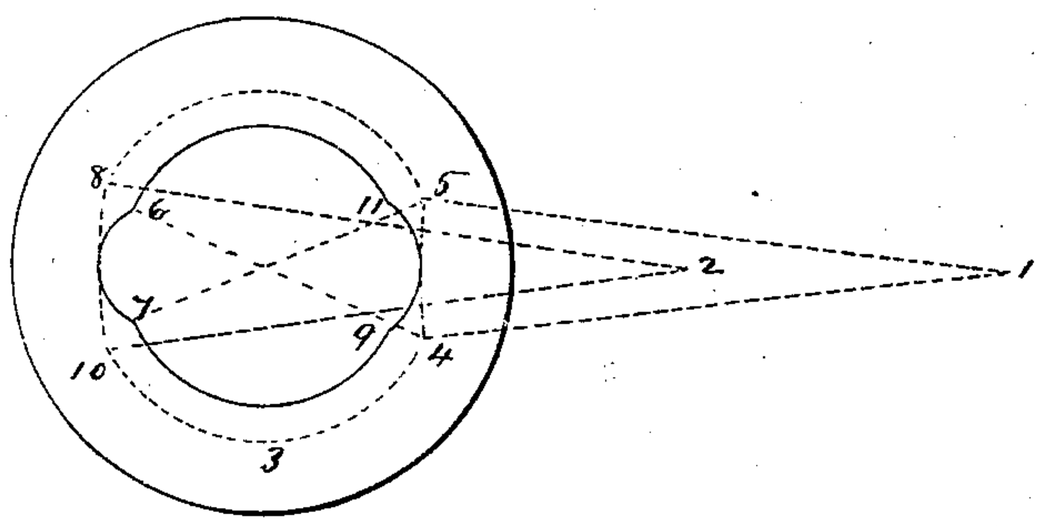
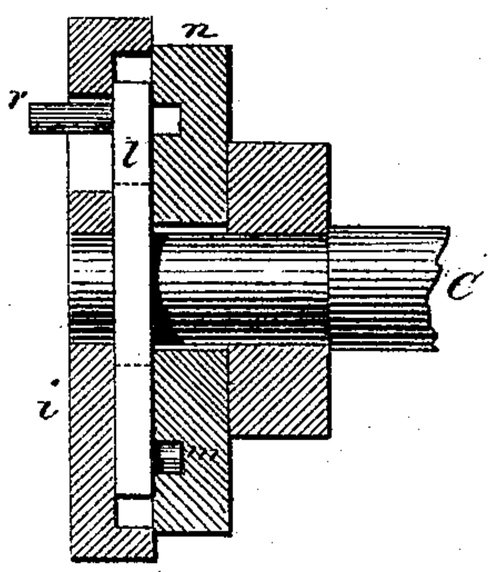


fig. 5



Witnesses.

J. W. Shumway

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By Atty.

John P. Gault

UNITED STATES PATENT OFFICE.

JOSEPH H. GREENLEAF, OF NEW HAVEN, ASSIGNOR OF ONE-HALF HIS RIGHT TO NATHAN A. BALDWIN, OF MILFORD, SAMUEL COIT, OF HARTFORD, AND SAMUEL PECK, OF NEW HAVEN, CONNECTICUT.

IMPROVEMENT IN NEEDLE-LOOMS.

Specification forming part of Letters Patent No. **151,384**, dated May 26, 1874; application filed February 18, 1874.

To all whom it may concern:

Be it known that I, JOSEPH H. GREENLEAF, of New Haven, in the county of New Haven and State of Connecticut, have invented a new Improvement in Needle-Looms; and I do hereby declare the following, when taken in connection with the accompanying drawings and the letters of reference marked thereon, to be a full, clear, and exact description of the same, and which said drawings constitute part of this specification, and represent, in—

Figure 1 a front view, Fig. 2 a top or plan view, Fig. 3 an end view, Fig. 4 a detached view, of the feeding mechanism enlarged; Fig. 5, a longitudinal section of the mechanism which imparts a reciprocating movement to the needle; Fig. 6, an inside view of the revolving head and slide with which the pitman is connected; and in Fig. 7, a diagram illustrating the operation of the mechanism for driving the needle.

This invention relates to an improvement in that class of looms in which the filling-thread is carried through the shed by an eye-pointed rod or needle, interlocked with a selvage or shuttle-thread upon the opposite edge, and returned with the needle, leaving a double filling in the shed, and this beaten up by the lay as in ordinary looms, with special reference to the loom for which Letters Patent were granted to John Earnshaw, April 9, and July 9, 1867, but applicable to other needle-looms.

The object of this invention is, first, to provide a positive cloth take-up, which shall be adjustable to the greatest nicety; second, to impart to the needle a quick reciprocating movement through the shed with a positive stand-still at each extreme of its motion; and, also, to adjust the length of motion of the needle, so that a wide loom may be adapted to various widths of fabrics, so as to allow an increase of speed of the loom as the throw of the needle is shortened.

The invention consists, first, in placing upon the cloth-beam, or in direct connection therewith, a worm-gear in which a worm works to cause the beam to revolve, the said worm and worm-gear combined with a disk, and an adjustable frictional pawl operating thereon, the same being intermittently actuated by a constantly revolving cam, thereby imparting to the beam a corresponding intermittent rotating movement; second, in combining with the properly-guided needle on one side of the loom, and interlacing-shuttle upon the other side, a needle-driving mechanism having a combined rotary and radial movement, so that at the extreme points of the needle's movement the needle will come to a positive rest, (first, for the passage of the shuttle through the filling-thread loop; and, second, for the movement of the lay in beating up the filling;) third, in a series of bearings for the needle-staff in a line drawn from the point where the connecting-rod is attached to the staff when in its extreme forward position to the lowest bearing, whereby in either of the bearings of the series the forward point reached will always be the same, but the return shortened or lengthened as the bearing is lower or higher.

A is the frame; B, the driving-shaft, to which power is communicated through a pulley, B′. Neither the reeds, the lay, or the harness, or their operative mechanism, are shown, these parts not differing essentially from the common and well-known construction. The shaft B communicates a corresponding revolution to a transverse shaft, C, by bevel-gears D D. E is the cloth-beam, arranged in bearings E′. On one end of the beam a worm-gear, F, is rigidly fixed, and across the end of the loom, or parallel with the shaft is another shaft, L, on the end of which, beneath the gear F and working therein, is a worm, L′, so that by turning the shaft L, the beam E will be rotated accordingly. On the shaft C is a cam, N, and hung to or substantially concentric with the shaft L, (see Fig. 4,) is a lever, P, its free end resting upon the cam N, or in the path of said cam, so that the revolution of the cam imparts a corresponding vibrating or swinging movement to the said lever, as denoted in broken lines, Fig. 4. To adjust the said lever P so that the cam will take it sooner or later, an adjusting-screw, R, is arranged in connection with the lever, so that the free end of the lever may be raised from or dropped nearer to

tle cam. On the shaft L is a disk, S, upon which an adjustable frictional pawl, *a*, in connection with the lever P, works, so that each upward movement of the lever P imparts a corresponding partial rotation to the disk S, thence through the shaft L to the cloth-beam E. A spring, T, holds the lever P down to its work.

This construction imparts a positive movement to the beam, and the worm-teeth prevent any reaction of the beam after feeding, as is unavoidably the case when the feeding device is applied directly to the beam, as in the usual construction, and the tension may be very great by the exertion of a slight amount of power.

This feeding mechanism may be applied to other classes of looms.

The extent of the feed is varied or adjusted to any given number of picks to the inch by setting the adjusting-screw R to make the play of the lever P greater or less.

The disk S and its pawl may be constructed so that the pawl will have a frictional bearing to engage the disk.

The needle *b* is secured to the slide *d*, running freely in guides *e*, the path of the needle being at right angles to the warp. Upon the opposite side of the loom is the shuttle *f*, working in a race, *g*, parallel with the warps and driven from the shaft B, this shuttle interlacing its thread with the filling-thread, substantially as in needle-looms.

A rapid movement of the needle is required to pass it over and return through the shed between each beat of the lay; and to do this, a rest of the needle must occur at the two extreme points of its motion—at the forward extreme, in order that the shuttle may pass through the filling-thread loop and complete its passage before the needle commences its backward movement; and at the other extreme, that the lay may be thrown up and returned before the needle again enters the shed. To do this, a continuous revolving head, *i*, is attached to the shaft C, and centrally in this is a slide, *l*, which revolves with the head, and has also a radial movement across the face of the revolving head *i*. Back of this head *i* is a stationary disk or plate, *n*, in the face of which is cut an irregular groove; and from one end of the slide *l* a stud, *m*, extends into the groove in the fixed plate *n*, so that, in revolving, the said stud *m* will follow the groove in the fixed plate, and impart to the slide *l* a radial movement corresponding to the irregularity of the groove in the plate *n*. From the other side of and opposite end of the slide *l* a crank-pin, *r*, projects through a slot in the revolving head *i*, and to this crank-pin one end of a connecting-rod, *t*, is attached, and the other end to a staff, U. This staff is pivoted at the lower end, and the upper end connected to the needle-slide *d*, as seen in Fig. 1.

The combined action of the stationary plate *n* and the revolving head *i* upon the needle is shown in diagram, Fig. 7. 1 represents the extreme back point or the connection with the staff U, and 2 the extreme forward point; the broken line 3 the path of the crank-pin, which, without the irregular groove in the fixed disk or plate, would travel in a circle concentric to the axis of the shaft; but it is desired that at the extreme backward point the staff or point 1 shall be at a dead stand from 4 to 5. To do this, the crank-pin must move through an arc of which the point 1 is the center, as indicated, from 4 to 5. The stud *m* is at the opposite end of the slide, and the path of the stud, while the crank-pin is moving from 4 to 5, will be as from 6 to 7; hence the groove in the fixed disk or plate is made of that form, the solid line denoting the shape or form of the groove. From one extreme, 5, to the other, 8, the path of the crank-pin is concentric, and also the stud *m*, for the same time, as from 7 to 9. At the said point 8, which is the other extreme, 2, where it is desired that a dead stand still be made to the point 10, the groove in the fixed disk from 9 to 11 is correspondingly formed, as before described; then from 10 to 4, the place of beginning, the path is concentric, as from 5 to 8.

It is desirable in this class of looms to provide for weaving various widths of fabrics, and as the fabric is narrowed an increase of speed is desirable, as the needle may reciprocate faster as its extent of motion is decreased. The needle must invariably move to the same point under the interlocking shuttle, and consequently any cutting off of its throw must be accomplished on its backward stroke.

No change can be made in the points connecting the crank-pin with the staff U without altering the throw of the needle on both ends of its stroke. This desired adjustment of throw is attained by a series of bearings, here represesented as holes in the lower end of the staff U, and corresponding holes in the fulcrum-stand X. The bearings in the fulcrum-stand must be in a line drawn from the point where the connecting-rod is attached to the staff when in its extreme forward position, as denoted in broken lines, Fig. 1, and the lowest bearing or hole; hence, to adjust the throw, the bearing or fulcrum of the shaft is changed from one point to another, and the same forward point is always reached; but the extreme backward point, varied to a greater or less distance, according as the fulcrum or bearing is at a higher or lower point.

In this class of looms, for weaving wide goods, there is a tendency of the needle to vibrate when running at a high rate of speed, thus endangering the warp-threads on the entrance of the needle into the shed, and a possibility that the needle (owing to vibration) may not properly enter the shuttle-race. To obviate this difficulty of vibration, I attach to the breast-beam of the loom a needle-guide, Y, which is formed from two pieces of sheet-steel or other suitable material, one end secured to the beam, the other extending to the path of the needle, so that the needle in its passage will pass between said two pieces; and, at that

point, I form a groove through which the needle passes, the parts yielding as the needle advances, and closing as it returns. The needle being tapering it is supported at that point so as to positively prevent the vibration of the needle to any extent.

It may be desirable to place some other material than metal in the grooves to bear upon the needle, in order to prevent heat or friction.

I claim as my invention—

1. In combination with the cloth-beam E, gear F thereon, worm L, disk S, and frictional pawl *a*, the lever P, made adjustable by the screw R, and cam N, substantially as described.

2. In combination with the needle *b* and shuttle *f*, or other thread-interlacing device in a needle-loom, the continuous revolving head *i*, carrying the radial slide *l*, the fixed cam *n*, the said revolving head and cam or disk imparting to the said slide *l* a combined revolving and radial movement, and the said slide connected to the needle-slide *d*, so as to impart to the needle a reciprocating movement, with a positive stand-still at each extreme of its movement, substantially as described.

3. In combination with the reciprocating needle-slide *d*, the staff U, and a mechanism for imparting a vibratory motion to said staff, the fulcrum-stand X, when the said stand is constructed with a series of bearings in a line drawn from the point where the connecting-rod is attached to the staff in its extreme forward movement and the lowest bearing, and the said staff also constructed to be set in or upon either of said series of bearings, arranged substantially as and for the purpose specified.

JOSEPH H. GREENLEAF.

Witnesses:

A. J. TIBBITS,

J. H. SHUMWAY.