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S. T. THOMAS.

LOOM.

No. 180,171. Patented July 25, 1876.

FIG. 1.

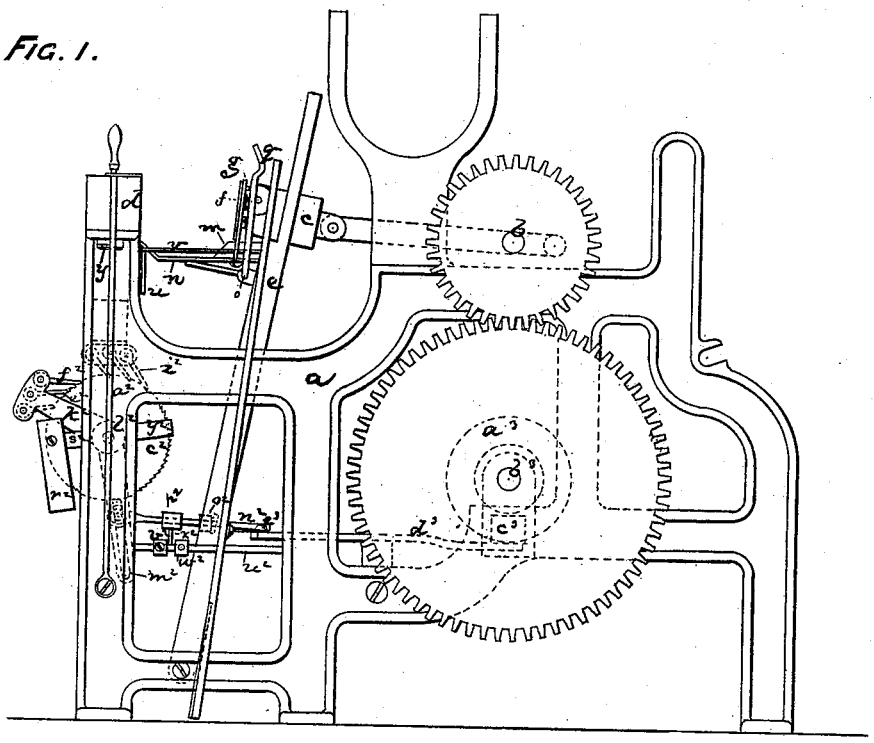


FIG. 5.

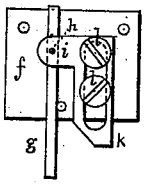
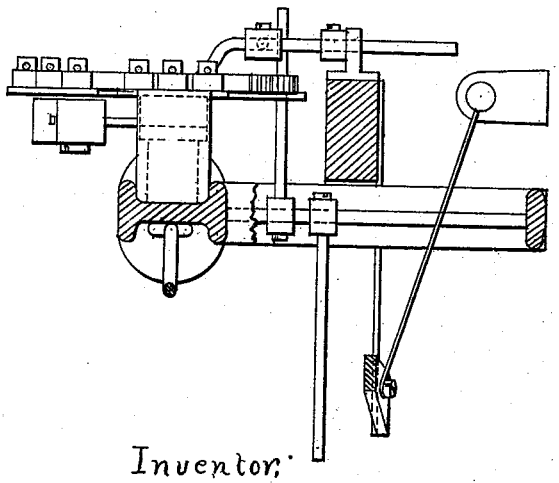


FIG. 2.



Witnesses.
Eben Hutchinson
Eugene J. Humphrey

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FIG. 4

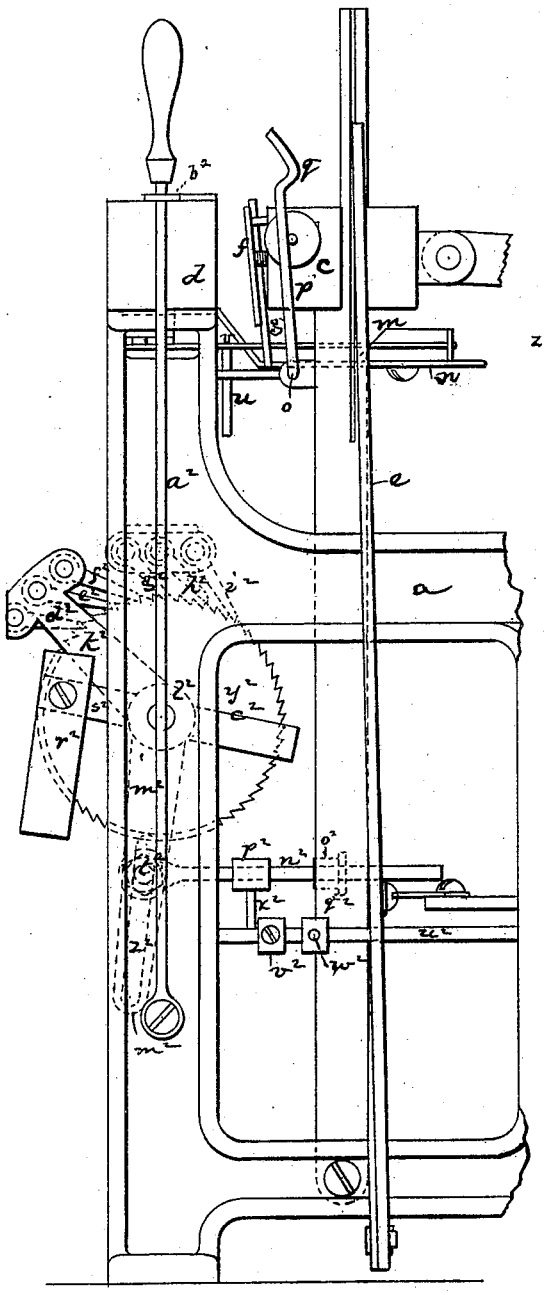
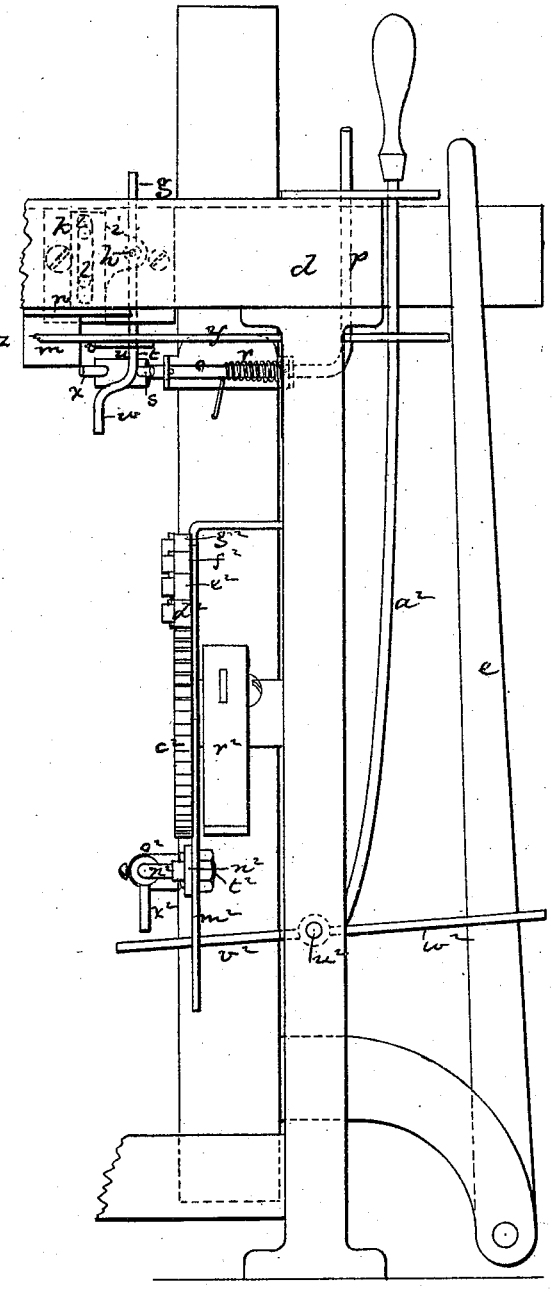


FIG. 3



Witnesses.
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Fig. 6.

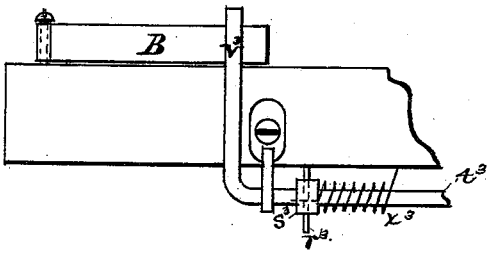


Fig. 7.

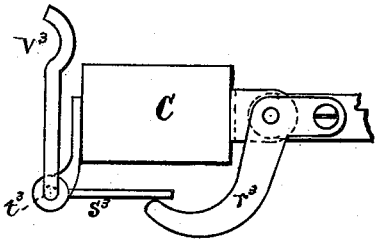


Fig. 8.

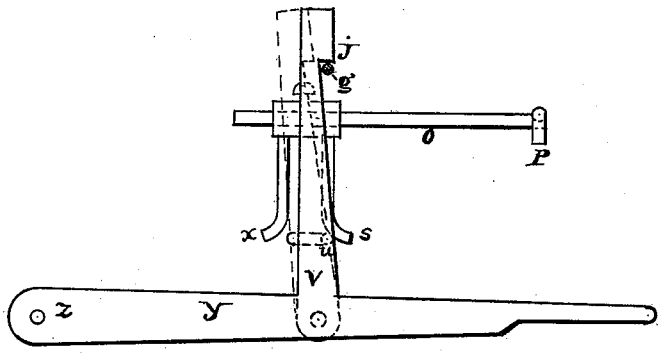
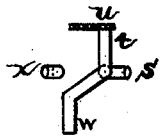


Fig. 9.



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Inventor:
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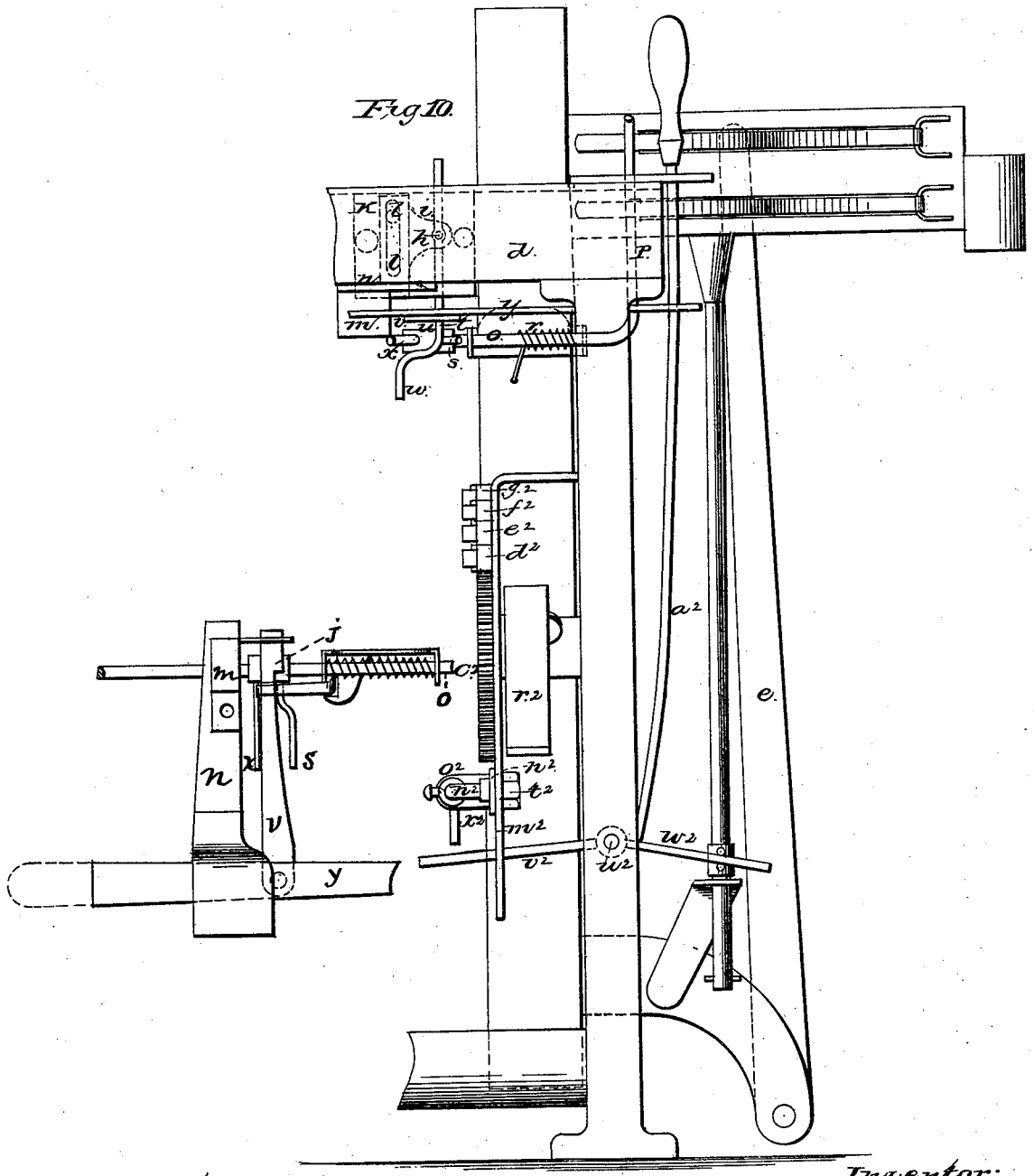
4 Sheets—Sheet 4.

S. T. THOMAS.

LOOM.

No. 180,171. Patented July 25, 1876.

Fig 10.



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UNITED STATES PATENT OFFICE.

SAMUEL T. THOMAS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN LOOMS.

Specification forming part of Letters Patent No. **180,171**, dated July 25, 1876; application filed March 11, 1875.

To all whom it may concern:

Be it known that I, SAMUEL T. THOMAS, of Boston, in the county of Suffolk and Commonwealth of Massachusetts, have invented certain Improvements in Looms, of which the following is a specification:

The invention relates to a new weft-stop motion for looms, or a new combination and arrangement of mechanism for stopping the loom in case of a break in the filling, or the failure of the shuttle to make a pick. The invention relates further to a new combination of mechanism for a take-up motion.

The drawing represents a loom, or the parts of a loom, embodying my invention.

Figure 1 shows the loom-frame and mechanism in side elevation. Fig. 2 is a plan of one end of the lathe and breast-beam, and the mechanism connected therewith. Fig. 3 shows such mechanism in front elevation. Fig. 4 is an end view of the same. Fig. 5 shows the weft-feeler and its connections in elevation. Fig. 6 is a front elevation of one end of the lathe, showing the shuttle-binder, protector-rod, and devices for relieving the shuttle. Fig. 7 is an end elevation of the same. Fig. 8 is a plan of a portion of the devices for stopping the loom. Fig. 9 is a front view of a portion of the devices for stopping the loom. Fig. 10 is a similar view to that of Fig. 3, but showing the position of the boxes and box-rod.

a denotes the frame of the loom; *b*, the crank-shaft; *c*, the lathe; *d*, the breast-beam; *e*, one of the picker-staffs. On the front side of the lathe I fasten a plate, *f*, between which and the lathe I place a weft-feeler, *g*, this feeler being so arranged as to be capable of a slight vertical movement, and also of a tipping or tilting movement, in the plane of the front face of the lathe. When raised, the upper end of the feeler extends beyond the top of the lathe, or into the path of the selvage-loop made by the pick of weft. The feeler is so hung that when the loop strikes its top it tips it, and thus passes over it; but if no loop meets it the lower end of the feeler will be in position to strike a hook as the lathe beats back, the hook being connected with the shipper-bar, and the strain upon the hook and bar releasing the shipper-lever from its notch, whereupon the spring of the lever actuates it to stop the loom. The application of this tilting-feeler to the lathe, and the mechanism connected therewith to operate it, constitute a principal part of my invention.

The feeler is shown as pivoted by pin *h* to an ear, *i*, extending from a slotted slide, *k*, sliding vertically on pins *l*. The bottom of said slide extends below the lathe and into the path of movement of an incline, *m*, on a bar, *n*, projecting from the breast-beam. The weight of the lower end of the feeler tends to hold the feeler in vertical position, and at each beat back of the lathe the incline raises the slide *k*, and thereby projects the top of the feeler above the plane of the shuttle-race, the feeler falling by gravity when the lathe beats up and as soon as the feeler passes beyond the incline. Beneath the lathe is journaled a horizontal rod, *o*, at the outer end of which is a vertical arm, *p*, having a bend, *q*, that stands in front of the shuttle-binder in line with the race, the bend being pressed back normally by a spring, *r*, and being pressed forward by the shuttle, when the shuttle enters, or is in the box behind it. The opposite end of the rod has a fork, the prong *s* of which, when the arm *p* is thrown forward by a shuttle, is in line with the lower part *w* of the bent pin *u*, extending from a hook, *v*, while the other prong, *x*, thereof is in line with the upper part *t* of said pin, when the arm *p* is thrown back by its spring. The hook *v* is pivoted to a bar, *y*, which is pivoted at *z*, and whose outer end is extended beyond the shipper-lever a^2. Said lever, by back movement of the bar *y*, being released from its notch b^2, is then thrown outward by its spring to stop the loom.

The prongs *s x* come into position to operate the pin *u* of the hook *v* just before the lathe reaches the termination of its beating-up movement, and if the shuttle is in the box the prong *x* will strike the part *w* of the pin and will throw the hook over so that its notch *j* is in line with the feeler *g* if said needle is hanging in normal or vertical position. The shuttle is thrown before the feeler reaches the hook, and, if the weft is unbroken, its loop will catch upon the feeler, which is thrown up by the incline *m* before the shuttle is thrown, or while the shuttle is in flight, tipping the feeler and thereby preventing it from catch-

ing the hook; but if the weft be broken or the shuttle fails to be thrown, then the feeler remains vertical, and its lower end catching upon the hook draws back the hook and with it the bar *y*, the bar dislodging the shipper-lever and stopping the loom, such stoppage occurring while the lathe is on its back motion, and thus preventing the lathe from beating up the broken end of the pick.

As the lathe beats up, the feeler falls as soon as the slide *k* passes the incline, thereby clearing the idle weft-threads. The prong *s* is employed to throw the hook *v* over, so that its notch *j* (see Figs. 8 and 9) shall not be in line with feeler *g* when the shuttle is thrown from the opposite shuttle-box, and therefore not operating on feeler *g*, with its weft-thread, and this prong *s* operates for this purpose against the part *t* of the bent pin *u* as the lathe beats up, when, in the absence of the shuttle, the arm P is thrown back by its spring, as above described.

This mechanism being duplicated at the opposite end of the lathe, the loom will be stopped by breakage of the weft prior to the flight of a shuttle in either direction, and will be stopped on the back beat of the lathe instead of as the lathe beats up toward the filling, or after the broken weft is beat in. It will be observed that the entrance of the shuttle into its box throws out the arm P, and brings the prong *x* into position to actuate the hook as the lathe beats up, to in turn position it for engagement with the feeler as the lathe beats back, which engagement must take place unless the loop of weft tips the feeler, or, in other words, must take place and arrest the loom if the weft be broken, or if the shuttle be not thrown. As the arm at either end of the lathe springs back as soon as the shuttle back of it leaves its box, the fork adjacent to an empty shuttle-box, or to the box left by the flying shuttle, is always left in position to so place the adjacent hook as to escape the adjacent feeler; hence the loom is stopped only by the absence of the weft at the time the shuttle is or should be thrown.

Beneath the breast-beam is the take-up ratchet c^2. This ratchet I operate by a series of impelling-pawls, d^2 e^2 f^2, for which there is a corresponding series of detainer-pawls, g^2 h^2 i^2. Thus, if there are three teeth, they are placed at such distances apart that when one pawl is in engagement with the ratchet another will be distant from the shoulder of a ratchet-tooth one-third of its length, while the third will be distant two-thirds of the length of the tooth from the shoulder in front of it.

By this provision minute changes may be made in the take-up, the fractional teeth insuring the proper movement of the ratchet for this purpose.

The impelling-pawls are jointed by an arm, k^2, of a pawl-lever, l^2, fulcrumed on the pin upon which the ratchet is mounted, said lever having another arm, m^2, to which is jointed a rod, n^2, said rod being either reciprocated or moved in one or the opposite direction by the lathe, the rod passing through an eye, o^2, of a plate fixed to the lathe. This part of the mechanism relates to the take-up produced by using on said rod n^2 a collar, p^2, placed in front of the eye o^2, and a weight, r^2, hung upon an arm, s^2, of the pawl-lever, (see Figs. 1 and 4,) the ratchet in such case being positively moved, but the pawls slipping back only as caused by the stress of the weight.

Such an arrangement is used for weaving with alternately coarse and fine filling, and to automatically vary the take-up in accordance with such change in the filling, I employ a shaft, u^2, turning in bearings, and having arms v^2 w^2, one extending under the rod n^2, and the other out from the loom. The outer arm w^2 I connect to the box-rod, so that by the vertical movements of the box-rod, to position the respective shuttles, the arm w^2 is raised or lowered, thereby raising or lowering the inner arm v^2, and carrying it into or from the line of movement of an arm, x^2, extending from the rod n^2, this arm being so positioned as to strike the arm v^2 when the box-rod is so moved as to bring into the line of the shuttle-race a box containing a shuttle with fine weft, and the arm v^2 intercepting the arm x^2 upon the rod n^2, so that the take-up is less to the extent required by the difference in the size of the yarn. The arm x^2 extends from the collar p^2, by sliding which on the rod n^2 the time of contact of the arms may be varied, and thereby the movement of the pawl-lever, as the size of the weft-yarn may require.

To relieve the shuttle from the pressure of the shuttle-binder, just before the shuttle is driven out of its box, I employ the simple and effective mechanism shown in Figs. 6 and 7. Upon the lathe-pitman I attach the curved bar r^3, through which the pitman-pin passes, and farther back it is rigidly bolted to the pitman, so that it forms, in connection with the pitman, a curved lever, fulcrumed on the pitman-pin, and worked by the crank-shaft. On the rod t^3 is secured a lever, s^3, which extends back under the lathe and above the end of bar r^3. When the lathe has completed its extreme forward movement, and beaten up the weft, the pitman and its crank are in line with each other, and the end of bar r^3 is in slight contact with the lever s^3. Now, as the rotation of the crank-shaft continues the back end of the pitman drops during a quarter revolution, while its front end, with the bar attached, turns on the pitman-pin as a fulcrum, and the bar r^3 is thereby caused to press up under and raise the end of lever s^3, which lever thereby turns the rod t^3, to which it is attached, and the bent arm v^3 of said rod is thus thrown off from the shuttle-binder, and the shuttle is relieved from pressure at the moment the picker-staff sends it out of its box. As soon, however, as the crank-shaft has passed said downward quarter of a revolution, the bar r^3 and lever s^3 are again separated, and the protector-rod t^3 is free to act by

force of its spring x^3 upon the shuttle-binder as the shuttle enters its opposite box.

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

1. In combination with the shuttle-binder and weft-feeler g, pivoted upon the front of the lathe, the arm p and the fork $s\ x$, pivoted rod o, the hook v, provided with bent pin v, and the pivoted bar y, all constructed to operate as shown and described, whereby the loom is stopped in the backward movement of the lathe.

2. In combination with the lathe and the shuttle-box rod, the shaft w^2, provided with the arms v^2 w^2, rod n^2, collar p^2, arm x^2, and pawl-lever l^2, by which means the throw of the take-up pawls is limited, as and for the purposes set forth.

SAMUEL T. THOMAS.

Witnesses:
EBEN HUTCHINSON,
EUGENE HUMPHREY.