2 Sheets—Sheet 1.

O. H. MOULTON, A. M. DAMON, Dec'd., & I. L. G. RICE.

LAURA S. DAMON, Admr'x.

WARPER.

No. 169,568. Patented Nov. 2, 1875.

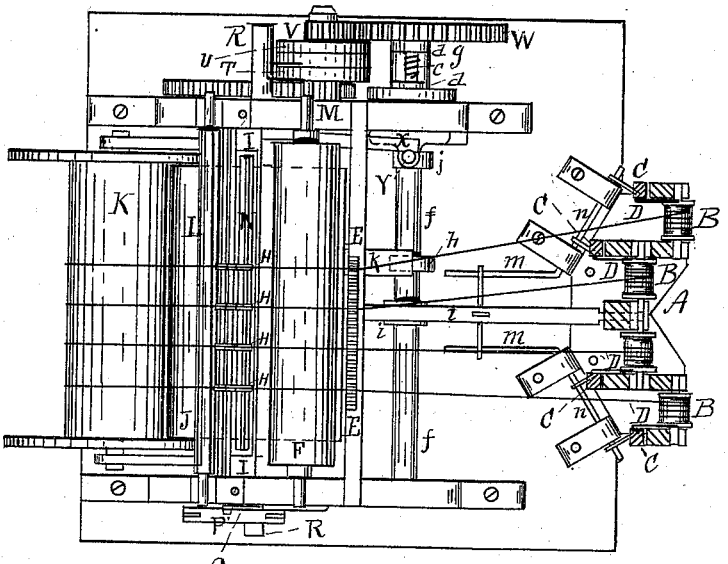

Fig. 1.

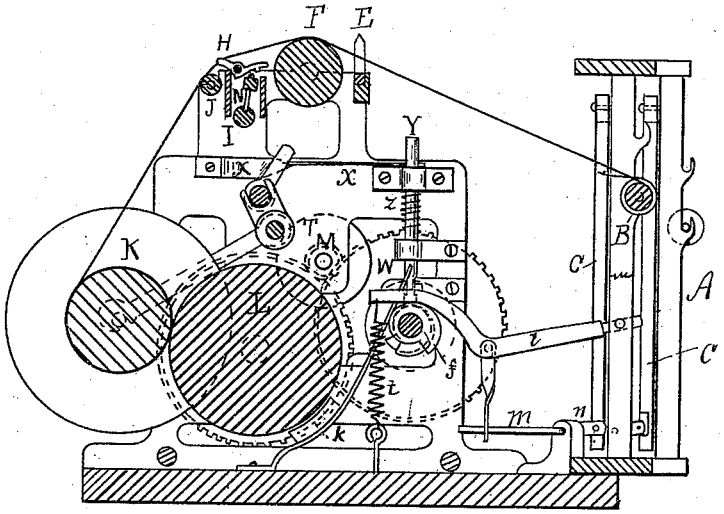

Fig. 2

WITNESSES

Frank G. Parker

Arthur Berry

INVENTORS

Israel L. G. Rice,
Oliver H. Moulton,
Laura S. Damon, Administratrix
of A. M. Damon
by Israel L. G. Rice Atty.

2 Sheets—Sheet 2.

O. H. MOULTON, A. M. DAMON, Dec'd., & I. L. G. RICE.

LAURA S. DAMON, Admr'x.

WARPER.

No. 169,568. Patented Nov. 2, 1875.

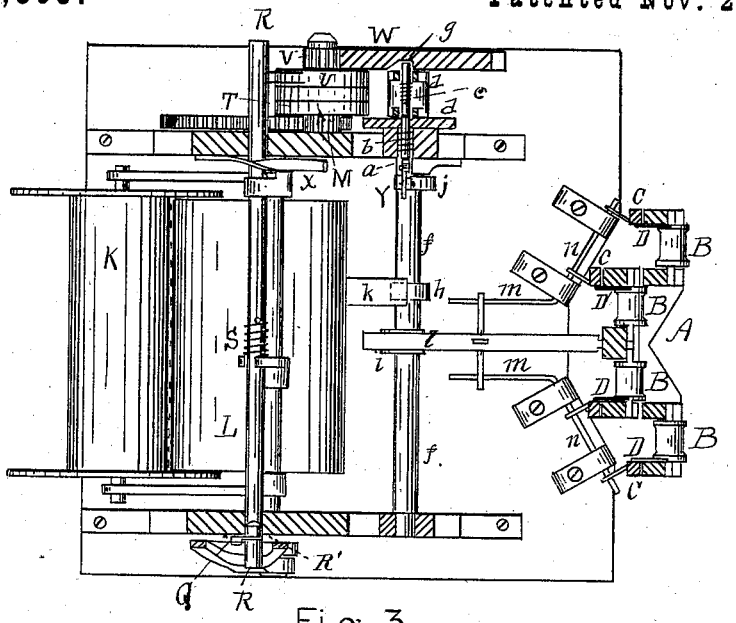

Fig. 3.

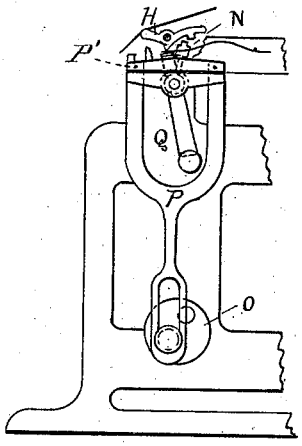

Fig. 4.

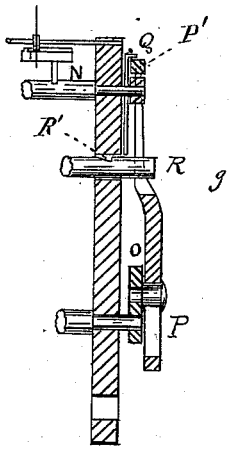

Fig. 5.

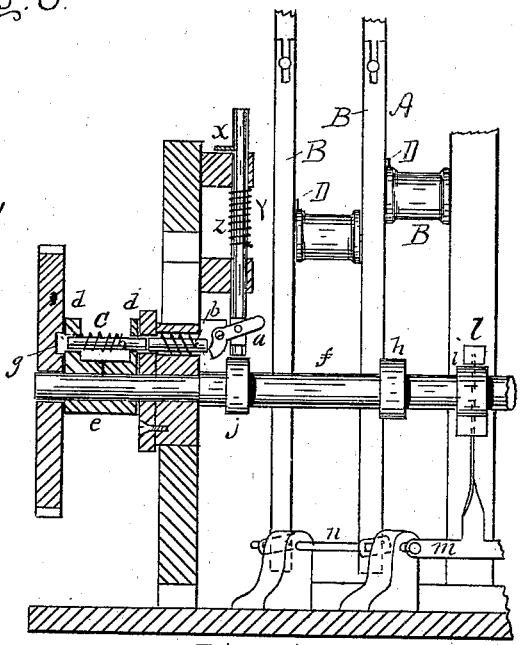

Fig. 6.

WITNESSES

Frank L. Parker

A. Wm Berry

INVENTORS

Israel L. G. Rice,
Oliver H. Moulton
Laura S. Damon, Administratrix
of A. M. Damon,
Israel L. G. Rice Atty.

UNITED STATES PATENT OFFICE.

OLIVER H. MOULTON, OF LOWELL, MASSACHUSETTS, LAURA S. DAMON, (ADMINISTRATRIX OF ALEXANDER M. DAMON, DECEASED,) OF ALBANY, VERMONT, AND ISRAEL L. G. RICE, OF CAMBRIDGE, MASSACHUSETTS; SAID RICE ASSIGNOR TO CHARLES E. RICE AND RETIRE H. PARKER, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN WARPERS.

Specification forming part of Letters Patent No. **169,568**, dated November 2, 1875; application filed July 27, 1875.

To all whom it may concern:

Be it known that we, OLIVER H. MOULTON, of Lowell, ALEXANDER M. DAMON, late of Lowell, (deceased,) and ISRAEL L. G. RICE, of Cambridge, Massachusetts, have invented certain Improvements in Warpers, of which the following is a specification:

The object of this invention is to enable the warping-machine to be run at a greater speed than has heretofore been practical.

Warpers were formerly made to run slowly; but, as a greater amount of work was required of the machine, the speed was increased, and it was found that the momentum of the spools caused them to revolve after the beam stopped. This caused much slack-yarn between the spools and the beam, and it frequently became snarled up, causing delay and trouble. To obviate this, rising or falling rolls, such as are now common on American and English warpers, were applied to the machines.

The greater the speed of the warper the greater will be the slack, and, therefore, to take up all the slack when the spools have acquired considerable momentum, the rolls rise or fall quite a distance, causing considerable friction on the yarn, and tending to break it.

Our improvement is intended to take the place of the rolls, and of other similar devices for keeping the yarn taut. Our invention consists in self-acting mechanism, that is put in motion by the breakage of a thread, and which causes the spools and beam to stop simultaneously.

Figure 1 is a plan view of a warper and creel. Fig. 2 is a sectional view of the same. Fig. 3 is a plan view, with the drop-box, yarn, &c., removed. Fig. 4 shows yarn passing through one of the thread-holders of the drop-box, the rocker-shaft, and the eccentric that gives it motion. Fig. 5 is an end view of the same. Fig. 6 is a sectional view, showing mechanism for stopping the spools in conjunction with the beam. This view shows the side of the warper opposite Figs. 4 and 5.

Only a few spools are shown in the drawings; but, in practice, there are about three hundred and twenty-five spools on the creel, varying as the different kinds of cloth require.

The operation of the machine is as follows:

The creel A, having the spools B B, and provided with the sliding rods C C and spring-brakes D D, to stop the spools, is placed behind the warper. The yarns are then drawn through the comb E and over the roller F, through the drop-thread carriers H H H, and over the roller J, and are secured to the beam K, which is operated by the revolving cylinder L. These parts are common to all warpers. When a thread breaks, it allows the end of the thread-carrier H to fall, these thread-carriers being held up by the yarn. When the end of the thread-carrier falls, it is struck by the rocker-shaft N, Figs. 4 and 5, which is reciprocated by the eccentric O and rocking-frame P. As soon as a thread-carrier falls and stops the shaft N, the rocking-frame P continues to move as usual; but the rocker-shaft N being stopped, and the rocking-frame P being kept in motion, the upper part P′ of the rocking-frame, being rigid on the frame, lifts the catch Q out of the notch or depression R′ in the shipper R, (see Figs 4 and 5,) which is thereby released and thrown back by means of the spring S, and the belt is shifted from the driving-pulley T to the pulley U, which has a gear, V, attached to it. This causes the gear W to revolve; and, as the shipper flies back, it not only carries the belt off the driving-pulley to the loose pulley U, but it also strikes the spring X, that is on the side frame of the machine, nearly opposite the driving-gear, and knocks it out of a catch in the upright sliding rod Y, (see Fig. 6,) which is thereby left free to be forced down by the spiral spring Z. This moves the lever *a*, pivoted to it, against the sliding pin *b*, which forces the sliding pin *c*, supported in the arms *d* of the frame *e*, fast upon the cam-shaft *f*, into

the notch or hole *g* in the side of the gear W, thus causing the cam-shaft *f* to revolve with the gear W.

In practice it is found best to have a series of notches on the inside of the gear W, instead of one, as shown in the drawing.

On the cam-shaft *f* are fastened three cams, *h*, *i*, and *j*. When the cam *h* revolves it moves the elastic brake *k* against the cylinder L, and as the cylinder stops the yarn-beam stops also. The cam *i* then lifts up the lever *l*, (see Fig. 2,) and through it the arms *m m* on the shafts *n n*, which causes the sliding rods C C and the elastic brakes attached to act on the spools B B, and stop them. The cam *i* as it continues to rotate allows the spring *t* to lift the brakes off the spools after they have come to a full stop, and the cam *h*, as it continues to rotate, allows the brake *k* to withdraw from the cylinder L. The cam *j* then lifts the sliding rod Y (see Fig. 6) back into its former position, where it is held by the spring-catch X. As the sliding rod Y moves up it pulls back the lever *a*, and allows the pin *b* to be forced back by the spiral spring upon it, while the spiral spring on the pin *c* forces it out of the notch *g* in the gear W, so that the cam-shaft *f* makes but a single revolution each time a thread breaks and the shipper flies back.

There are other devices for throwing the shipper, which may be used in connection with our mechanism for stopping the yarn-beam and spools in conjunction with one another.

The brakes may be applied to the sides of the rims or to other parts; or the brakes may be taken off and a ratchet-wheel put on each spool, and pawls arranged to act on the ratchet.

The essence or principle of the invention is the stoppage of the spools and beam simultaneously, by means of automatically-acting mechanism. The beam and all the spools may not all stop at the same moment, but for all practical purposes the rotation of the spools a half revolution or so, after the beam has come to a dead stop, would not cause enough slack to allow the yarn to become snarled. It is evident that by carefully adjusting the cams the stoppage of the beam and spools can be regulated.

If the warper is run very rapidly, it will be found that the measuring-roll has a tendency to count more yarn than there is run off, as it acquires much momentum, and continues to turn after the beam has stopped. To obviate this, a brake, worked by a cam on the shaft *f*, should be applied to it, so that the measuring-roll will stop at the same time the beam ceases to turn.

A warper built on this principle can be run at a speed two-thirds greater than the warpers having the rising or falling rolls.

The sudden stoppage of the beam allows the warper-tender to find the broken end before it has been carried around the beam two or three times, and got snarled up with other yarn.

What we claim as our invention, and desire to secure by Letters Patent, is—

1. The combination, with the thread-carriers and stopping mechanism of a warping-machine, of the spool-creels and warp-beam-driving cylinder, and friction mechanisms adapted to operate upon the spools and the driving-cylinder, whereby when a thread breaks the warp-beam and the spools are simultaneously stopped, as and for the purpose set forth.

2. In combination with the warp-beam-driving cylinder of a warping-machine and the belt-slipping mechanism controlled by the thread-carrier, the cam-shaft and intermediate mechanism, substantially as shown, for controlling and operating it, which shaft is adapted, through intermediate friction-brake devices, to stop the beam and the spools simultaneously, as and for the purpose set forth.

3. In a warping-machine, the combination of a belt-shipping mechanism, controlled by the thread-carriers, with the friction-brakes adapted to operate upon the spools, and intermediate operating mechanism, substantially as described, whereby the spools are stopped when a thread breaks, as and for the purpose set forth.

OLIVER H. MOULTON.
ISRAEL L. G. RICE.
LAURA S. DAMON,
Administratrix.

Witnesses as to O. H. MOULTON and I. L. G. RICE:
F. RODLIFF, Jr.,
GEO. W. FARRINGTON.

Witnesses as to L. S. DAMON:
LYMAN DAMON,
PUTNAM JAMISON.