J. & J. Haworth.

Loom.

No. 5,891. Patented Oct. 31, 1848.

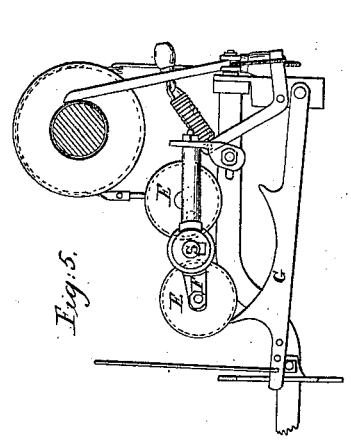

Fig. 5.

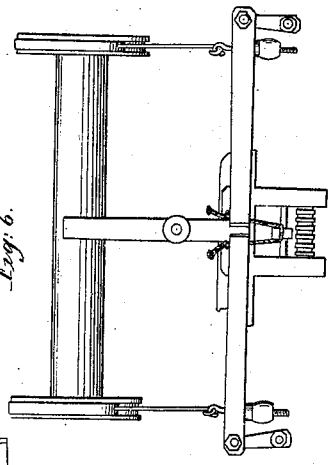

Fig. 6.

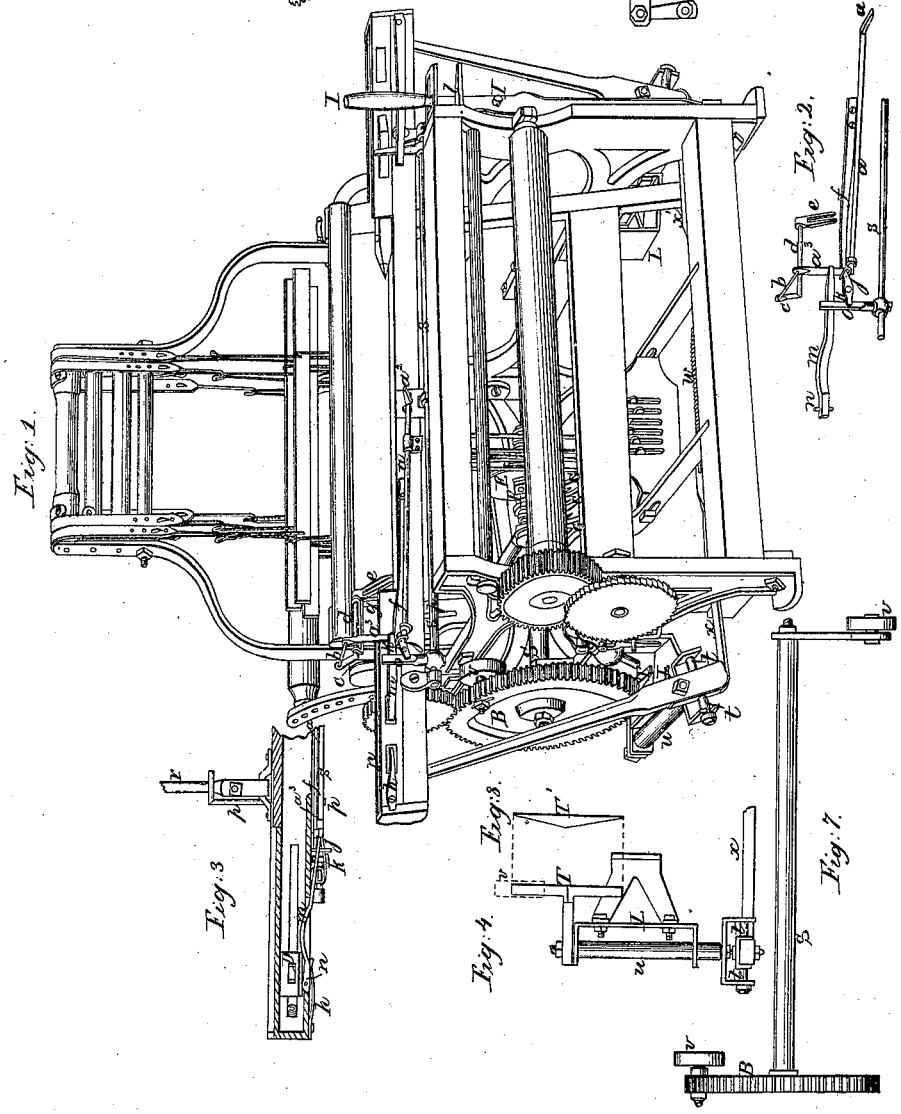

Fig. 1.

Fig. 2.

Fig. 3

Fig. 4.

Fig. 3.

Fig. 7.

UNITED STATES PATENT OFFICE.

JAMES HAWORTH AND JNO. HAWORTH, OF NEAR FRANKFORD, PENNSYLVANIA.

LOOM.

Specification of Letters Patent No. 5,891, dated October 31, 1848.

To all whom it may concern:

Be it known that we, JAMES HAWORTH and JOHN HAWORTH, of near Frankford, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Power-Looms, which are described as follows, reference being had to the annexed drawings of the same, making part of this specification.

Figure 1, is a perspective view of the loom taken from a position opposite its left front corner. Fig. 2, is a perspective view of the combination of mechanism attached to the lay for the purpose of stopping the motion of the loom. Fig. 3, is a top view of one of the shuttle boxes. Fig. 4 is a plan of the combination of mechanism attached to the loom for operating the picker staff. Fig. 5, is a vertical section showing one of the treadles and two of the grooved wheels for operating them. Fig. 6 is an elevation of the mechanism for regulating the tension of the warp during the decrease in diameter of the yarn on the beam by diminishing friction on the pulleys or wheels as the leverage of the warp decreases. Fig. 7, is an elevation showing the shaft, cranks, and rollers for turning the rock shaft alternately for operating the picker staffs. Fig. 8, is an elevation of the T-shaped head showing the double inclined plane.

Similar letters in the several figures refer to corresponding parts.

The loom is made like other power looms in use, except in the particulars hereafter stated.

Our improvements are the following: First, a new and useful combination and arrangement and application of parts to the lathe of the common power loom for the purpose of stopping the motion of the loom the moment the weft or filling breaks, and is called the "stop motion and thread protector." Second, a new mode of attaching the picker staves to the forked rock shafts by means of additional axles arranged at right angles thereto in the forks of the rock shafts by which the upper ends of the picker staves are made to move in the direction that the lathe moves and also in the direction that the shuttles move the lower or larger ends of the staves being made to have a universal movement—the rock shafts, carrying the picker staves being operated by means of pulleys on wrists of cranks on the outer ends of the lower shaft of the loom, or on wrists or pins inserted into a wheel or wheels by which the usual straps and picking treadles are dispensed with. Third, in the employment of wheels, channeled on their peripheries in the shape of the letter V corresponding to the shape of the upper or concave surface of the treadles which are also made of a V shape inverted for doing away with the friction of the sliding cam—said wheels rolling over the treadles instead of sliding over them—said wheels being true circles instead of eccentric curves.

a is a horizontal turning shaft, called "the thread protector finger shaft," attached to the front of the lay in a parallel position to the ordinary stop rod *s*, by suitable bearing plates, or boxes, in which it turns. The inner end of said shaft next the center of the lay is turned or bent horizontally toward the front of the loom forming a finger a^2 for striking against the stop lever *b*, when the loom is to be stopped. The outer end, next the shuttle box, is turned up vertically, forming an arm a^3 for the purpose of receiving a connecting rod *b* that connects it with the right angled arm *c* of a short rock shaft *d* called "the forked finger shaft," turning in suitable bearings formed in a plate secured to one of the swords of the lay. To one end of this shaft, (which is above the open end of the shuttle box,) is affixed a forked finger *e* for the purpose of striking against the filling, or weft, by the action of a spring *f*, attached to the lay and thus preventing the finger a^2 from turning downward to such angle as to cause it to strike the ordinary stop lever *l* of the loom.

During the operation of the loom the finger a^2 in the forward movement of the lay just clears the upper edge of the stop lever *l* which is made, arranged, and operated, in the usual manner; but when the filling or weft breaks and the forked finger *e* meets with no resistance its lower ends passing through an opening or grating *g* in the lay and caused by the action of the aforesaid spring *f* by means of the arms and the connecting rod to turn the horizontal shafts *a* and depress the finger a^2 to such angle as to cause its point to strike the stop lever *l* and turn it on its fulcrum *i* and actuate the shipper lever I and stop the loom by moving the band from the fast to the loose pulley in the usual manner. One end of the spring *f* is fastened to the front of the lay; the other is placed between the arm a^3 of the shaft *a*

and the shuttle box and bears the upper end of said arm from the shuttle box and causes the lower ends of the fingers to pass through the grating *g* of the lay, when not stopped in front of the grating by the filling or weft. The fingers are moved from before the mouth of the shuttle box and toward the breast beam of the loom in order to let the shuttle pass into the shuttle box to which the finger *e* is attached without obstruction by means of a spring *h* that presses the swell lever *m* inward toward the center of the shuttle box the moment the shuttle is thrown from contact with it—said swell lever turning on a pin *n* as its fulcrum at one end while its other end is made to bear against the arm a^2 of the horizontal shaft *a* by the force of the spring *h*, aforesaid, pressing the arm a^3 toward the lay and contracting the spring *f* and turning the shafts *a* and *d*.

When the shuttle is to be thrown from the shuttle box to which the finger *e* is attached the finger *e* is moved out of the way or from before the mouth of the first named shuttle box by means of a short lever *j* made to bear against the arm a^3 and cause it to move toward the shuttle box by means of the arm *o* inserted into the stop rod *s* of the stop motion (patented on the 20th day of March, 1847, by one of the present applicants); which rod is operated by the bent arm *p* Fig. 3 projecting from the shaft *s* and lying upon the connecting rod *r* of the lay and crank, as described in said patent. The fulcrum of this the aforesaid lever *j* is a screw bolt *k* inserted into the lay after passing through the lever. See Figs. 1 and 2.

The picker staves for throwing the shuttles are operated by the following arrangement of machinery and in the following manner. A short axle *t* is passed through the picker staff near its lower end and in the direction of its movement, and on which it vibrates, in the direction of the movement of the lay. This axle turns in bearings in the forked end of a rock shaft *u*. The bearings of said rock shaft are formed in adjustable plates L fastened to the frame of the loom. It is caused to turn a segment of a circle in the direction of the movement of the shuttle for the purpose of moving the picker staff to throw the shuttle by means of a roller *v* on the wrist of a crank on the shaft S; which roller, at every revolution of the crank, comes in contact with a T shaped arm T affixed to the rock shaft *u*, whose head is made in the form of a double inclined plane, as shown at T′ Fig. 8, and bears it down in the arc of a circle scribed from the center of the rock shaft producing the operation above named of moving the picker staff. The roller first strikes upon the rear end of the T shaped arm, and after rolling over it and gradually bearing it down till it (arrives) at the middle of the bar, which is the highest point of the inclined planes, when the bar commences to rise and continues to rise until the wheel leaves the end of the T shaped arm. The spiral spring *w* attached to the strap *x* affixed to the foot of the picker staff reverses the movement of the picker staff throwing back the end to which the shuttle driver D Fig. 3, is attached. While this picker staff is moving back from the shuttle, by the action of the said spring *w*, the picker staff at the other end of the shuttle box is being thrown toward the shuttle by means of a similar arrangement of parts to those above described, operated by a similar crank and roller on the same shaft S arranged so as to make the movement alternate. In Fig. 1, the roller *v* is represented nearly at its maximum height. In Fig. 4, it is represented in the act of bearing down the double inclined plane head of the T shaped arm. The roller on the left side of the loom may be placed on a pin inserted into the large cog wheel B Fig. 1 in any suitable place for actuating the rock shaft at the required moment of time for throwing the shuttle.

The mechanism for operating the treadles of the harness are made and arranged in the following described manner. Instead of the usual cams, or eccentric wheels, with flat surfaces to depress the treadles there are to be substituted circular wheels E Figs. 1 and 5, arranged on the wrists of cranks F projected from the main shaft S whose peripheries are to be channeled in the form of a V to run over and along the concave surfaces of the treadles G which are also shaped like the letter V inverted so as to exactly fit or correspond with the edges of the wheels.

The depressions or concavities of the treadles over which the peripheries of the wheels traverse are made of such curvature as will produce the required movements of the treadles during the revolving movement of the cranks F and wheels E. The positions of the wheels and cranks and treadles may of course be changed to produce any required movement. The above described construction and arrangement removes the great friction experienced in the use of the sliding cams and flat treadles. A small block of wood is attached to the upper end of each picker staff by being passed through a mortise in the same which is used as a driver for driving the shuttle and which always goes back or recedes before the shuttle strikes. It requires no oil. Its use dispenses with the use of spindles, pickers and picking strings, and is believed to be simpler and better than the old plan, but to originality of invention in this particular I do not wish to lay especial claim in this application.

Having described the several improvements which we have made in the loom we will now state the claims.

What we claim as our invention and improvement is—

1. The combination and arrangement, and organization, and operation of mechanism as above described, for stopping the looms when the filling or weft breaks, said combination consisting of the forked finger *e* that rests against the filling when not broken and which passes through the grating in the lay when the filling breaks and causes the loom to stop—the short rock shaft *d* to which the forked finger *e* is affixed—arm *c*—connecting rod *b*—arm a^3 finger shaft *a*, finger a^2 and spring *f*, in combination with the stop lever *l* against which the finger a^2 strikes, causing the lever to turn on its fulcrum *i* and actuate the belt shipper for casting off the belt from the fast to the loose pulley, and thus stop the loom.

2. We also claim the combination and arrangement and operation of the before described mechanism for actuating the picker staves for throwing the shuttles without the use of picking treadles, straps and other appendages usually employed for such purposes—said combination consisting of forked rock shafts *u u* to which the picker staves are connected the short axles *t* passing through the picker staves into the forks of the rock shafts—the T shaped bars T attached to the rock shafts and the rollers *v* on the cranks projected from the shaft S for turning the rock shafts alternately as described, the picker staves being free to turn in the arc of a circle in the direction of the movement of the lay, as well as in the direction of the throw of the shuttle simultaneously.

In testimony whereof we have hereunto signed our names before two subscribing witnesses this twelfth day of April, A. D. 1848.

JAMES HAWORTH.
JOHN HAWORTH.

Witnesses:
LEWIS EMERY,
PETER CASTOR.