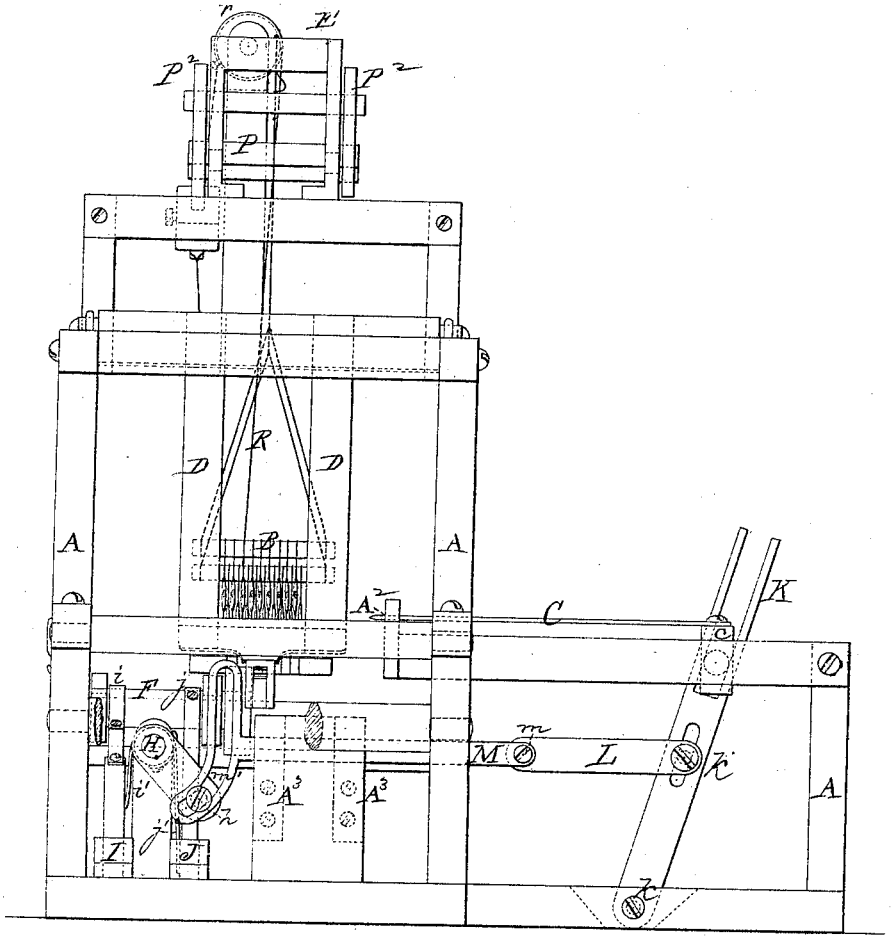
2. Sheets. Sheet. 1

Porter & Cross,

Hair Cloth Loom

No. 108,292. Patented Oct. 11. 1870.

Fig. 1.



Witnesses,

C. L. Livings

Inventors.

W. J. Porter and W. Cross,

by their attorney, J. D. Nelson.

2 Sheets. Sheet. 2

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Fig. 2.

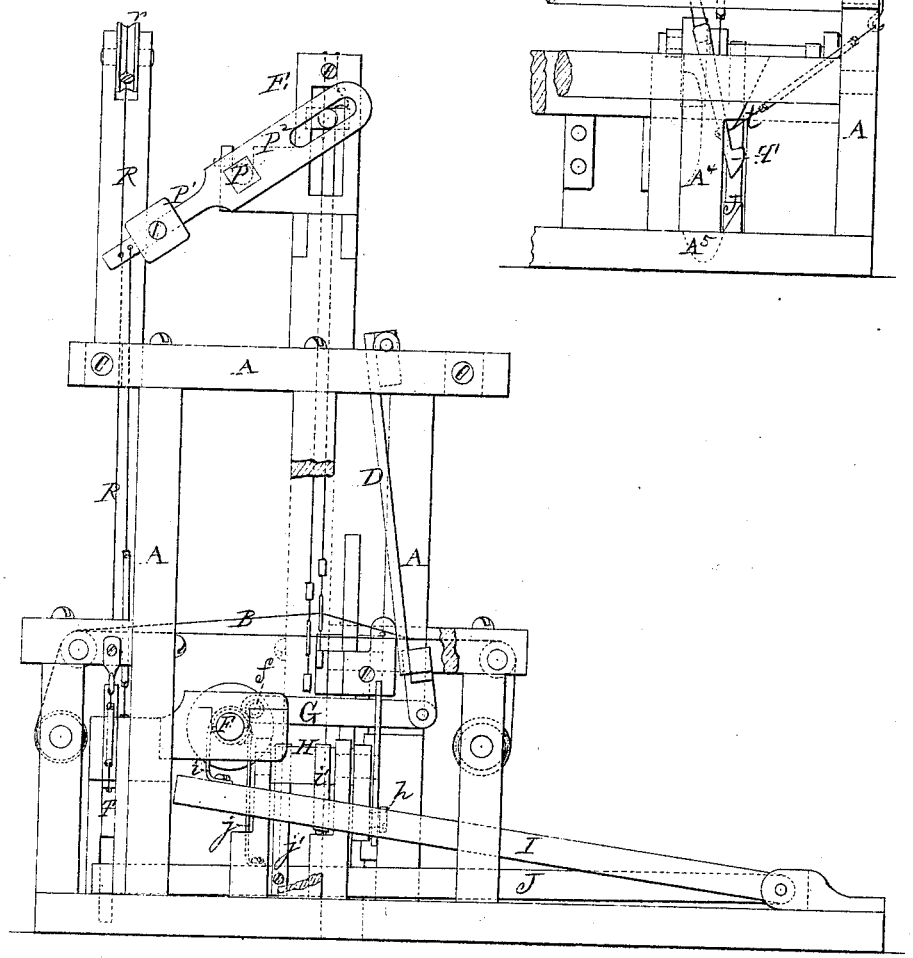

Fig. 3.

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by their attorney

S. D. Stetson

United States Patent Office.

WILLIAM J. PORTER, OF NEW YORK, N. Y., AND WILLIAM CROSS, OF JERSEY CITY, NEW JERSEY, ASSIGNORS TO EDWARD H. FAULKNER, OF NEW YORK CITY.

Letters Patent No. 108,292, dated October 11, 1870.

IMPROVEMENT IN LOOMS.

The Schedule referred to in these Letters Patent and making part of the same.

To all whom it may concern:

Be it known that we, WILLIAM J. PORTER, of the city, county, and State of New York, and WILLIAM CROSS, of Jersey City, in the county of Hudson and State of New Jersey, have invented certain new and useful Improvements in Looms for Weaving Hair-Cloth; and we do hereby declare that the following is a full and exact description thereof.

We supply the horse-hairs separately, by hand, using a warp of cotton or other suitable material, and drawing the hairs separately across to form the filling. The loom may be worked by the feet or by power, but we will describe it as operated by the feet alone.

We use a simple jacquard, in the reversed position. Two treadles are employed. The movement of the same treadle draws the hook, with its horse-hairs, across the warp, and closes the shed, the operation being timed so that it is closed just as the hook escapes.

The novelty in our invention consists in a peculiar mode of connecting and operating the hook, and in facilitating and expediting the opening of the shed. The shed opens instantly in advance of the movement of the treadles or other ordinary actuating mechanism, so that the hook, which, on being withdrawn, escapes from the selvage, with the warps just closing, returns to find the shed wide open, and ready to allow the hook to be inserted with certainty.

We will proceed to describe what we consider the best means of carrying out our invention.

The accompanying drawing forms a part of this specification, and represents the novel parts of our loom, with so much of the other parts as is necessary to indicate their relation thereto.

Similar letters of reference indicate like parts in all the figures.

Figure 1 is a front elevation, with the cloth-beam partially broken away, to show the work in the rear;

Figure 2 is a side elevation; and

Figure 3 is a view of a portion.

Referring to the figures—

A is the fixed frame-work of the loom, which may be of wood or metal.

B B are the warps, led from rear to front, and adapted to be operated by harness, as will be obvious.

D is the lay, and performs its usual function of beating up each hair of the weft, and returning again to allow the next hair to be received.

We use the term "shed" in its ordinary significance, to mean the space formed by the elevation of a portion of the warps, by the working of the harness; but we operate the harness to open the shed more rapidly than usual.

C is the hook, which is, by preference, provided with a small roller, not represented, to diminish the friction of the hair as it is drawn rapidly through it, placing the hair in position between the warps. The hook is worked by a positive motion, as will presently be detailed.

When the loom is worked slowly, the hook is traversed backward and forward through the shed slowly, the shed closes slowly, and the lay comes forward to strike the hair, thus introduced, slowly and gently, and returns again with a similarly moderate motion; but the opening of the shed is always rapid. When the proper period has arrived, the harnesses which are to be elevated, as determined by the jacquard, are lifted almost instantaneously to their full height.

E represents, collectively, the mass of mechanism known as the jacquard. It is adapted to give a sufficiently long train of motions to provide for all the ordinary varieties of twill, or the like, which is required in this class of goods. The machine may be worked very rapidly, the hairs being supplied in the ordinary manner, by introducing them singly into the hook C by hand, in the manner heretofore employed in effecting this class of work.

It being premised that the parts which we shall denominate treadles, or parts equivalent in function thereto, may be worked by power, if preferred, we will describe the operating by the foot.

The attendant sits in the ordinary position at the front of the loom, with the right foot on the treadle J and the left foot on the treadle I, depressing them alternately.

The strap of leather *i*, from the treadle I, and the strap of leather *j*, from the treadle J, are wound partially or entirely around the rocking shaft F, mounted transversely above, and being wound in opposite directions, it follows that, as the treadles are alternately depressed and released, the shaft F effects about a half revolution alternately, in opposite directions.

A crank-pin, *f*, mounted eccentrically on the overhanging end of this rocking shaft F, is connected by a rod, G, to the lay D.

The hook is worked in a manner somewhat corresponding, but with an important modification in the mechanism, which causes it to remain a considerable period at rest in its withdrawn position. The rock-shaft, for this purpose, is mounted fore-and-aft of the loom, as represented by H.

It is connected by leather straps *i' j'* to the treadles I and J, and is rocked by their motion, but to a greater extent than the rock-shaft F. It should perform about two-thirds of a complete revolution.

A crank-pin, *h*, carried on an arm on the front end of the rock-shaft H, has considerable throw, as represented. It is through the agency of this pin, which is rapidly swept around in a large arc in opposite directions, that the proper motion and rest is given to the hook.

The hook C is fixed on a slide-block, *c*, carried on parallel ways, A^1. It is also guided by passing through a hole in the frame-work, at A^2, so that it is thrust in through the shed, and withdrawn again in a strictly straight line, without requiring any further support.

K is a slotted lever turning on a fixed pin, *k*, in the frame-work below.

L is a connection from a pin, *k'*, fixed near the center of this lever K, and connecting it to a pin, *m*, on a sliding bar, M, which is supported in bearings A^3, in the frame-work, so that it is capable only of a direct motion toward one side and the other of the machine.

The end of the slide M opposite the connection L is formed, as represented, with an extended slot, curved at its lower end, and straight up and down at its upper end, as indicated by *m'*. In this slot is received the pin *h*, before described. At each rocking motion of the shaft H the pin *h* traverses rapidly from one end to the other of this slot *m'*.

It will now be seen that each depression of the treadle J causes the pin *h*, in its sweep to the right, to move the slide M, and, consequently, the hook C to the right, and to hold it there at rest; that is to say, it compels the hook C to perform its extreme movement to the right, while the pin *h* is describing only a part of its arc.

During the latter portion of the traverse of the pin *h*, it moves in the curved portion of the slot *m'*, and this curve is exactly concentric with the axis of the rock-shaft H. It follows that, on the depression of the treadle J, the pin *h* first moves the slide M to the extreme right, (meantime, it is moving down in a straight portion of the slot *m'*,) and afterward it holds the slide M still in its extreme right position, (and, meanwhile, traversing itself idly downward in the curved portion of the slot *m'*.) When the treadle I is depressed, and the treadle J is correspondingly raised, the reverse of these motions occurs.

The same movement of the treadles operates the lay D, through the rock-shaft F, more directly, and without the interposition of any such provision for a delay in the movement. As the hook C moves to the right, the lay moves forward, but in different times. The hook moves to the right rapidly, rests there a time, and then moves to the left again rapidly. The lay, meantime, has come forward, and struck the last hair of the weft, and returned again out of the way, by reason of its motion being more rapid in this part of its course. The delay provided, during which the hook rests in its extreme withdrawn or right-hand position, allows the lay to perform its function and return without obstruction.

If the harnesses were operated with the slow motion of the treadles, the shed, on the arrival of the hook C to perform a new traverse across the warp, would be only partially opened, and the hook, by making a false thrust, might get above the threads of the upper portion of the warp. To avoid this evil, we introduce mechanism at the rear, which causes the shed to open almost instantaneously, by the force of a spring or weight, and its opening motion commences before the extreme depression of the treadle J, and, consequently, before the full stroke of the lay D is effected.

We consider it unnecessary to represent in minute details all the complicated mechanism known as the jacquard, or to describe the modifications which we employ in our simple form.

It will be sufficient to explain that the jacquard performs the function (for which it is used in many other looms) of indicating which harnesses shall be raised, while the power to effect the operation is transmitted through other parts, which are plainly represented.

P is a rocking shaft mounted in the frame-work, as represented, and provided with slotted arms, P^2 P^2, which engage with and operate the trap-board to perform its usual functions.

The arm P^1, weighted or drawn down by a spring, or by both, sinks rapidly when allowed so to do, and, consequently, the front arms P^2 P^2 are lifted suddenly to open the shed.

R is a string leading upward from the arm P^1, over a pulley, *r*, mounted in the position represented, and extending from thence downward to a beveled hook, T, which is confined loosely in a vertical casing, open at one side, as indicated by A^4.

The extreme back end of the treadle J is beveled, and is adapted to act against the beveled hook T.

When the treadle J rises, its beveled face, striking the beveled face of the hook T, presses it back into the casing A^4, against a gentle force exerted by a string, *t*, shown in dotted lines, which may be of rubber, or may be actuated by a weight or spring. The treadle J thus gets above the hook T. Now, on its being depressed, it carries with it the hook T, and thus, through the connections represented, lifts the arm P^1 and closes the shed. This operation we have before referred to as being necessarily positive, and dependent on the time of the other motions of the loom.

It is important that the shed should not close before the hook C is withdrawn, or the hook might disturb the warps. And it is equally important that the shed shall not remain any appreciable time after the hook is withdrawn, because it would allow the hair to crinkle up and curl, and impair the perfection of the goods. The positive connection, during the closing, allows the timing to be effected relatively to the motion of the hook, with any required degree of delicacy.

Now, when the shed is closed, and the hook is withdrawn and commences its period of remaining stationary in its extreme right position, and while the lay is performing its function of pressing the hair firmly into its place to form a portion of the cloth, the lever P^1 is suddenly liberated, and allowed to descend rapidly, and open the shed widely and instantaneously, for the next round of operation. This is effected by the sudden liberation of the hook T from the treadle J.

The depression of the treadle J, when it has reached a certain point near or not quite to its extreme lowest position, brings the beveled face of the hook T in contact with a stop, A^5, which may be adjustable, if preferred, or it may form a fixed part of the framing of the loom. It is sufficient that it stands in the path of the hook T, and presses it to the right as it descends sufficiently to disengage it from the treadle J. Immediately on its disengagement, it rises, slackening the string R, and allowing the proper harnesses to be instantly lifted, and the shed to be opened, as above described.

Although we have represented our loom as introducing hairs into the warp by means of the hook C, served by hand, and operated by the peculiar motion herein represented, and esteem this an important part of our invention, a portion of the benefit of our invention can be made available by using our means for quick opening of the shed, in connection with a shuttle, operated by any suitable mechanism, and supplied with hairs by a self-server or by hand, or in any other way. We can also use a self-server in connection with our hook C, operated as described.

We are aware that many previous modifications of carrying devices for introducing hairs, and of jacquards for operating harnesses, have been before in use, and we do not claim the details of our mechanism; nor, again, do we confine ourselves to the precise form and

arrangement of the parts; but having now fully described our improvement,

We claim, as an improvement in looms for horse-hair and analogous weaving—

1. The treadles I J, operating both the warp mechanism and the filling-hook, as shown, when the crank-pin *h*, on the rocking shaft H, travels in the curved slot *m'*, in the hook-slide M, so as to induce the proper periods of rest and motion, all substantially as herein set forth.

2. The catch T and treadle J, combined with the trap-board, or its equivalent, for governing the harness mechanism, and operating as represented, to open the shed rapidly in advance of the return motion of the treadles.

In testimony whereof, we have hereunto set our names in presence of two subscribing witnesses.

WM. J. PORTER.
WILLIAM CROSS.

Witnesses:
C. C. LIVINGS,
WM. C. DEY.