(No Model.) 2 Sheets—Sheet 1.

R. CUSCADEN & W. F. POIESZ.

LOOM.

No. 572,246. Patented Dec. 1, 1896.

FIG 1

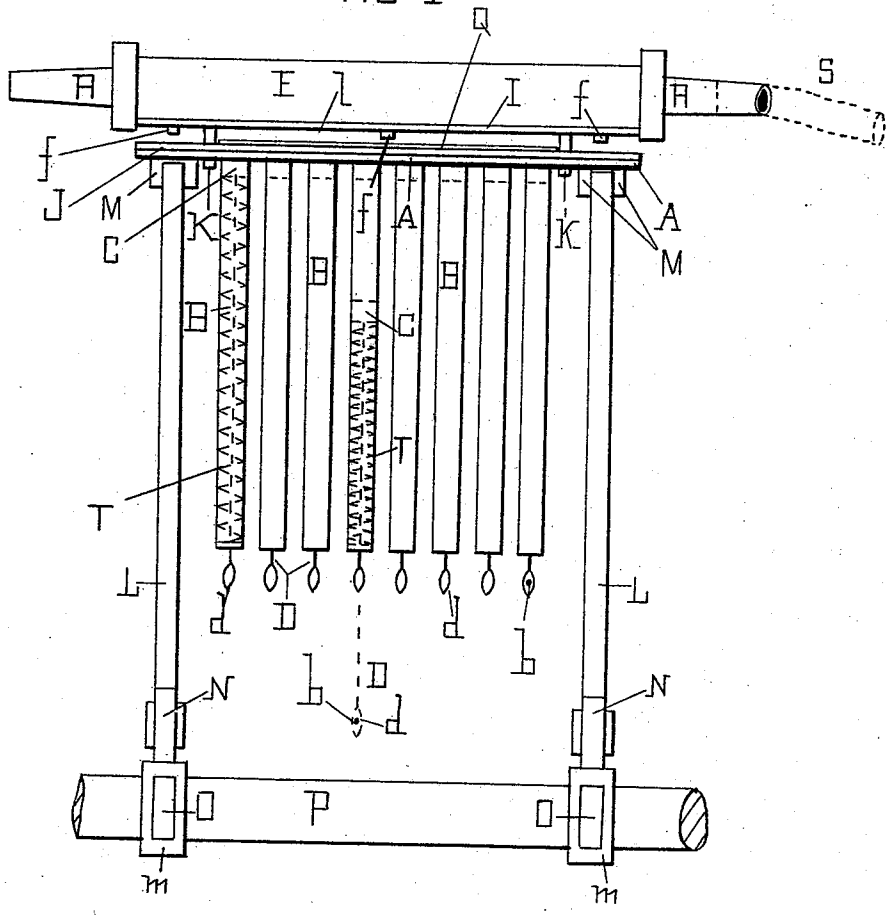
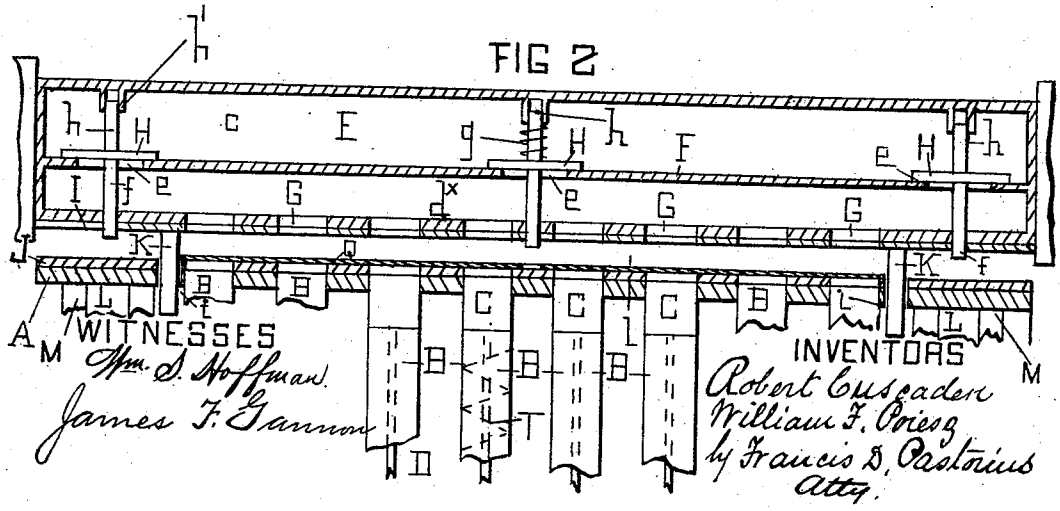


FIG 2



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(No Model.) 2 Sheets—Sheet 2.

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LOOM.

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FIG 3

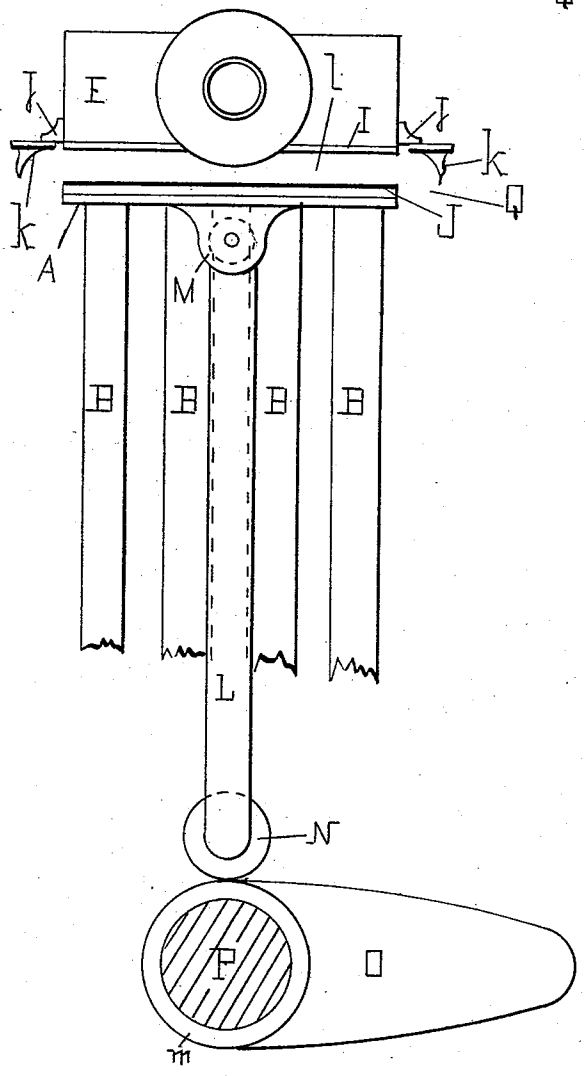
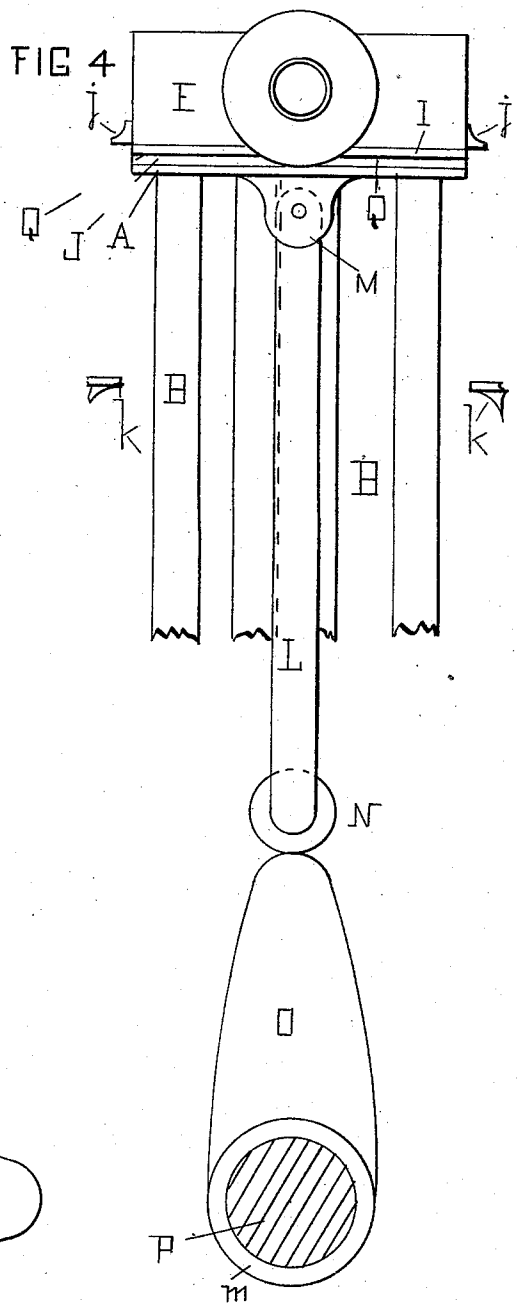


FIG 4



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UNITED STATES PATENT OFFICE.

ROBERT CUSCADEN AND WILLIAM F. POIESZ, OF PHILADELPHIA, PENNSYLVANIA.

LOOM.

SPECIFICATION forming part of Letters Patent No. 572,246, dated December 1, 1896.

Application filed January 9, 1896. Serial No. 574,808. (No model.)

To all whom it may concern:

Be it known that we, ROBERT CUSCADEN and WILLIAM F. POIESZ, citizens of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented certain new and useful Improvements in Looms; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention consists in the novel features hereinafter described and claimed, reference being had to the accompanying drawings, which illustrate one form in which we have contemplated embodying our invention, and said invention is fully disclosed in the following description and claims.

Referring to said drawings, Figure 1 represents a front elevation of an apparatus embodying our invention. Fig. 2 represents a vertical longitudinal sectional view, slightly enlarged, showing the air-chest, the tube-sheet, and portions of the air tubes or cylinders. Fig. 3 represents an end view of the apparatus, showing the tube-sheet down, the lower portions of the air-tube being broken away. Fig. 4 represents a similar view showing the tube-sheet in engagement with the air-chest and both parts in elevated position.

In carrying out our invention we provide a loom with a vertically-movable tube-sheet A, which is provided with a plurality of downwardly-extending air tubes or cylinders B, in each of which is a piston C. To each of these pistons is secured a downwardly-extending warp-thread-carrying rod D, projecting from the lower end of its respective tube and provided with an eye *d* or equivalent device to hold one of the warp-threads *b*. The tubes or cylinders B may extend entirely through the tube-sheet or register with apertures therein, as desired, and there may be any desired or necessary number of these tubes with their pistons C and warp-holding rods D. Within each of the tubes or cylinders is a coiled or other spring T, preferably surrounding the warp-carrying rod and arranged to press upwardly upon the piston C, thus maintaining the pistons and their connected warp-carrying rods D normally in their highest positions.

Above the tube-sheet A is a compressed-air chest E, which is provided interiorly with a horizontal partition F, dividing the chest into an upper or compression chamber *c* and a lower or distributing chamber $d^{\times}$. The lower face of the air-chest E is provided at each side, preferably, with downwardly-extending guide-rods K, which engage guiding-recesses *i i* in the tube-sheet, thereby securing the tube-sheet and air-chest from lateral movement with respect to each other, but permitting a vertical movement of the tube-sheet with respect to the air-chest, as hereinafter described. The air-chest E is normally supported upon brackets or supports *k k*, which are provided upon the loom-frame, and in this instance said air-chest is provided with lugs or projections *j j*, extending laterally therefrom, which rest upon said brackets and support the air-chest.

The bottom of the air-chest, which forms the bottom of the distributing-chamber $d^{\times}$, is provided with a series of holes G, circular in form, which are of substantially the same size as the bore of the tubes or cylinders B, and said apertures are so arranged that each is directly in line and adapted to register with one of said tubes B when the tube-sheet and air-chest are brought together. The meeting faces of the air-chest and tube-sheet are provided each with a sheet of elastic packing of felt or other suitable material having circular openings cut therein to register with the apertures in the air-chest and tube-sheet, the packing for the lower face of the air-chest being indicated by I and that for the upper face of the tube-sheet being indicated by J. It will thus be seen that if the tube-sheet be raised into contact with the air-chest the apertures G in the latter will register with the tubes B, and the packing-surfaces I and J will make tight joints between the parts.

In order to admit air to the distributing-chamber $d^{\times}$, we provide the partition F with one or more openings *e*, each of which is provided with a valve H, having a valve-stem *f*, which preferably extends above and below the same, the upper portion *h* extending into

a guiding recess or collar h', formed in the top plate of the air-chest, and the lower part f extending downwardly through the bottom of the air-chest and having its lower end projecting slightly below the packing I thereon. Each of the valves H is provided, preferably, with a spring to hold it upon its seat, a coiled spring g being shown surrounding the upper part h of the valve-stem.

Q represents one of the pattern-cards for controlling the movement of the pistons C and their connected warp-carrying rods D and warp-threads b. These cards are adapted to be placed upon the top of the tube-sheet A between the guide-rods K while the tube-sheet and the air-chest are separated, as shown in Figs. 1, 2, and 3, and each card is provided with perforations adapted to register with the tubes, the warp-threads of which are to be depressed in forming the shed. We also provide each card with a smaller aperture for the passage of each of the valve-stems f, which are above the position occupied by the card when in operative position, one such aperture being shown centrally in Fig. 2.

It will be seen that when the tube-sheet, with a card Q laid upon it, is raised into contact with the bottom of the air-chest the lower ends of the valve-stems f f will engage the elastic packing J of the tube-sheet when the card is very close to the packing-sheet I and will, by reason of the spring-pressure and air-pressure exerted upon said valves in the compression-chamber, be forced into said elastic packing J until the card Q has been made to engage the packing I sufficiently to prevent the escape of air laterally between the parts. The further pressure of the rising tube-plate will cause the springs g of the valves H to yield and open the valves, admitting compressed air from the compression-chamber c to the distributing-chamber $d^{\times}$, and thus through all of the openings G in the air-chest which are not closed by solid portions of the card Q to the respective tubes B, registering therewith. The effect of this will be to depress the pistons of said tubes and the warp-rods and warp-threads controlled by said pistons.

The air-chest E will be supplied with compressed air from any suitable source of power by means of a pipe S, attached to a nozzle R on the air-chest, as shown in Fig. 1. The air-chest will ordinarily be provided with two nozzles R, as shown, so that several machines may be connected and supplied continually with compressed air, if desired.

We prefer to continue the upward movement of the tube-sheet A after it has effected a connection with the air-chest, thereby lifting the air-chest bodily with it. In lowering the tube-sheet the air-chest will descend with it until it comes in contact with the brackets k k, when it will be arrested, while the tube-sheet descends a little farther, thereby separating the parts at l to permit the pattern-cards to be moved on and adjusted, and also to permit the tubes B, the pistons of which have been acted upon by compressed air, to exhaust and allow the pistons to be returned by their retracting-springs T. As soon as the air-chest comes to rest and the tube-sheet begins to separate therefrom the pressure on the lower ends of valve-stems f will be relieved and the valves H will instantly close, shutting off the communication between the two chambers and preventing waste of the compressed air.

In order to give the proper movements to the tube-sheet, we have shown a lifting-shaft P supported in the main frame of the loom and provided with lifting-cams O, which are adapted to engage the lower ends of parts connected with the tube-sheet, in this instance a pair of lifting-arms L, secured to the tube-sheet jaws at M, and provided at their lower ends with antifriction-rolls N to engage the cams O.

The operation of the device is as follows: The parts being in the position shown in Figs. 1, 2, and 3, the lifting-arms L L resting upon the concentric portions m m of the cams, a pattern-card is inserted between the tube-sheet and the air-chest and the lifting-shaft is started, thereby raising the tube-sheet and with it all of the warp-threads b carried by the warp-rods D D. When the card Q is clamped between the tube-sheet A and the air-chest E, as before described, the valves H will be opened and compressed air admitted to certain of the tubes B, determined by the positions of the apertures in the pattern-card, thereby depressing the pistons in said tubes and the warp-threads connected therewith. The continued upward movement of the tube-sheet, carrying with it the air-chest, lifts the warp-threads the pistons of which have not been operated upon, while those whose pistons have been operated upon by the compressed air are held down, thereby forming the shed, through which the shuttle is driven. As the tube-sheet descends the air-chest is stopped by the brackets k k, the parts separate, and the pistons of the depressed warp-threads are drawn up by their springs T, thereby restoring all the warp-threads to their original positions.

The extent of the upward movement of the tube-sheet and the downward movement of the pistons in their tubes are substantially equal, and together give the warp-threads the extent of separation desired to form the shed.

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

1. In a loom, the combination with a series of cylinders disposed perpendicularly to the warp-threads, and in line therewith, of a piston in each cylinder, operatively connected directly to one of said warp-threads, means for supplying a fluid under pressure to said cylinders, and controlling devices for said fluid supply, substantially as described.

2. In a loom, the combination with a series of cylinders disposed perpendicularly to the warp-threads, each of said cylinders being in line with one of said threads, of a piston in each cylinder operatively connected with its respective warp-thread, compressed-air-supplying devices for all of said cylinders, and a perforated pattern-card, adapted to be interposed between said air-supplying devices and said cylinders, substantially as described.

3. In a loom, the combination with a series of cylinders disposed perpendicularly to the warp-threads, each of said cylinders being in line with one of said threads, a piston in each cylinder operatively connected with its respective warp-thread, means for supplying compressed air to all of said cylinders, means for controlling the admission of air to each cylinder, and lifting devices for elevating said cylinders, substantially as described.

4. In a loom, the combination with a series of cylinders, disposed perpendicularly to the warp-threads, each cylinder being in line with one of said threads, of a piston in each cylinder, operatively connected with its respective warp-thread, compressed-air-supplying devices for all of said cylinders, a perforated pattern-card, adapted to be interposed between said air-supplying devices and the said cylinders, and lifting devices for elevating said cylinders, substantially as described.

5. In a loom, the combination with a series of cylinders disposed perpendicularly to the warp-threads, each of said cylinders being in line with one of said threads, a piston in each of said cylinders operatively connected with its respective warp-thread, retracting devices for said pistons, compressed-air-supplying devices for all of said cylinders, a perforated pattern-card adapted to be interposed between said air-supplying devices and said cylinders, and lifting devices for elevating said cylinders, substantially as described.

6. In a loom the combination with the warp-thread carriers, of a cylinder, and a piston therein operatively connected with each carrier, a compressed-air chest provided with delivery-apertures adapted to register with said cylinders, and means for separating said cylinders and air-chest to permit the insertion and removal of a pattern-card and a perforated pattern-card, substantially as described.

7. The combination with the tube-sheet provided with a plurality of tubes or cylinders, a piston in each of said cylinders, and a warp-thread carrier connected with each of said pistons, of the compressed-air chest, provided with a series of discharging-apertures adapted to register with said tubes, and means for moving said tube-sheet into and out of engagement with said air-chest and controlling devices for the air supply, substantially as described.

8. The combination with the tube-sheet provided with a plurality of tubes or cylinders, a piston in each of said cylinders, and a warp-thread carrier operatively connected with each of said pistons, of a compressed-air chest provided with apertures adapted to register with said tubes, and having guiding projections engaging guiding-recesses in said tube-sheet, and means for moving said tube-sheet into and out of engagement with the air-chest and controlling devices for the air supply, substantially as described.

9. The combination with the tube-sheet, the tubes or cylinders, pistons in said cylinders and warp-thread carriers operatively connected with said pistons, of the air-chest provided with a compressed-air chamber, and a distributing-chamber, said distributing-chamber having apertures adapted to register with said tubes or cylinders, controlling-valves for admitting air from said compressed-air chamber into said distributing-chamber, said valves having operating parts extending outside of the air-chest and adapted to be engaged by the tube-sheet, and means for moving said tube-sheet into and out of engagement with the air-chest, substantially as described.

10. The combination with the vertically-movable air-chest provided with a series of delivery-apertures and stationary supports for engaging parts connected with said air-chest and limiting its downward movement, the tube-sheet supported normally below said air-chest, leaving a space between them for the insertion and removal of a perforated pattern-card, said tube-sheet being provided with a series of tubes or cylinders adapted to register with the openings in said air-chest, pistons in said cylinders and warp-thread carriers operatively connected with said pistons and means for raising said tube-sheet and air-chest, a perforated pattern-card, and controlling devices for the air supply, substantially as described.

11. The combination with the air-chest having a compressed-air chamber and a communicating distributing-chamber provided with a series of discharge-apertures, controlling-valves for the communications between said chambers, having their stems projecting below the bottom of the air-chest, a tube-sheet supported normally below said air-chest, and provided with a plurality of tubes or cylinders adapted to register with said apertures in the air-chest when the parts are brought together and packing-sheets secured to the meeting faces of said parts having apertures therein registering with the said apertures and tubes, substantially as described.

12. The combination with the vertically-movable air-chest provided with a series of discharge-apertures and stationary supports for limiting the downward movement of said air-chest, of the tube-sheet normally supported below the air-chest, provided with a series of tubes or cylinders adapted to register with said apertures, a piston and warp-thread car-

rier for each tube or cylinder, said air-chest having guiding portions adapted to engage the tube-sheet to prevent lateral movement of one with respect to the other, and lifting devices operatively connected with the tube-sheet for raising it a greater distance than the distance between the tube-sheet and air-chest, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

ROBERT CUSCADEN.
W. F. POIESZ.

Witnesses:
J. B. CONGDON,
GEORGE W. MYERS.