Sheet 1, 3 Sheets.

L. Van Riper.

Loom.

No. 12,565.

Patented Mar. 20, 1855.

Fig: 2.

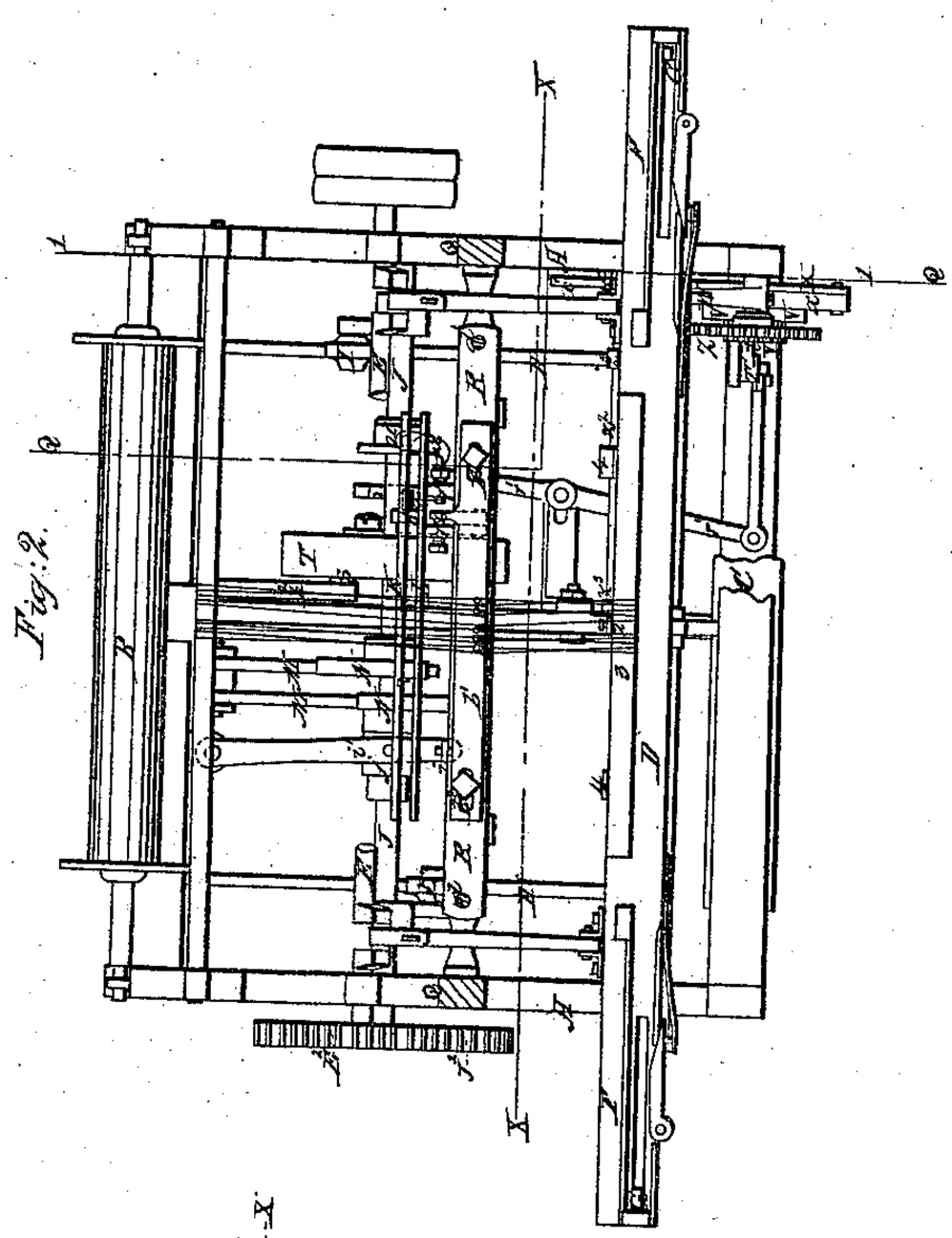
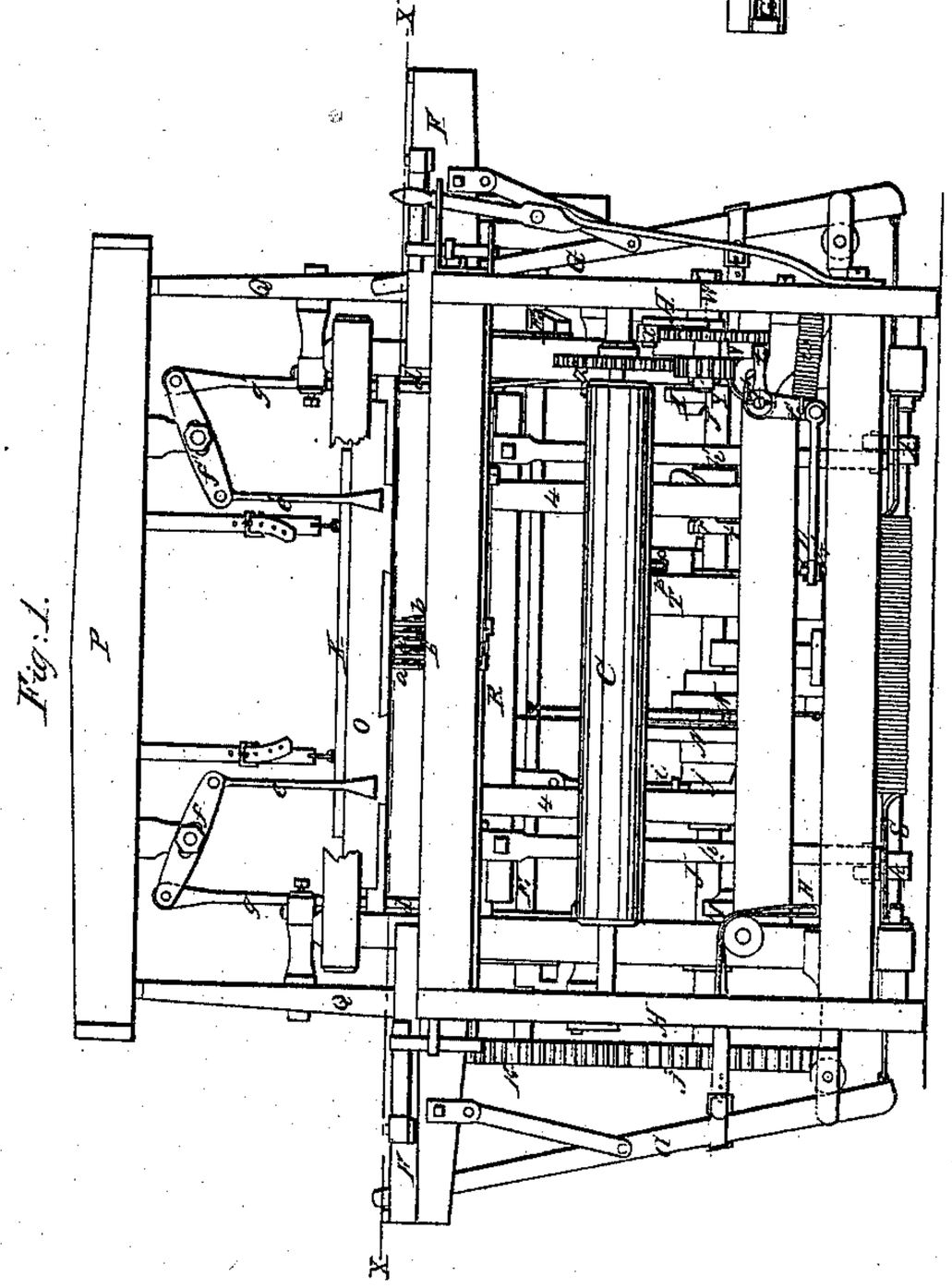


Fig: 1.



Sheet 2, 3 Sheets.

L. Van Riper.

Loom.

No. 12,565

Patented Mar. 20, 1855.

Fig: 1.

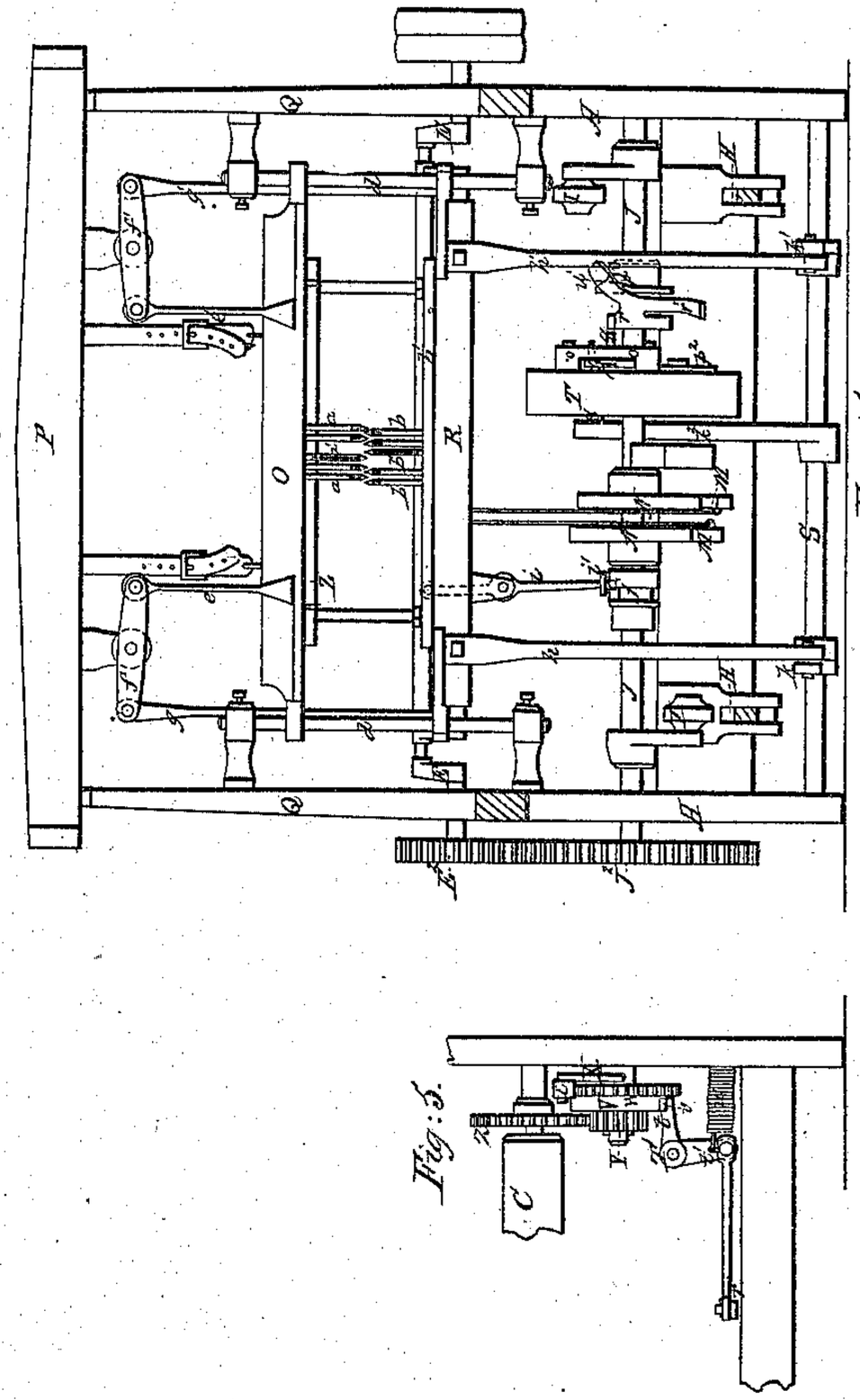


Fig: 1*.

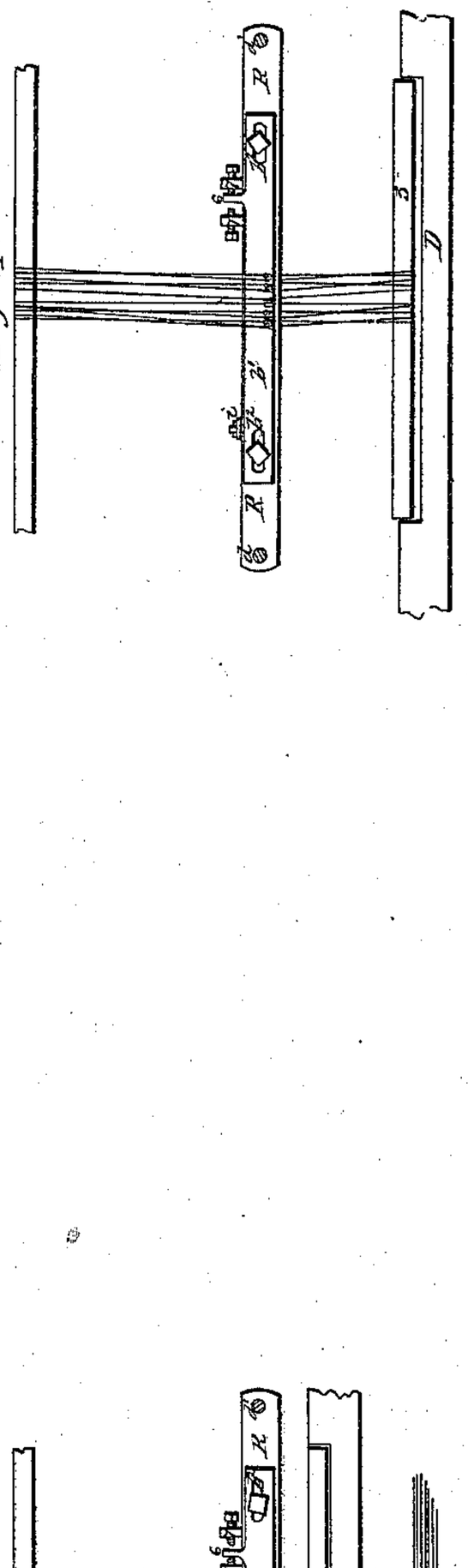


Fig: 5.

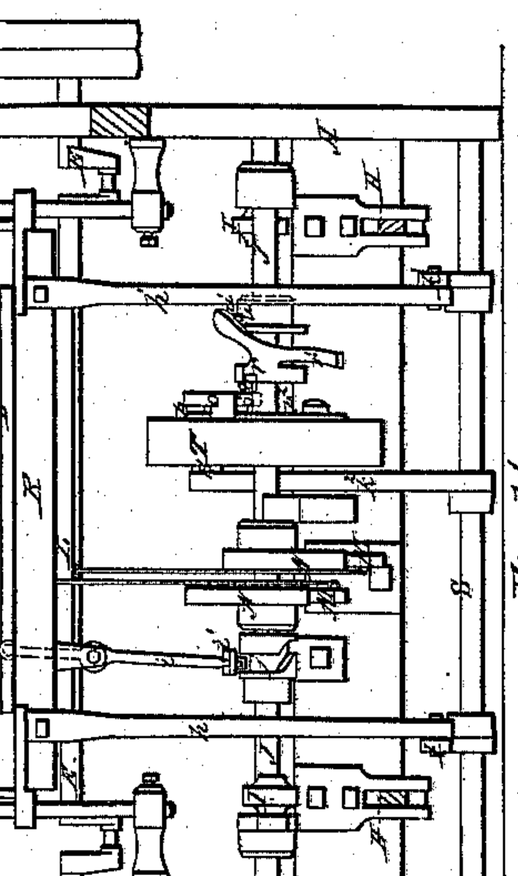
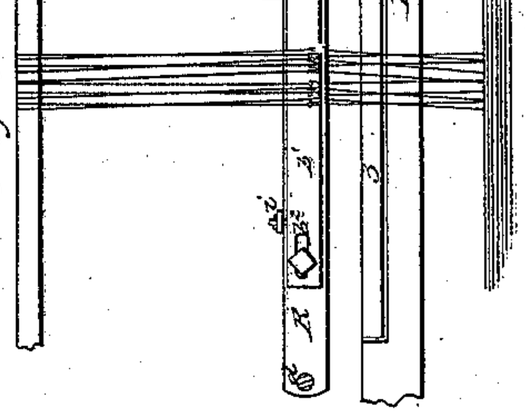


Fig: 3.

Fig: 3*.



Sheet 8, 8 Sheets.

L. Van Riper.

Loom.

No. 12,565. Patented Mar. 20, 1855.

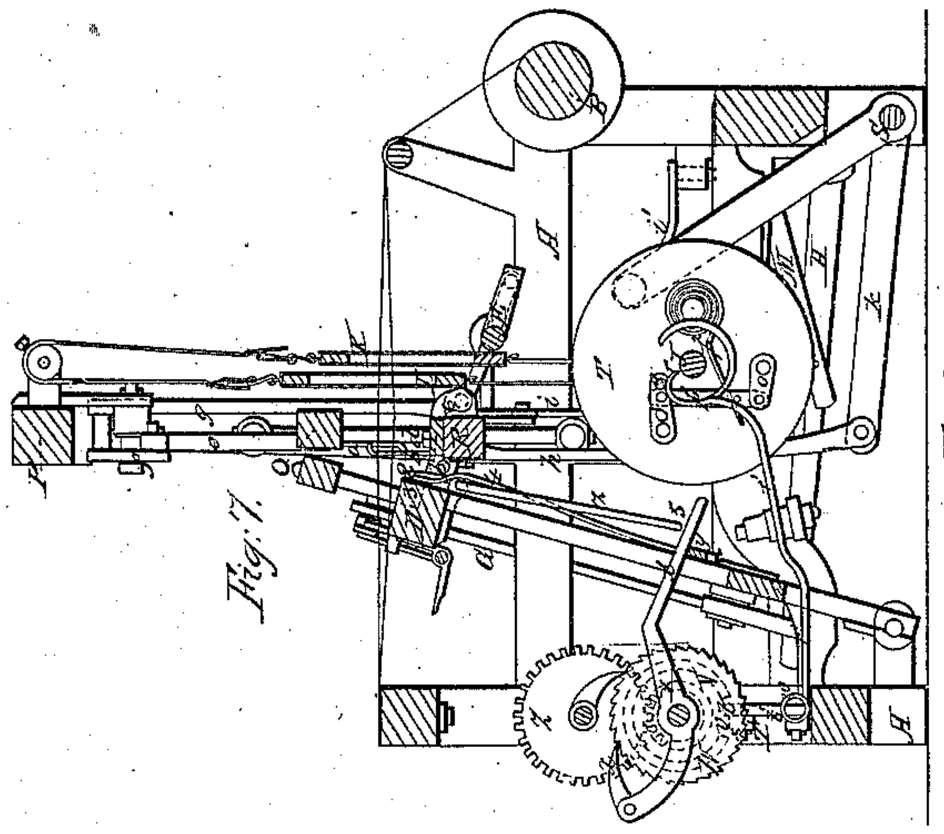


Fig. 7.

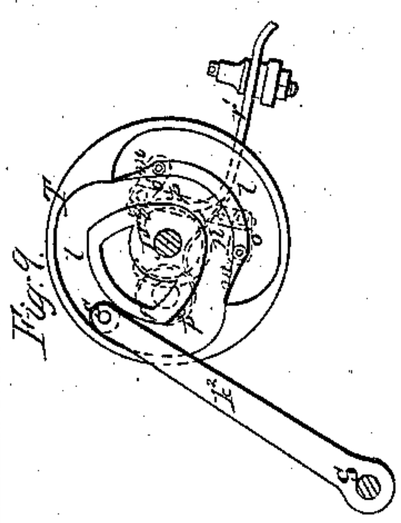
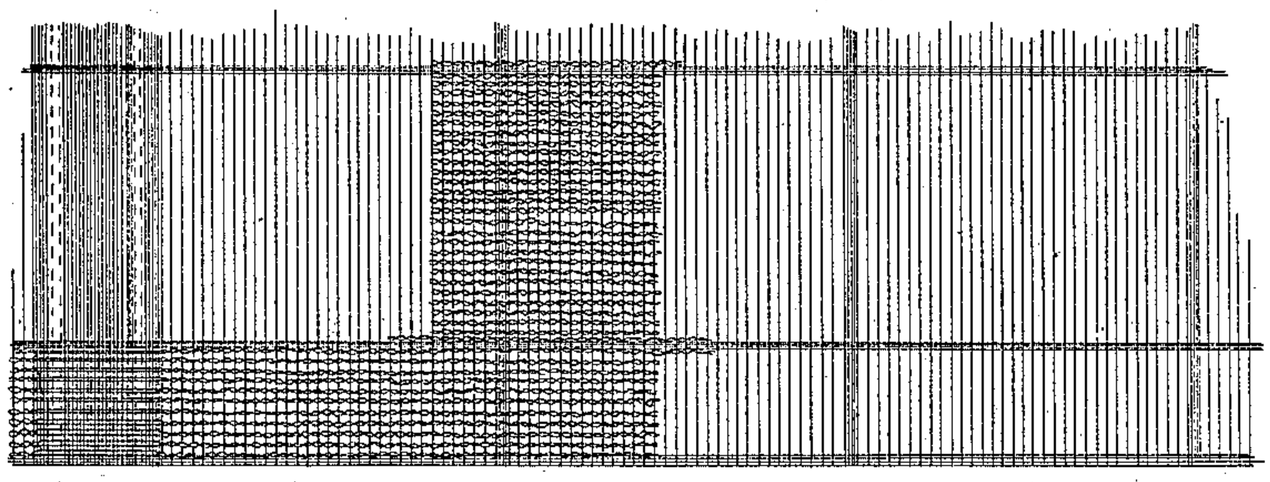


Fig. 9.



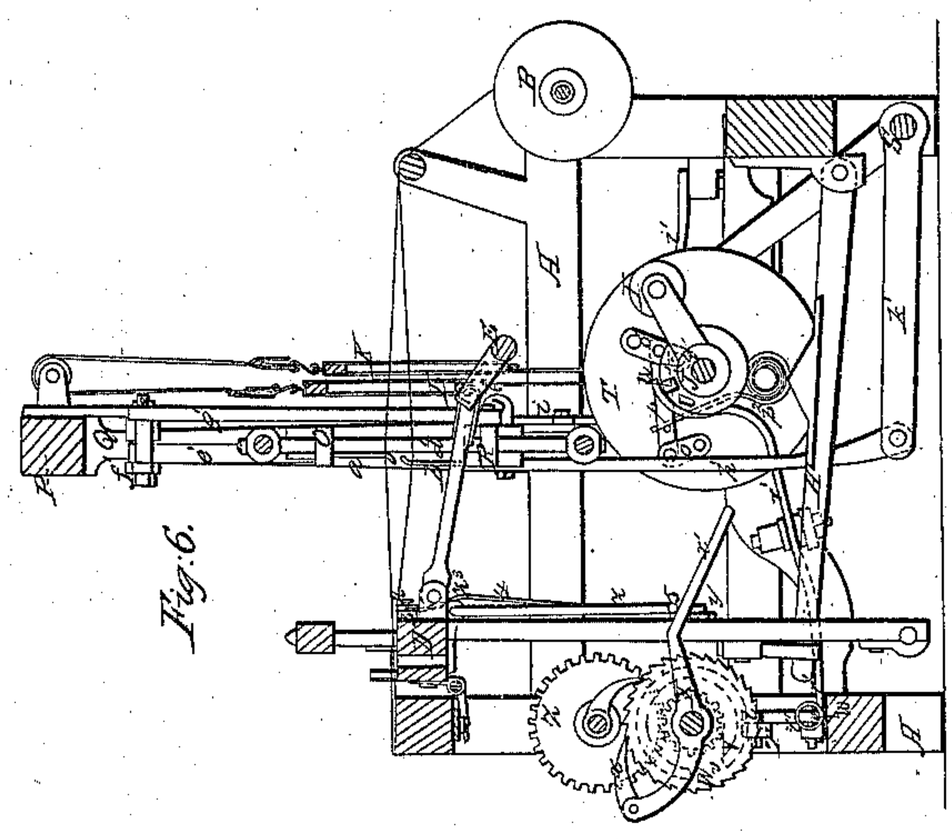


Fig. 6.

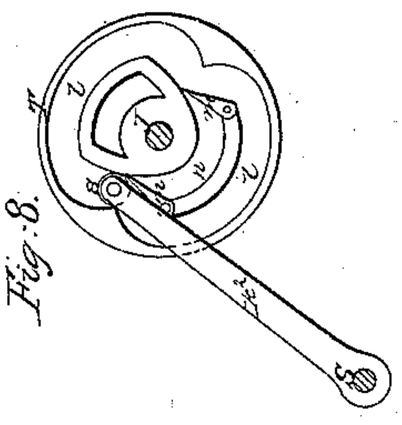


Fig. 8.

UNITED STATES PATENT OFFICE.

LEWIS VAN RIPER, OF SPRING VALLEY, NEW YORK.

LOOM.

Specification of Letters Patent No. 12,565, dated March 20, 1855.

To all whom it may concern:

Be it known that I, LEWIS VAN RIPER, of Spring Valley, in the county of Rockland and State of New York, have invented certain new and useful Improvements in Looms for Weaving Gauze Fabrics, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings of the same, which make part of this specification, and in which—

Figure 1 represents a front elevation of a loom embracing my improvements. Fig. 2, represents a horizontal section taken at the line *x x* of Fig. 1. Fig. 3, represents a vertical section taken at the line # # of Fig. 2. Fig. 4, represents a similar section with the parts in a different position from that seen in Fig. 3, and Figs. 3′ and 4′ represent sections showing the positions which the intertwisting needles respectively occupy in Figs. 3 and 4, the red and blue lines indicating the warp threads and manner in which they are intertwined with each other right and left. Fig. 5 represents a view of the mechanism for turning the cloth roll to wind up the cloth. Fig. 6 represents a transverse section at the line 1, 1, of Fig. 2. Fig. 7 represents a similar section at the line ♀ ♀ of Fig. 2. Fig. 8 represents the cam with its gates closed, so that the traversing pin and its lever, must make two vibrations to every revolution of the cam, and Fig. 9, represents the cam with its gates open, so that the pin can traverse only one half of the groove *l*.

My invention and improvement relates chiefly to those parts of the loom which are concerned in working the warp threads, and it consists in intertwining these threads by means of needles having a compound motion, instead of using harness or doups for this purpose as heretofore.

My invention further consists in making the ends of the needles for working the warp, thin and crooked to facilitate the passage of the points of the needles of one series between the threads passing through those of the other series to intertwist the threads carried by the two series of needles. Further the bending of the points of the needles over the threads which they carry, shields those threads and guides the points of the needles of the other series, past them.

My invention further consists in arranging these needles in two series, and giving to one or both series a compound lateral and longitudinal motion to intertwist the warp-threads, and at the same time open a shed for the passage of the shuttle with the weft thread.

My invention further consists in so arranging and operating the mechanism for working the needles that they will at proper intervals omit the intertwisting of the warp threads and simply elevate and depress them to form a shed and weave plain cloth, in order that the fabric may consist of alternate transverse stripes of gauze and plain cloth.

My invention further consists in so arranging and operating the two series of needles, that they will produce a series of longitudinal stripes of gauze, while a pair of heddles working in connection with the needles will produce a series of stripes of plain cloth, each stripe of the plain fabric being between, and connecting two adjacent stripes of gauze. By means of this and the last recited contrivance, the web will be transveresly and longitudinally striped so as to form a reticulated plain fabric, with the interstices filled gauze.

My invention further consists in certain new combinations of devices for effecting certain objects which devices and their combinations will be hereafter more particularly described.

The accompanying drawings represent a loom having my improvements applied thereto.

The frame (A) is of the usual form and materials. It supports a yarn beam (B) at the back, which carries the warp threads and a cloth roll (C) at the front, on which the cloth is wound up as fast as it is woven. The winding up of the cloth regulates the delivery of warp from the yarn beam, which is prevented from turning too freely, by a pace or friction brake.

The lay (D) and crank shaft (E) which gives it motion, the shuttle boxes (F), picker staffs (G) treadles (H) for driving the picker staffs, and wipers (I) on the cam shaft for giving them motion, may be of the usual construction. The crank shaft (E) and the cam shaft, J, are geared together by the wheels (E^2 and J^2) which bear such proportion to each other that the crank shaft will revolve twice to the cam shaft once, as in looms for plain weaving.

The loom is provided with a pair of heddles (K and L) of the usual construction

operated by treadles (M) and cams (N) in the usual manner so as to open a shed at each beat of the lay and if the action of these heddles upon so much of the warp threads as are passed through them, is not counteracted or modified, plain cloth will be the result. But a small portion of the warp threads are passed through the heddles while the greater part of them are passed through the eyes of a series of needles (*a* and *b*) placed in front of the heddles, though every alternate thread of that part of the warp which is to be woven into gauze fabric is passed through these needles. The purpose of these needles is to intertwist together between each weft thread alternately to the right and left every pair of warp threads passed through them; that is one thread of the upper series of needles and the corresponding thread of the lower series are intertwisted or twined together to the right after one weft thread has been thrown, and to the left after the next weft thread is thrown. To produce this effect of intertwisting the warp threads between the weft threads, it is only necessary that the warps of the two series of needles should be crossed at every second pick, for their return from the crossed to the parallel state produces the reversed twining.

The upper series of comb teeth or needles (*a*) is attached to and project downward from a bar (O) which is free to be moved up and down on the guide rods (*d* and *d'*) which pass through it or through lugs on its ends. From the upper side of this bar, two flexible or jointed standards (*e* and *e'*) project, which are pivoted to the inner end of small balance beams (*f f'*) whose fulcra are on arms depending from the beam (P) which connects the standards (Q) that rise up from the sides of the loom frame to support the harness. The lower series of needles (*b*) rest upon a second cross bar (R) which is also free to slide on the rods (*d d'*) and is guided thereon in the same manner as the upper bar O. The lower bar is connected by link rods (*g g'*) to the outer ends of the balance beams (*f f'*). Under this arrangement, when one of the bars with its series of needles, is depressed, the other will be simultaneously elevated. This elevation and depression is effected in this instance by connecting the lower bar (R) by means of link rods (*h h'*) to the extremities of arms (*k k'*) that project from a rock shaft (S) which derives motion from a cam T on the cam shaft (J), which cam is of peculiar construction. This cam is of the grooved variety and its groove (*l*) in shape very nearly resembles the figure 8, so that a pin (*s*) on the end of the lever or arm (k^2) which traverses this groove, will give to the arm two reciprocating motions or vibrations for each revolution of the cam. This groove (*l*) in the cam is capable of being changed in form by means of a pair of hinged shutters or gates (*m*) so that the pin (*s*) after traversing one half of the figure 8 will pass over by a cross groove (*n*) and retrace its path through the same half of the figure instead of traversing the other half. When the cam is thus made to pass by or skip one half of the groove (*l*), the arms (k^2) only makes one vibration to one revolution of the cam shaft. The vibrations of the arm (k^2) are made to vary so as to give a variable motion to the needles from and toward each other for a purpose that will be hereafter explained.

The journals on which the gates (*m*) turn extend through the cam to the side opposite the grooves and have cranks (*o o'*) formed on their ends and these cranks are connected by means of a rod (*p*), so that the gates may be simultaneously opened and closed. One of these cranks (*o'*) is longer than the other and fitted with a pin (*q*) which under certain circumstances strikes a spiral guide or cam (*r*) on the end of a lever (*r'*) which by its peculiar shape operates to turn the cranks about 60° of a circle more or less, so as to open and close the gates (*m*) and thus vary the shape of the groove. When the lever is turned so as to bring the guide (*r*) without the range of motion of the wrist pin (*q*), the cam pin (*s*) traverses the whole groove (*l*); but when the guide is brought within the range of motion of the pin (*q*), the latter runs on it as shown in Figs. (7 and 9), and opens the gates, which are closed immediately after the passage of the pin (*q*) around the guide by the spring (p^2) which bears on one of the cranks or their connecting rod when the cam pin only traverses half the groove (*l*). The guide (*r*) is moved into and out of range of the revolution of the crank pin (*q*) by means of the joint action of a cam (U) on the cam shaft and a cam (V) on the side of the ratchet wheel (W) by which the cloth beam is turned to wind up the cloth as fast as it is woven.

The cam (V) on the ratchet wheel is a segment of a ring of about seven eighths of a circle. The office of this annular segment is to hold down one arm (*t*) of a bell crank (T') which holds the other arm (*t'*) in a position more remote from the ratchet wheel than if the arm (*t*) were not held down. This holds the front extremity of the lever (*r'*) toward the middle of the loom, and keeps its opposite end with the guide (*r*) out of the range of the crank pin (*q*), and the pin *u* projecting from a branch arm of the guide out of the range of the cam (U).

When the space (*v*) between the ends of the annular segment (V) is brought over the arm (*t*) of the bell crank, a spring (*w*) acting upon the arm (*t'*) will pull it toward

the ratchet wheel, and cause the other arm to rise and enter the notch or space between the ends of the segment. This will draw the front end of the lever (r') toward the ratchet wheel (W) and move its opposite end toward the cam, bringing the guide scroll (r) within the plane in which the crank pin (q) turns, and turning the pin (u) within the plane described by the projection (u') of the cam (U); so that the gates (m) in the grooves (l) of the cam will be opened to allow the cam pin to traverse one part of the groove, and then cross back and retraverse it again, making a single vibration of the arm for one revolution of the cam, instead of allowing the pin (s) to pass around both ends of the groove, and give two strokes or vibrations to the arm for one revolution of the cam.

The arm (t) remains in the space or notch (v) except for an instant during each revolution of the cam (U) when it strikes the pin (u) in passing, and turning the lever (r') withdraws the arm from the notch for an instant, which will permit the ratchet wheel to turn, if the requisite number of weft threads have been woven into the web to make a transverse stripe of plain cloth of the width required, which in the example of cloth represented in the drawings is five weft threads.

The ratchet wheel (W) is turned, and the cloth wound up by means of a ratchet arm (x) on a vibrating lever (X). This lever is bent at the point so that a portion (x') of its outer end is inclined to the radius of the arc in which the lever turns. This inclined end of the lever passes between a pin (y) projecting from the side of the sword of the lay, and another pin just above it which projects from the side of an arm (z) so that when the lay moves forward to beat up the weft, the pin (5) will press against and slide along the upper side of the inclined part of the lever, and depress it, which will have the effect of pushing forward the ratchet and turning the wheel (W) which turns the pinion (Y) that gears into a wheel (Z) on the cloth roll (C) and winds it up. On the return back of the lay, the pin (y) will strike and slide along the under side of the inclined part (x') of the lever, elevating its inclined end, and depressing the opposite end which will pull back the ratchet, ready to be again pushed forward to turn the wheel (W) and the notch on the next forward stroke of the lay. The arm (z) projects down from a shaft (z^2) on the back of the lay, which rests in bearings in brackets (z^3). Another arm (2) projects upward from this shaft (z^2) and is jointed to a bar (3) on the lay, to which the reed is attached. This reed bar (3) is constantly pressed forward by two springs (4) on the back of the lay, and when the weft thread is beaten up, the reed will yield and press these springs back which protects the web from being beaten up too forcibly by the reed, and also insures its being beaten up equally provided the cloth is taken up at the same speed with which it is woven. This take up is insured by making the yielding of the reed wind up the cloth. This is done by the bar pressing the arm (z) back, when the reed strikes up the weft. The resistance of the weft to being beaten up turns the arm (z) with its pin, forward, and causing it to turn the lever down, if the reed should not be forced back, the pin (5) would remain so far back of the inclined end of the lever (x') that it would not press it down on the forward movement of the lay, and therefore on that beat no winding up would take place, although a weft thread would be put in. Now this will render the explanation of the unequal feed easy.

Where the warps are twined together the weft threads can not be beaten nearly so close together as where the warps are not twined; therefore, whenever the arm (t) of the lever (T') drops into the notch (v) of the cam (V) and the twisting of the warps ceases, the reed will meet with less resistance in beating up the weft, and but little if any winding up of the cloth will take place until a sufficient number of additional weft threads are thrown across to compensate the twining, which, in the example of cloth, shown in the drawing is five picks, when the feed will be resumed and the notch of the cam turned past the arm (t) while the latter is withdrawn by the cam (U) as hereinbefore described, and gauze will again be woven until the notch (v) of the cam again comes around to the lever and suspends the twining. In this way the feed is varied in the proper manner, and at the proper time, by the automatic action of the machinery itself.

The needles for twisting the warp are of two kinds, one (a' & b') with long eyes or mails, the other (a & b) with short eyes. Those with short eyes are designed to move the warp threads back and forth whenever they move, while those with long eyes are designed to move the warps in one direction only, to move freely over the warps in the other direction without moving them. The eyes of these needles are at a short distance from their ends, and the end from the eye outward is beaten into the form of a thin wedge, and bent as represented, while the shank of the needle is round or of any other suitable form. These needles are fastened by the end most remote from the eye to a stock or bar ( ) so that each series of needles with its stock resembles a comb.

The needle bars or stocks have a series of equidistant holes set out for the needles and

a sufficient number of the long eyed needles are set in at one end to make a strip of plain cloth of the required width for the selvage. Next a series of short eyed needles are placed in the stock, omitting one hole adjacent to the long eyed needles, for the purpose of permitting the lengthwise stripes to be woven in the web without crossing the thread. The number of short eyed needles thus placed must correspond to the number of meshes required in the stripe of gauze. Next, a long eyed needle is inserted, then a space of one hole is left, and another series of short eyed needles are inserted, and so, these operations are repeated until the comb is complete. The upper comb of needles should be commenced to be inserted at the opposite end of the stock from that at which those in the lower comb are inserted in order that the long eyed needles may be placed at opposite sides of the spaces in the two combs. The hooks of the needles in the two combs are turned toward each other, and the shanks of the two series stand in parallel planes but which do not meet or touch, and this is for the purpose of preventing the cutting or jamming of the warp threads that would take place if the needles of one series moved in the same plane while passing into the spaces between the needles of the other series, instead of passing in a plane in front or behind. This arrangement also greatly diminishes the liability of the needles to get bent or entangled with the warps or with each other.

Instead of bending the point of the needles they might be made straight, and those of one series inclined toward those of the other series, so that their tapered points might overlap, as they do when bent.

The stock of the lower series of needles has a lateral as well as an up and down motion, and the object is, to carry the threads which press through the eyes of those needles, alternately to the right and left of the threads which pass through the eyes of the upper series of needles preparatory to moving them up and down to form the shed. This gives the twist between the warps. This lateral movement of the needles takes place while they are at their lowest position with the two series of warp threads separated to form a shed, and preparatory to being raised, and it is effected by means of a spring lever (i) vibrated by a cam (j) or groove around the surface of a cylinder that runs to the right and left alternately in which groove a pivot traverses, that projects from a vibrating treadle (i') to the front end of which the lever (i) is connected.

The lateral motion of the lower needle stock, is limited by an arm (6) which projects down from it between two brackets (7) having adjustable set screws to limit these vibrations of the needles. The needle stock (b') has slots (b^2) in each end through which screws are inserted to hold it upon the bar (R) and to serve as guides for the stock, to keep it sliding properly.

Having thus described my improvements, what I claim as my invention and desire to secure by Letters Patent, is,

1. Intertwining the warp threads in the manufacture of gauze fabrics, by the employment of needles having a compound motion, substantially as herein described.

2. Constructing the needles for working the warps with flat or thin and crooked ends, substantially as herein described.

3. The arrangement of the needles in two series and giving to one or both series a compound lateral and longitudinal motion, to intertwist the threads which the two carry, and at the same time open a shed for the insertion of the weft thread substantially as herein described.

4. The method herein described of working the needles so as to cause them to raise, and lower, and intertwine the warps, alternately, with simply raising and lowering them, to adopt them to weaving gauze and plain fabrics alternately.

5. The combination of the needles and heddles operating automatically substantially as herein described so as to form a web of reticulated bars or strips of plain fabric with the spaces between the bars or strips filled with gauze.

6. The combination of the yielding reed (3), the lever (z) with the pin (5) on its lower end, the pin (y) on the sword of the lay, the ratchet lever (x) with its double inclined planes (x') for the pins to act upon, and the ratchet wheel (w), with the cloth beam, for the purpose of winding up the woven fabric at a variable rate, substantially as herein set forth.

7. The combination of the mechanism for winding up the woven cloth, with the cam (V) and the intermediate devices for the purpose of effecting the requisite changes in the variable cam (T).

8. The variable cam (T) for the purpose of changing the operation of the needles, as herein set forth, to adapt them to weaving plain and gauze fabric, alternately as herein set forth.

In testimony whereof, I have hereunto subscribed my name.

LEWIS VAN RIPER.

Witnesses:
F. G. de Fontaine,
P. H. Watson.