Sheet 1-2 Sheets.

C. Miller.
Loom.

No. 64,127. Patented Apr. 23, 1867.

Fig. 1

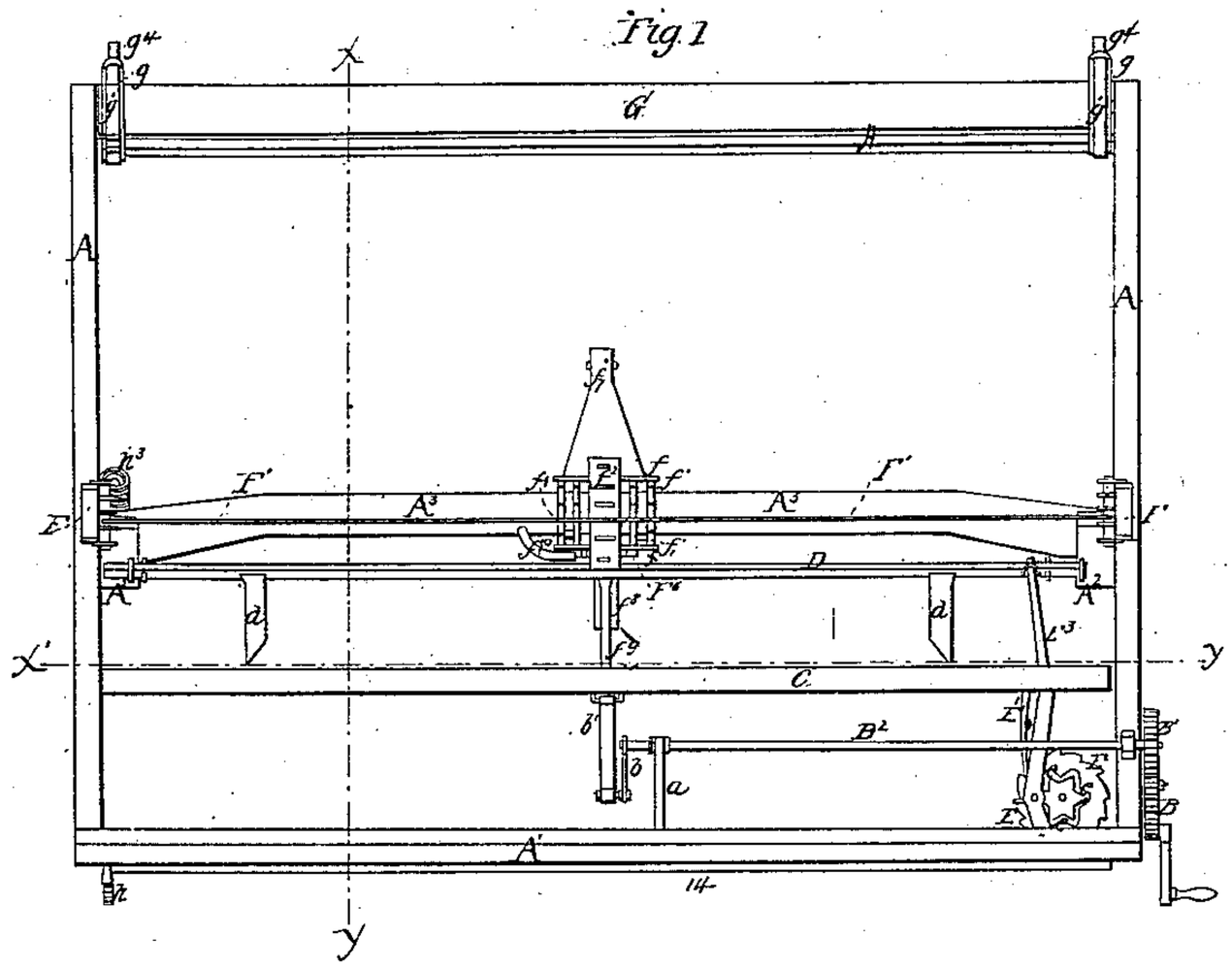


Fig. 2.

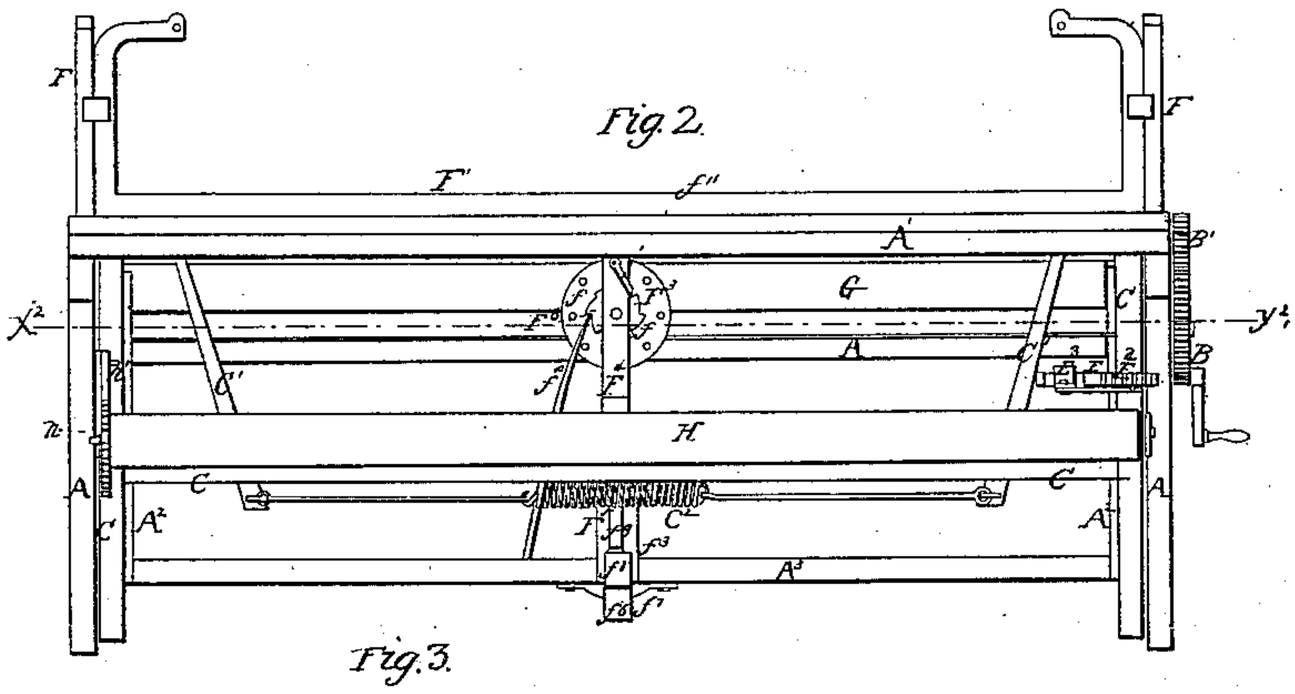
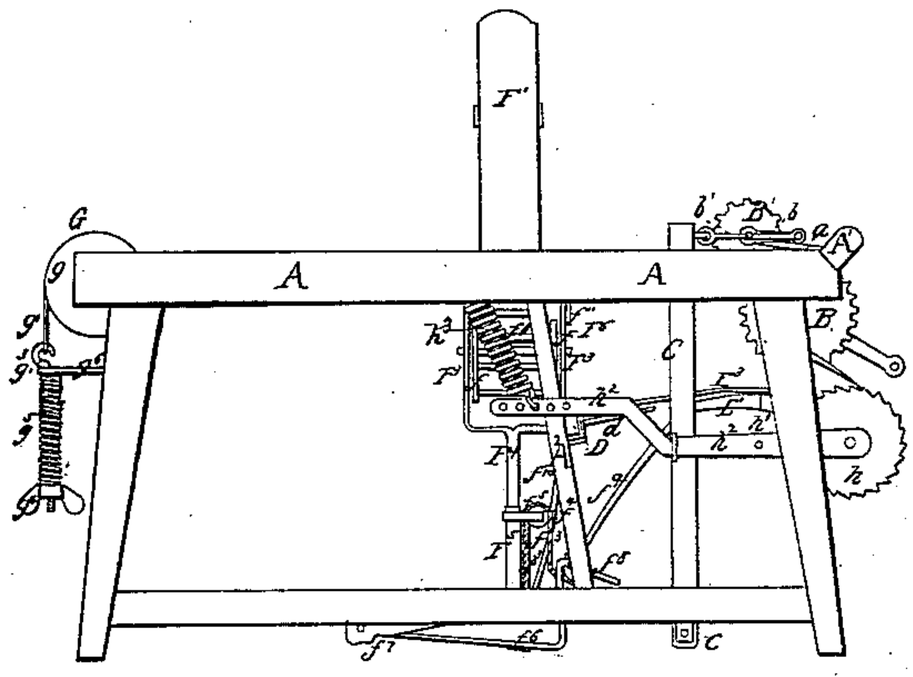


Fig. 3.



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Sheet 2-2 Sheets.

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Fig. 6.

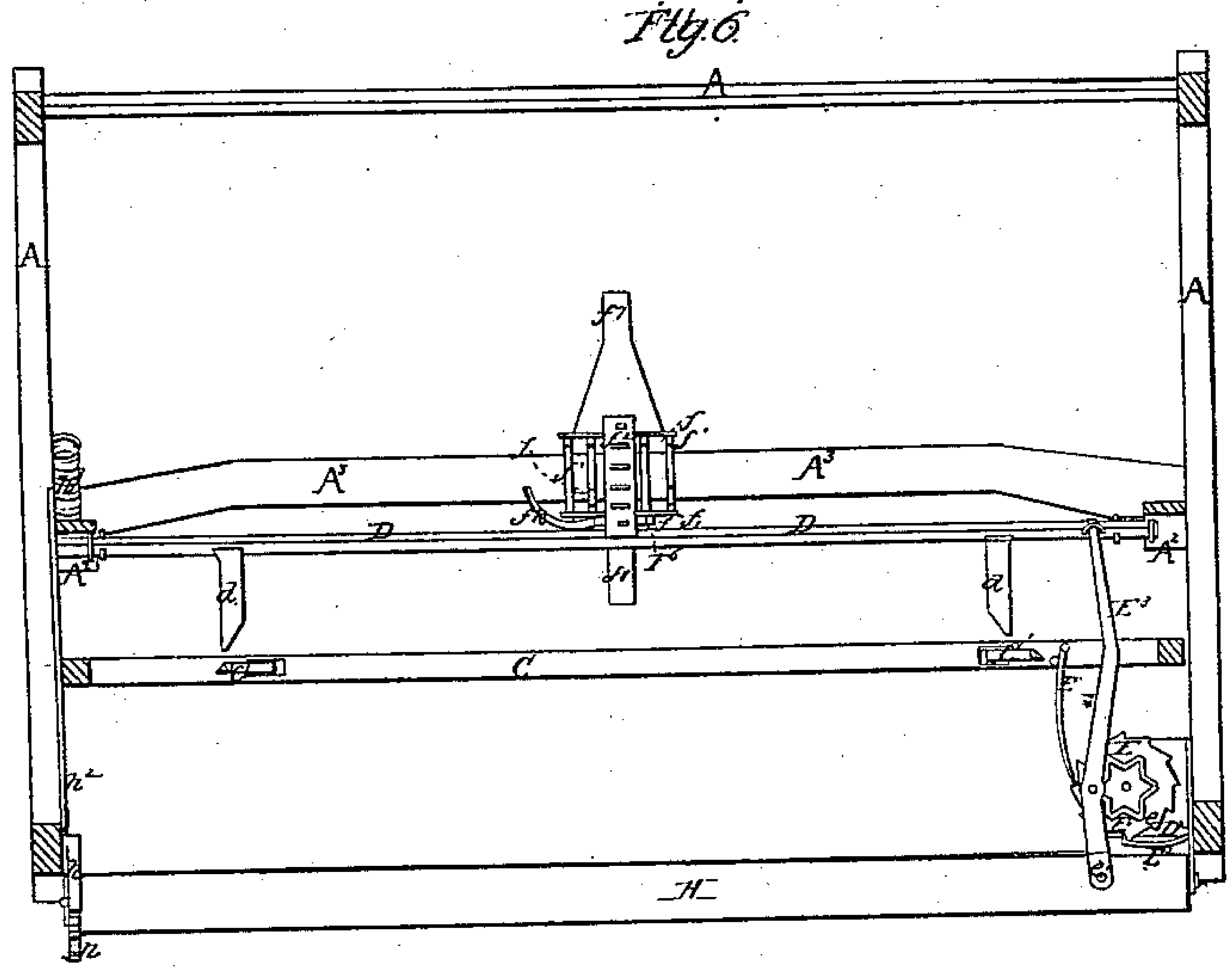


Fig. 5.

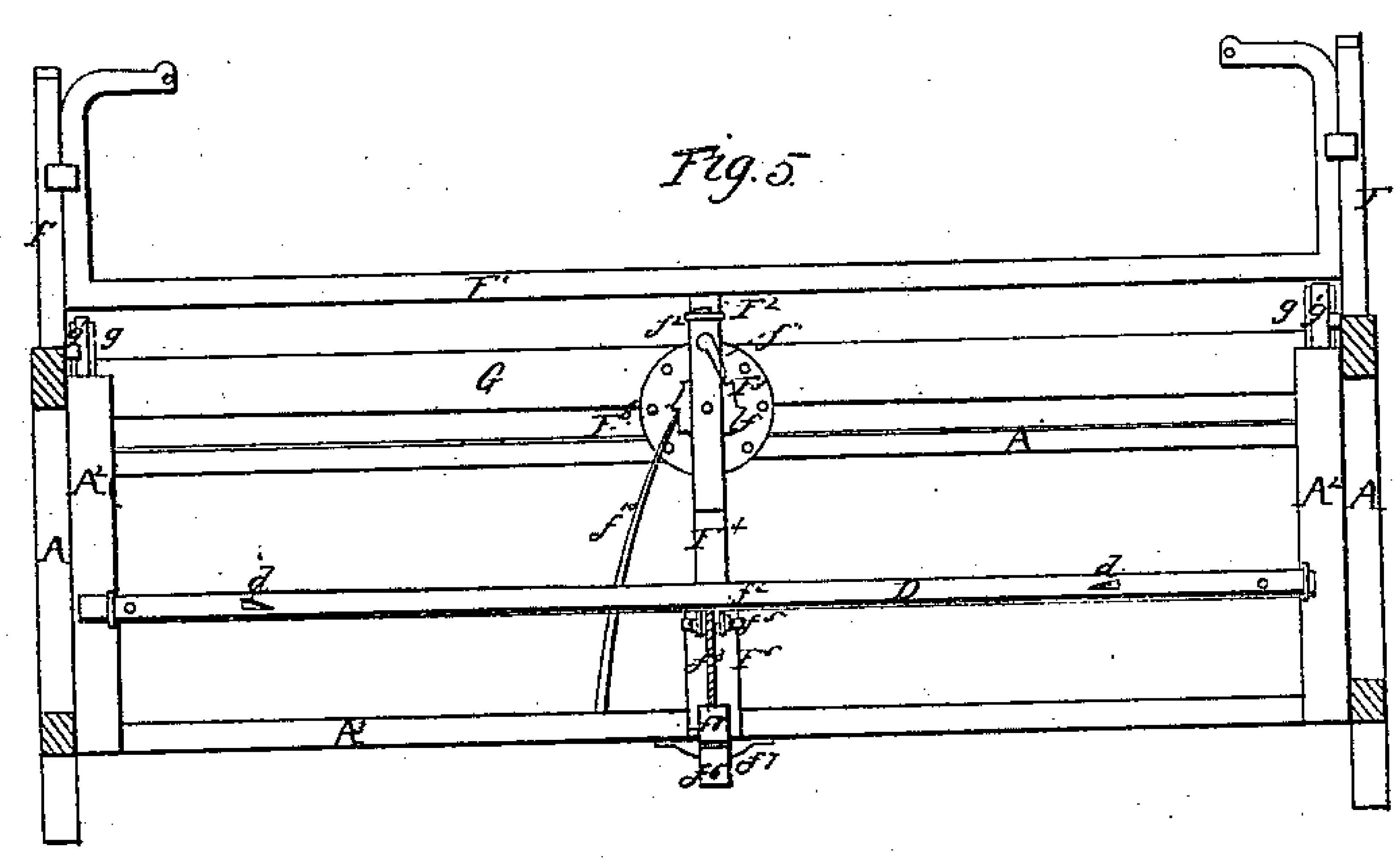
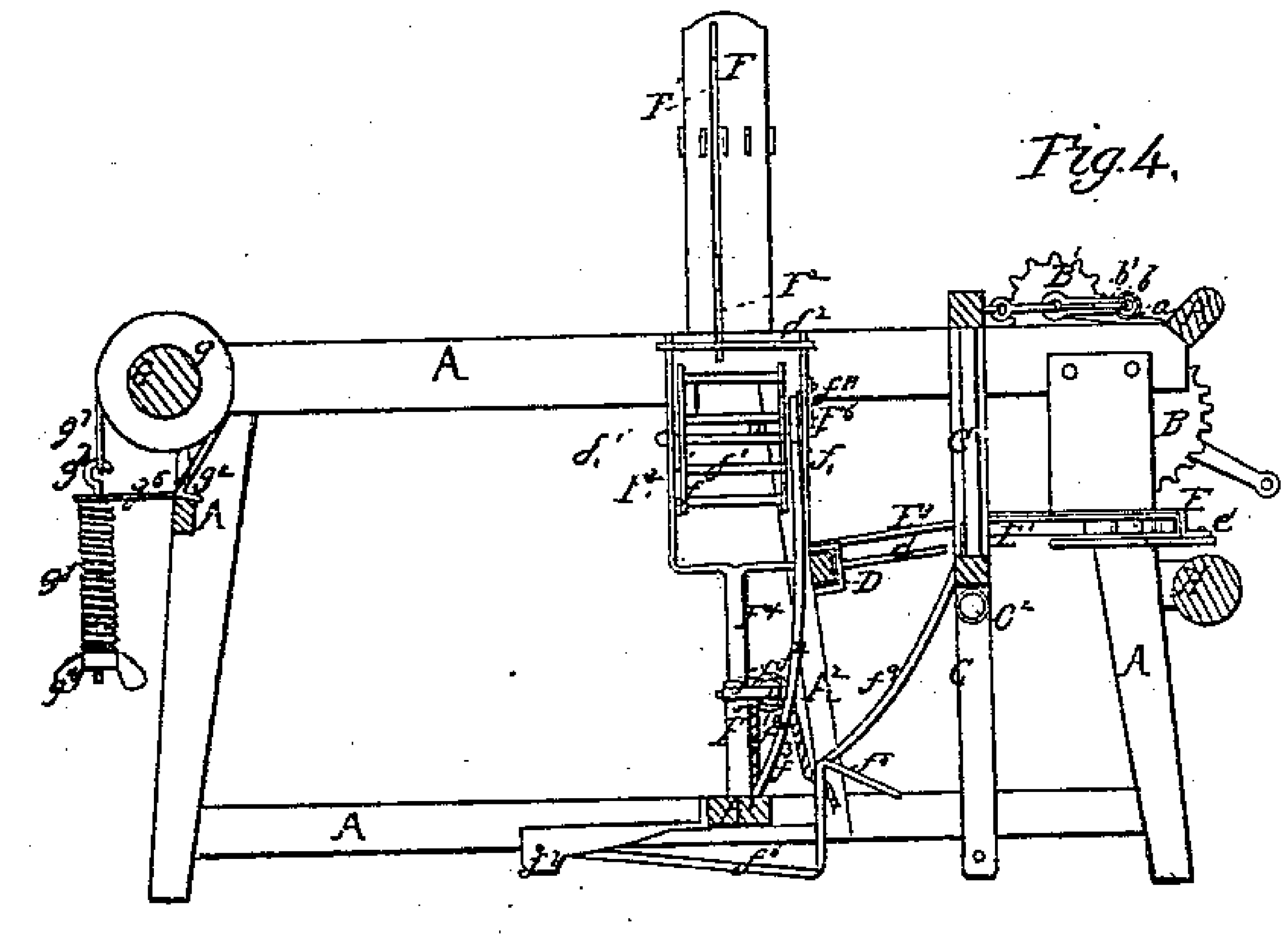


Fig. 4.



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CHARLES MILLER, OF ST. LOUIS, MISSOURI

Letters Patent No. 64,127, *dated April* 23, 1867; *antedated April* 10, 1867.

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 I, CHARLES MILLER, of the city and county of St. Louis, and State of Missouri, have invented a new and useful Improvement in Looms; and I do hereby declare that the following is a full and clear description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon.

Figure 1, sheet 1 of the drawings, is a top plan of the improved loom.

Figure 2, sheet 1, is a front elevation of it.

Figure 3, sheet 1, is an end elevation.

Figure 4, sheet 2, is a transverse section taken on the line $x\ y$, in fig. 1.

Figure 5, sheet 2, is a longitudinal section taken on line $x^1\ y^1$, in fig. 1.

Figure 6, sheet 2, is a horizontal section taken on line $x^2\ y^2$, in fig. 2.

This invention relates, firstly, to the construction and arrangement of the driving-shaft, by means of which the loom is worked; secondly, to the shifting-bar, by means of which the picking sticks are operated, so as to drive the shuttle through the warp, and also to the peculiar mechanism for driving the shifting-bar; thirdly, to the twill-governor or device for working the harnesses in such a manner as to produce regular or irregular figures in the woven fabric; and, fourthly, to the tension strap on the warp-beam, by means of which the warp is kept tight in the loom.

To enable those skilled in the art to make and use my improved loom, I will proceed to describe its construction and operation.

A is the frame, on which the other parts of the loom are constructed, and does not differ materially from the frames of looms now in use. B is a driving-wheel, which may receive its motion either from some other piece of machinery, or from hand power. The wheel B gears into the counter-wheel B^1, and communicates motion to it and its shaft, B^2. It has always been the practice in looms to place this counter-shaft entirely across the frame, and have a crank at both ends of it to drive the lay-frame C. As I intend to simplify and cheapen the loom, I place a bearing, *a*, near the centre of the beam A^1, so as to receive and support the shaft B^2 at that point, as shown in fig. 1. This shaft need not, therefore, be longer than one-half the length of the frame, and the loom will be considerably cheapened and lightened by this construction. The inner end of the shaft B^2 has a crank, *b*, which is connected by means of the connecting-rod b^1 with the lay-frame C, the upper beam of which receives a vibrating or reciprocating motion therefrom at every revolution of the crank. The lay-frame C consists of an upper and a lower beam, connected together by two end posts, on the lower ends of which are journals, which have their bearings in the boxes *c* attached to the end beams of the frame A. As the lower part of the lay-frame can only receive a rolling motion around the axis of the bearings *c*, and as its upper part or top beam receives a reciprocating motion from the crank *b*, it follows that the general motion of the lay-frame will be a rocking motion. Directly behind the lay-frame there are two posts, A^2, firmly secured to the frame A, and on the inside of its end beams. Between these two posts, or some other similar attachments of the frame A, the shifting-bar D is arranged to slide a short distance in either direction longitudinally. The two picking sticks C^1, which are intended to drive the shuttle through the warp from side to side alternately, as in other looms, are passed through mortises in the bottom beam of the frame C, and held there by a single pin, about the axis of which they vibrate. The bottom ends of these picking sticks pass below the bottom beam of the lay-frame, and are there connected by means of wires, cords, or some other such devices, with a spring, C^2, which draws the bottom ends of both of them toward the spring. The top ends of these sticks enter grooves cut in the bottom side of the top beam of the lay-frame, and, as they are driven back and forth alternately, send the shuttle through the loom in the usual manner, consequently the shuttle arrangement will not be herein minutely described. In order to work the picking sticks in the proper manner, I bevel off the outside of each of them at the point where they would strike against the shifting-stops *d*, the said stops being short studs attached to the shifting-bar D, and bevelled off on the same inclination as the bevelling of the picking sticks, as shown in fig. 6. The distance between the shifting-stops *d* is a little less than the distance between the picking sticks, so that, as the lay-frame and its picking sticks are rocked back toward the shifting-bar at each revolution of the crank *b*, one of the stops *d* will strike its picking stick, the bevelled edges of the two coming in contact with each other, and the stick sliding rapidly up on the stop, its upper end will receive a sudden jerk,

which will give the required motion to the shuttle. While one of the stops is thus moving the picking stick, the other one will be inside of its stick, which will pass it without touching at the first revolution, but before the next revolution of the lay-frame, the shifting-bar and its two stops will have changed positions, and the second stop will then move its picking stick, and so on, at each revolution of the crank *b*, one of the picking sticks will be operated, and the other one will remain stationary, each one operating alternately and the other remaining stationary. To accomplish the desired motion of the shifting-bar, I attach to some convenient portion of the frame A a ratchet, E. This ratchet may be placed in any convenient position, either before or behind the lay-frame, and it will, in either case, be operated by means of the pawl E^1, and secured by the dog E^2. The pawl E^1 is attached to the lay-frame, and at each vibration of the said frame the ratchet will be moved up a certain distance, care being taken in the construction of the ratchet, and the teeth of it so arranged that when the pawl leaves one tooth it will drop back into another notch or tooth, and then move the ratchet forward without any lost forward motion of the pawl. In the face of the ratchet there is a star-shaped groove, *e*, and the lever E^3, connected with its fulcrum at e^1, and with the shifting-bar at its other end, passes over or under the grooved face of the ratchet, and has a projecting pin entering therein, but not shown. The construction of these parts is such that at each revolution of the lay-frame, the aforesaid pin of the lever E^3 will be alternately in a salient and then in a re-entering angle of the groove *e*, and so the said lever, operating upon the shifting-bar to move it, will alternately throw it first toward one end, and then toward the other, thus keeping up a constant motion both of the shifting-bar and also of the picking sticks, as already explained, and the desired motion of the shuttle will, in this manner, be easily accomplished. F represents two posts, erected upon the top of the frame A, for the purpose of furnishing guides for the harness-frames F^1. There will be, say, half a dozen, more or less, of these harness-frames, according to the figure or twill desired. From the bottom of each of these harness-frames a short stud, F^2, projects downward, far enough to strike the twill-governor wheel F^3. This governor-wheel F^3 is formed of two circular end plates *f*, which are connected together by means of rods f^1, as shown in figs. 4 and 6. The distance between these rods is just sufficient to allow the lower end of the stud F^2 to pass between them easily as the said wheel is raised up, as hereinafter explained. The wheel F^3 is mounted on two journals, secured to the plates *f*, the said journals finding their bearings in the sliding stand F^4. The top plate f^2 of this stand is perforated with mortises, so that the stud F^2 may easily pass through the said mortises and be guided thereby. The bottom leg of the sliding stand is supported by a stationary stand, F^5, which is erected upon the beam A^3, and constructed so that the stand F^4 can easily slide up and down therein once at each revolution of the shaft B^2. The way this is accomplished is as follows: The cord or strap f^3, clearly shown in fig. 4, is attached to the bottom end of the stand F^4, through a slot cut in that side of the stand F^5, so as to allow the cord to slide up and down in the said slot, and follow the motions of the stand F^4. From the point of its attachment to the stand F^4, the cord or strap f^3 passes up to and over the sheave f^4, attached to the stand f^5, and thence down to the lever f^6, to which it is made fast, as shown in fig. 4. This lever f^6 is attached at its back end to the stand f^7, so its forward end may receive a vertical motion. The forward end of this lever at f^8 is made to extend a short distance, say three or four inches, more or less, toward the front of the machine, and is bent downward, as also shown in fig. 4, at an angle of about thirty degrees, more or less, to the horizon. A short foot, f^9, is attached to the lay-frame, and from thence extends backward and downward, so as to strike the inclined surface of the lever at its lowest and foremost point first, and then slide up and back on the said inclined surface, as the lay-frame is moved back at each stroke, thereby moving the said lever downward, and it in turn will draw the cord f^3 down with it, which cord, acting over the sheave f^4 upon the sliding stand F^4, will raise the said stand once at each stroke of the lay-frame. As soon as the foot f^9 is withdrawn from the incline f^8 of the lever f^6, the stand F^4 will drop down by its own gravitation, and thus the stand F^4 will, at each stroke of the lay-frame, make one vertical stroke up and down. A ratchet-wheel, F^6, is fastened to one end of the wheel F^3, and it is turned by means of a pawl, f^{10}, attached to the beam A^2, and held to the point to which it is turned by means of the dog f^{11}. At each upward stroke of the stand F^4 the pawl f^{10} will drop back a certain distance on the ratchet, and as the stand drops down at each stroke, the pawl will push the ratchet over a certain distance, which will be so arranged that at each motion of the wheel F^3 the studs F^2 will come between two of the rods f^1, which, in certain instances, (which will be hereinafter explained,) will slide up along the sides of the said studs, without carrying them with the upward motion of the wheel. There will be bridge pieces *f* fitted in between the rods f^1, in such a manner that they may be changed to any desired position or side of the wheel. There will usually be one or two of these bridges arranged to come directly under each of the studs F^2, and when the bridge, which belongs in the pathway of any particular stud, comes to the top of the wheel, the said stud will strike on the top of the said bridge and not pass down between the rods f^1, as at other times, and consequently when each bridge comes to the top of the wheel, the stud and harness-frame to which it belongs will receive the necessary upward motion, and then drop down again, as soon as the wheel drops, as has already been described. A simple and cheap harness motion can thus be produced, and the harnesses set, by means of the adjustable bridges *f*, to move up at any desired time, and the configuration of the twilling figuring on the woven fabric will be governed or regulated accordingly. The warp-beam G is placed along the back of the loom-frame in its usual position, and on each end of it there is a friction-pulley, *g*. Around each of these pulleys I draw a friction-strap, g^1, one end of which is fastened to the frame at g^2, and the other end is taken down and attached to the rod g^3, which may be tightened up on the friction-strap by means of its thumb-screw g^4. The pressure of the friction-straps upon their wheels may be eased and regulated by the spiral spring g^5, which intervenes between the thumb-nut or screw g^4 and the bearing g^6. The take-up beam H is arranged across the front end of the frame A in the usual position, and is so arranged that it will wind the right side of the goods outwardly, which is much better than the present

mode of winding the goods wrong side out. The take-up beam is actuated by the usual appliances of the ratchet h and its pawl h^1, the said pawl being moved by the lay-frame at each stroke. The shank h^2 of the pawl extends back of the posts A^2, and is drawn up by the spring h^3 instead of a weight, as formerly.

Having described my invention, what I claim, is—

1. The combination of the short shaft B^2, the crank b, and rod b^1, when the whole are arranged in connection with the lay-frame in the manner and for the purpose described.

2. I claim the combination and arrangement of the shifting bar D and its stops d and the picking sticks C^1.

3. I claim the ratchet E and its star-shaped groove e, for the purpose of giving the required motion to the shifting bar.

4. I claim the combination of the ratchet E and the lever E^3, substantially as described and for the purpose set forth.

5. I claim the combination and arrangement of the twill-governor, composed of the devices F^2 F^3 F^4 F^5 F^6, f^3 f^4 f^5 f^6 and f^7, substantially as described and set forth.

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