4 Sheets. Sheet 1.

M. W. Obenchain,
Carding Machine.

No. 5,280. Patented Sept. 11, 1847.

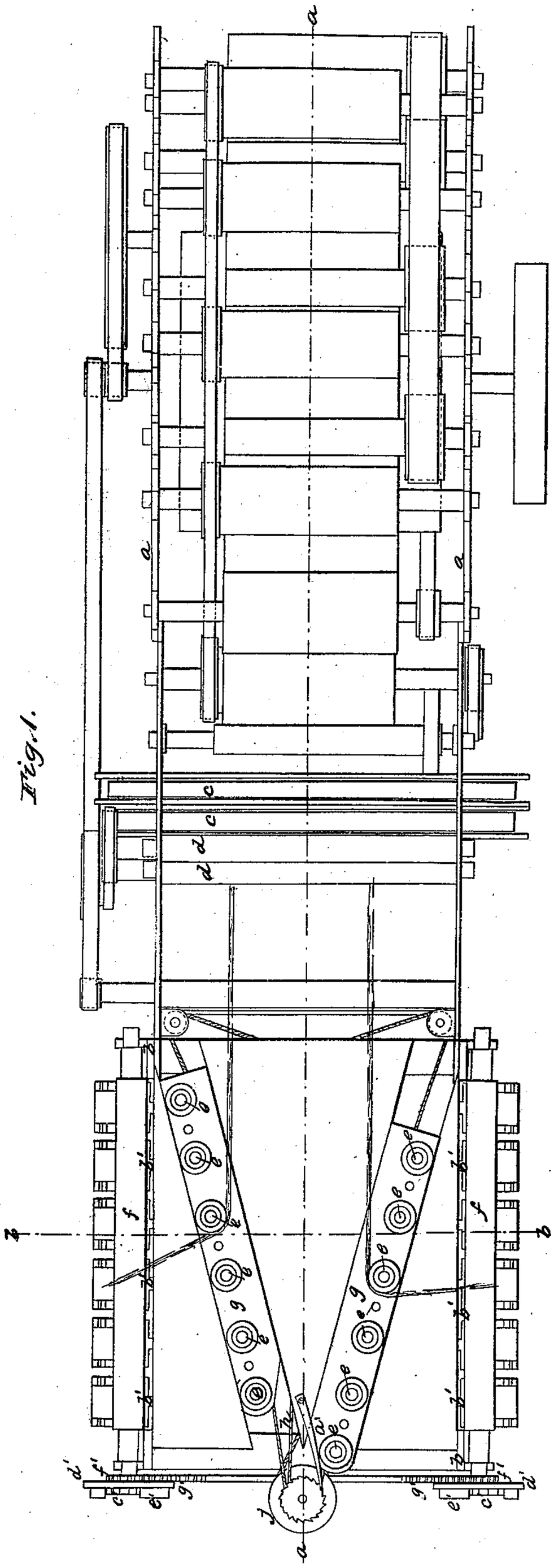


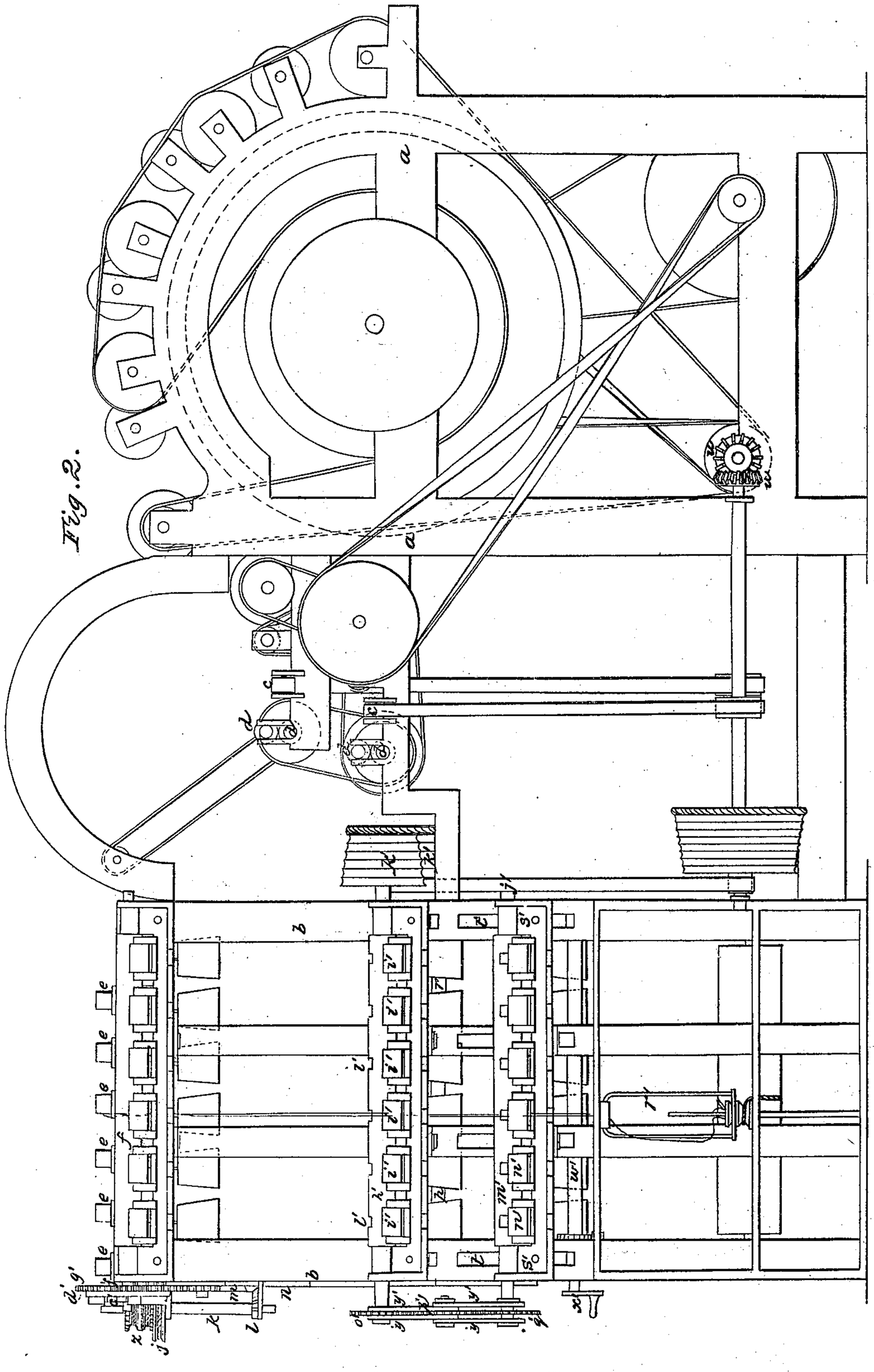
Fig. 1.

4 Sheets. Sheet 2.

M. W. Obenchain,
Carding Machine.

No. 5,280. Patented Sept. 11, 1847.

Fig. 2.



4 Sheets. Sheet 3.

M. W. Obenchain,
Carding Machine.

No. 5,280. Patented Sept. 11, 1847.

Fig. 5. b b. of Fig. 1.

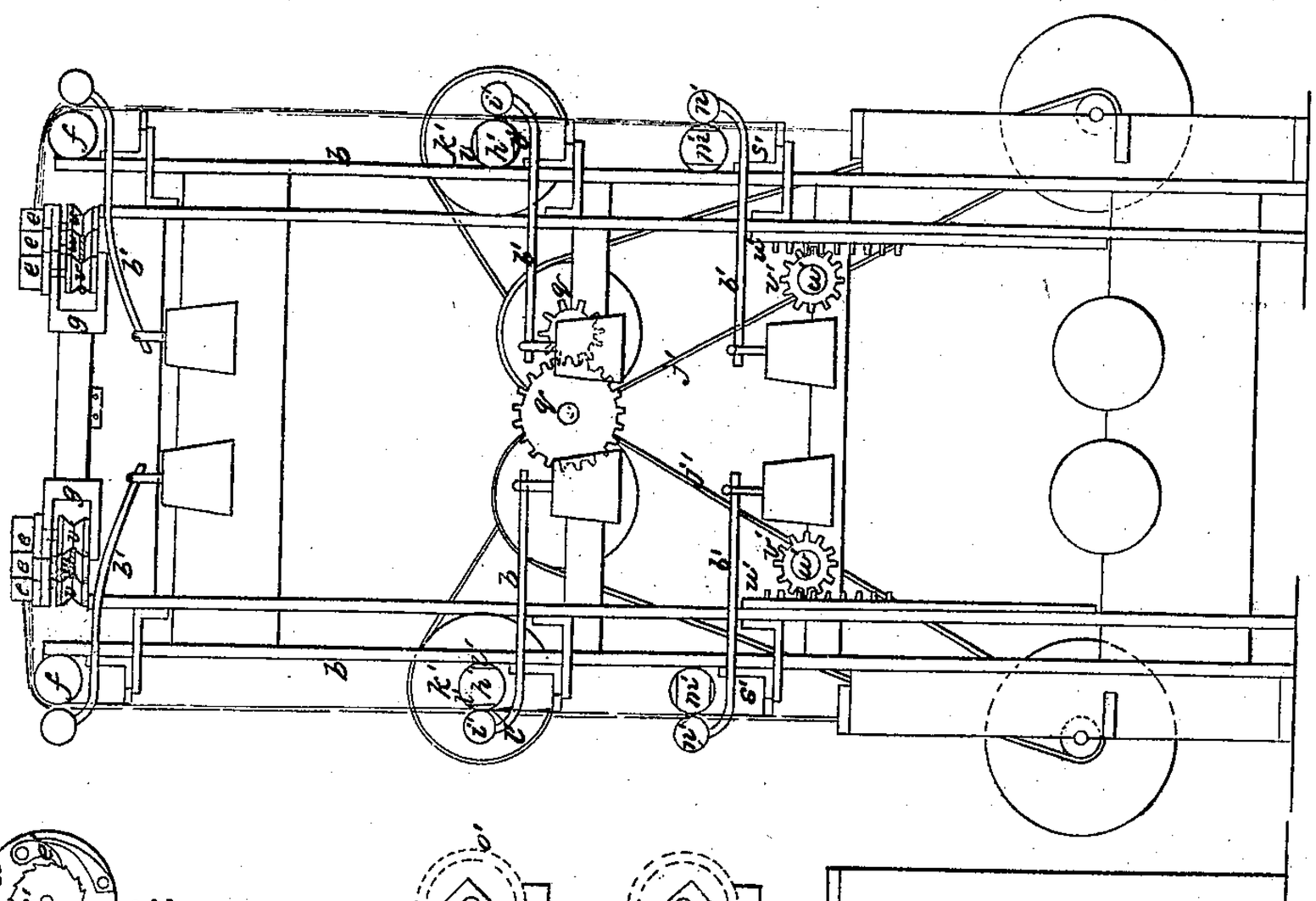


Fig. 3.

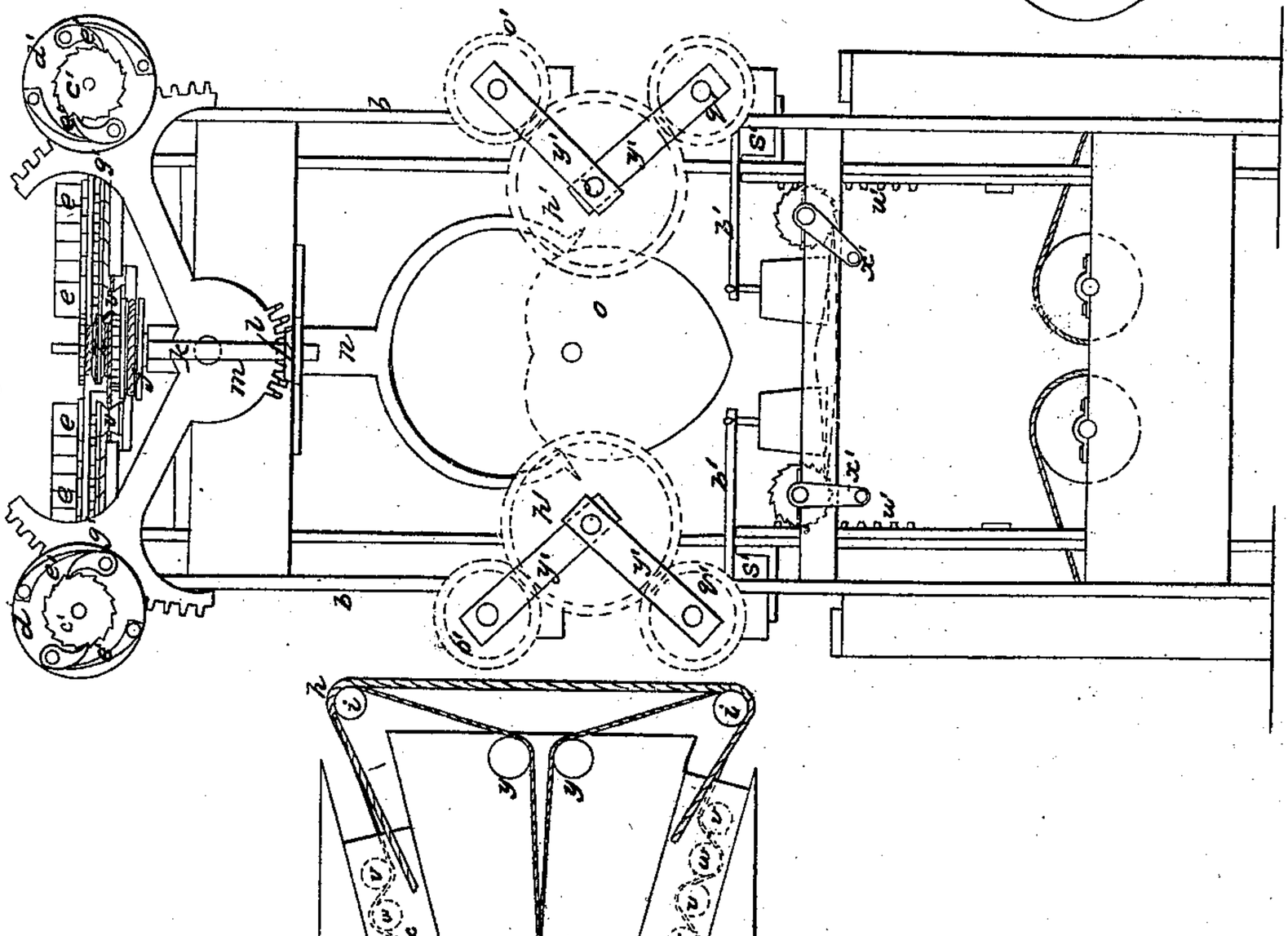
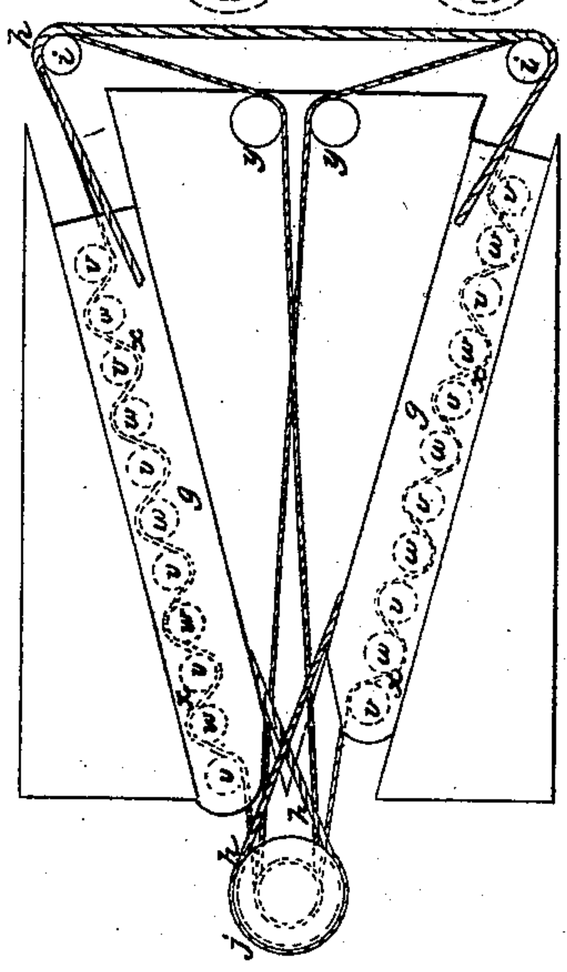


Fig. 6.

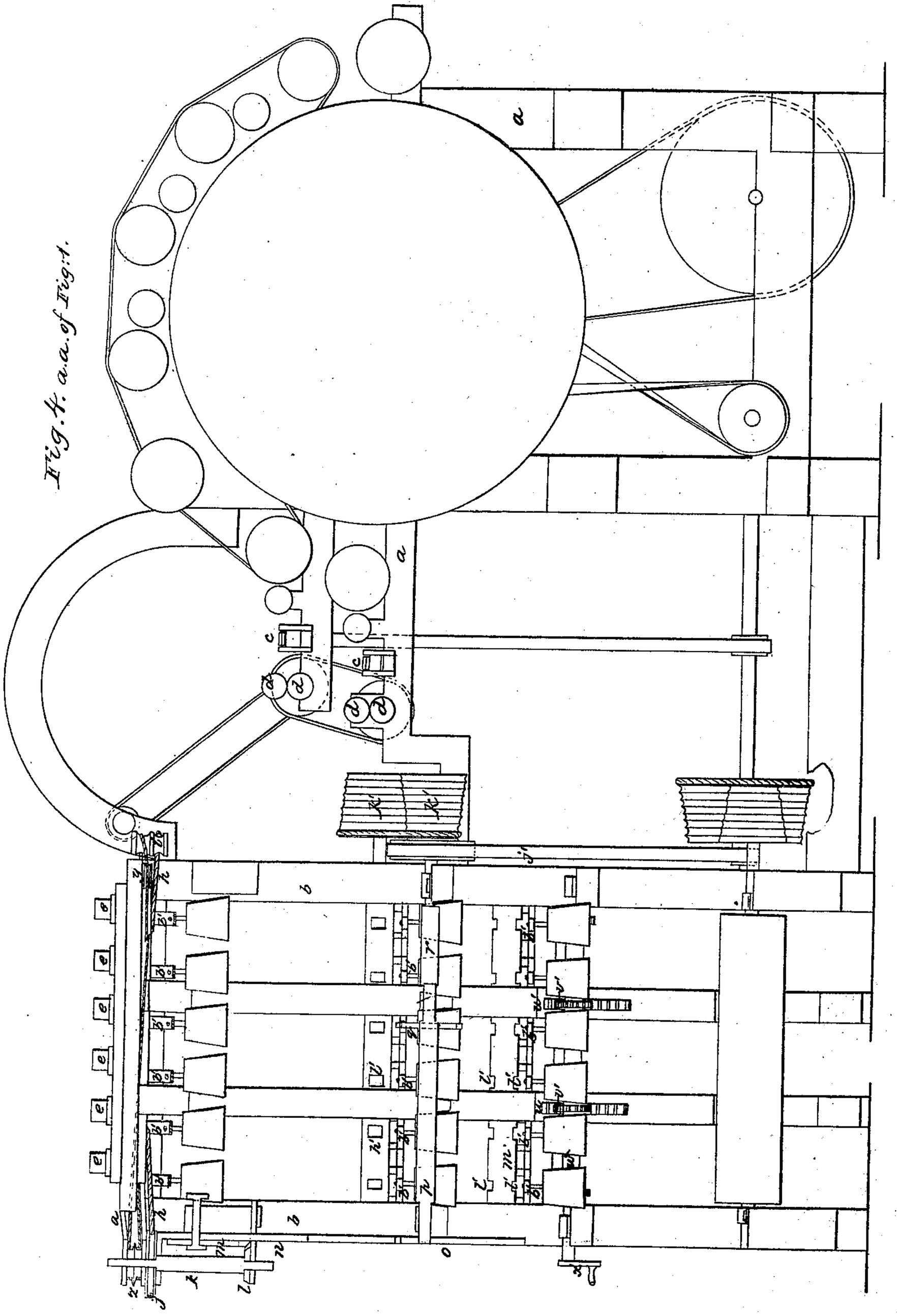


4 Sheets. Sheet 4.

M. W. Obenchain,
Carding Machine.

No. 5,280 Patented Sept. 11, 1847.

Fig. 4. a.a. of Fig. 1.



UNITED STATES PATENT OFFICE.

M. W. OBENCHAIN, OF SPRINGFIELD, OHIO.

MACHINERY FOR SPINNING.

Specification of Letters Patent No. 5,280, dated September 11, 1847.

To all whom it may concern:

Be it known that I, MATTHEW W. OBENCHAIN, of Springfield, in the county of Clark and State of Ohio, have invented new and useful Improvements in Machinery for Carding, Drawing, and Spinning Wool and other Fibrous Substances, and that the following is a full, clear, and exact description of the principle or character which distinguishes them from all other things before known and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan of the combined machine; Fig. 2, a vertical elevation of one side; Fig. 3, an elevation of the rear end of the machine; Fig. 4, a longitudinal section taken at the line (*a*, *a*) of Fig. 1, and Fig. 5, a cross vertical section taken at the line (*b*, *b*) of the same figure. The other figures will be described in their appropriate places.

The same letters indicate like parts in all the figures.

My invention relates to the carding, condensing, and spinning of fibrous substances, particularly wool, by a continuous series of operations constituting a combined machine, and the nature of my invention consists first in giving to the first pair of draw rollers that receive the rovings from the condenser, an intermittent rotary motion when this is combined with the second and third pairs made with their peripheries in segments, with the segments of one set placed at right angles to the segments of the other so that when the second set are drawing the rolls or rovings between them and the first pair that have an intermittent motion, the threads shall receive twist from the spindles to the second set, and when these have performed a portion of a revolution, equal to one segment, and liberate the rolls or rovings, the other pair begin to draw, the twist given to the threads from the points of the spindle to the second pair is permitted to run up to the rollers that move with an intermittent motion that the rovings may be partially twisted the better to sustain the drawing operation.

The second part of my invention consists in giving a reciprocating motion to the guides around which the rolls or rovings pass between the condenser and the first pair of draw rollers, that have an intermittent motion for the purpose of taking up the slack made by the continuous delivery of the condenser during the time that these rollers are not in motion.

The third part of my invention consists in giving to the guides around which the rovings pass an intermittent rotary motion on their axes corresponding with the intermittent motion of the first pair of draw rollers to prevent the breaking of the rovings by friction in passing around the guides. And the last part of my invention relates to the mode of regulating the amount of twist to be given to the threads by varying the catch of the two pairs of segment draw rollers, that is to say, by varying the distance between these two sets of rollers, which at the same time varies the distance between the lower pair of rollers and the points of the spindles, this being effected by mounting the lower pair of draw rollers on slides so that by means of a rack and pinion they can be moved up or down, the cog gearing which communicates motion from one of the pairs of segment rollers to the other being connected by joint links so as to retain the cog wheels at their true pitch as the distance between the draw rollers is varied.

In the accompanying drawings (*a*) and (*b*) represent the frame work properly adapted to the purpose and which may be varied at the pleasure or fancy of the constructor. The part (*a*) of the frame carries all the parts of any of the well known carding engines with two condensing belts (*c*, *c*) and two sets of delivery rollers (*d*, *d*) to supply the rovings for two ranges of spindles which are placed on opposite sides of the frame, and at right angles to the axis of the carding cylinder. As the rovings are delivered from the condensing belts by the rollers (*d*, *d*) they are carried around a series of vertical guide rollers (*e*) one for each roving, by which they are delivered to the first set of draw rollers (*f*, *f*) placed at right angles to the delivery rollers. The spindles of the guide rollers turn in a horizontal sliding frame (*g*) placed diagonally so as to receive the rovings from one half of the delivery rollers of the card, and keep them separate from one another; and as there are two ranges of spindles, two series of these guide rollers are used, each arranged on opposite sides and working alternately; and as the rollers (*d*, *d*) of the condenser deliver the rovings regularly and continuously, and the first set of draw roll-

ers (f, f) receive and deliver with an intermittent motion, during the intermissions of their motions the rovings make "slack," and to take up this slack the frames that carry the guide rollers receive an endwise motion from the delivery rollers, and a return motion during the rotation of the draw rollers to give up the "slack" previously taken up.

This reciprocating motion is given by a belt (h) (see Fig. 6 which is a view of the underside of this part of the machine) which is attached to the two sliding frames (g, g), passes around two guide rollers (i, i) at one end, and around a pulley (j) on a vertical arber (k) having a beveled pinion (l) at its lower end operated by a bevel segment rack (m) on a vibrating arm (n) which is forked at its lower end to embrace a heart (o) on a horizontal spindle (p) that receives motion by two cog wheels (q, q) from another arber (r) connected by beveled wheels (u, u) with the main shaft of the carding engine.

From the foregoing arrangement of parts it will be seen that by every rotation of the heart the arm (n) vibrates back and forth and by its connections gives the required reciprocating motions to the sliding frames that carry the guide rollers. When the draw rollers are in operation and draw the rovings around the guide rollers, these (the draw rollers) rotate to avoid friction which would otherwise frequently break the rovings, and this is effected in the following manner. The spindle of each guide roller has a pulley (v) on it, and between each of the spindles there is a pulley (w) that turns on a stud pin attached to the sliding frame, and a band (x) passes partly around each pulley then around two guide pulleys (y, y) and thence around a pulley (z) that turns freely on the arber (k), and provided with ratchet teeth so that this pulley is free to turn on the arber when the sliding frame moves in the direction of the arrow, that is when it is taking up the slack, but when it moves in the reverse direction the pulley is held and prevented from turning by the hand or pawl (a') and hence the series of guide rollers turn to supply the rovings without friction to the draw rollers. There is a similar pulley, ratchet, and hand for both series of guide pulleys.

The first set of draw rollers (f, f) consists of one long roller and a series of short pressure rollers that have their bearings in weighted levers (b') in manner well known to all mechanicians versed in this branch of mechanics. The long roller has a ratchet wheel (c') on the end and by the side of it a face wheel (d') and a spring catch or catches (e') on one face and a cog wheel (f') attached to its other face, and these turn freely on the axis of the roller so that when the cog wheel is turned in one direction by the vibration of a cogged sector (g') attached to the vibrating arm (n), the roller is turned to carry the roving through and when the cogged sector vibrates in the reversed direction the cog and face wheels turn without the roller. In this way the vibration of the arm (n), by the heart, gives the required intermittent motions to the draw rollers, to feed the roving by intermissions.

It will be observed that the same arrangement of parts is required on both sides of the machine, one for each series of spindles, and as the parts and their arrangement are duplicate it is not deemed necessary to describe more than one side except to say that the operations on opposite sides alternate. The rovings drawn through by the first set of draw rollers pass down to the second set, which like the first consists of one long roller (h') and a series of small pressure rollers (i'). The roller (h') receives motion from the arber (r) by a belt (j') and cone pulleys (k', k'). The small pressure rollers, one for each thread to be spun, are perfectly cylindrical, but the long roller is notched on opposite sides as at (l') to form two cylindrical segments, in width less than the length of the small pressure rollers so that these always bear on the cylindrical part of the long roller, and the notches are so deep as to leave the cylindrical segments of only about one quarter of the circumference. As the long roller rotates during two quarters of its revolution the rovings will be held in the bight of the cylindrical segments and the small pressure rollers, and during the other two quarters, or when the notched parts pass, the rovings will be free to pass through or turn between the two, the cylindrical portions of the long roller between the notches preventing the pressure rollers from bearing on them.

The third set of draw rollers (m', n') is placed still lower down and is made in every particular like the second set, and receives motion from the long roller of the second set by a cog wheel (o') on it that gears into an intermediate wheel (p') that in turn gears into the wheel (q') on the end of the long roller of the third set, so that these two long rollers turn in the same direction. The notched segments of the roller (m') however are at right angles to those of the roller (h') so that when the rovings, or rather threads, are held and drawn by the second set they are spun or twisted by the spindles (r') all the way up to the rollers, and when these have made a quarter revolution they liberate the threads which are at the same time caught by the third set which then begin to draw, the twist which was previously given to the threads between the second and third sets of rollers passing up and thereby giving a partial twist to the

roving all the way up to the first set of draw rollers, so that the rovings are at all times sufficiently twisted to be drawn with safety and to insure even threads.

The amount of twist to be given to a given length of rovings with a given number of revolutions of the spindles is regulated by the ratch of the second and third sets of draw rollers, that is by their distance apart, and this distance is regulated by having the bearings of the third set of rollers on a frame (s') that slides vertically on the main frame, the standards of which have slots (t') in them through which the securing bolts pass, and to the inner bolts are attached vertical racks (u', u') operated by pinions (v') on an arbor (w') provided with a crank handle or winch (x') by means of which the attendant can vary the ratch of the rollers as he finds that more or less twist is required—the intermediate cog wheel that communicates motion from one of the segment rollers to the other being connected with the journals of these two rollers by joint links (y', y') that keep the cogs in their proper pitch at all times. The spindles and the mode of operating them being similar to other well known spinning machines it is deemed unnecessary to describe them, they are however fully represented in the accompanying drawings.

The segments of the second and third draw rollers instead of being equal to only one quarter of the circumference may be one half or one third, but the two must have like divisions so that one set shall begin to draw as the other liberates the threads.

It will be obvious that the gearing of the machinery in all its parts may be varied at the pleasure of the constructor, so long as the movements above indicated are retained, and that any kind of carding and condensing engine may be substituted for the one represented in the accompanying drawings.

It will be observed from what has been stated above that the two series of spindles and their auxiliary parts are entirely independent of each other, so that the relative motions of the draw rollers and spindles may be varied during their operation to spin different qualities of threads on opposite sides, at the same time.

If desired the spinning part of this machine may be used independently of the card and condenser.

What I claim as my invention and desire to secure by Letters Patent is—

1. Giving to the first set of draw rollers an intermittent motion in combination with the second and third sets of draw rollers made with segments to draw alternately, substantially as described.

2. I claim giving to the series of guide rollers an intermittent reciprocating motion to take up the slack of the roving and then to give it out, substantially as described, in combination with the intermittent motion of the first set of draw rollers, as described. And I also claim in combination with this, giving to the guide rollers an intermittent rotary motion to prevent the breaking of the rovings by friction, as described.

3. And finally, I claim hanging the third set of draw rollers in a sliding frame, substantially as described, provided with the requisite mechanical agent for moving it during the operation of spinning, whether this be rack and pinion or other mechanical equivalent, whereby the amount of twist to be given to the threads that are being drawn and spun between the rollers, can be regulated at pleasure by the attendant, as described.

M. W. OBENCHAIN.

Witnesses:
CHS. M. KELLER,
J. P. VAN TYNE.