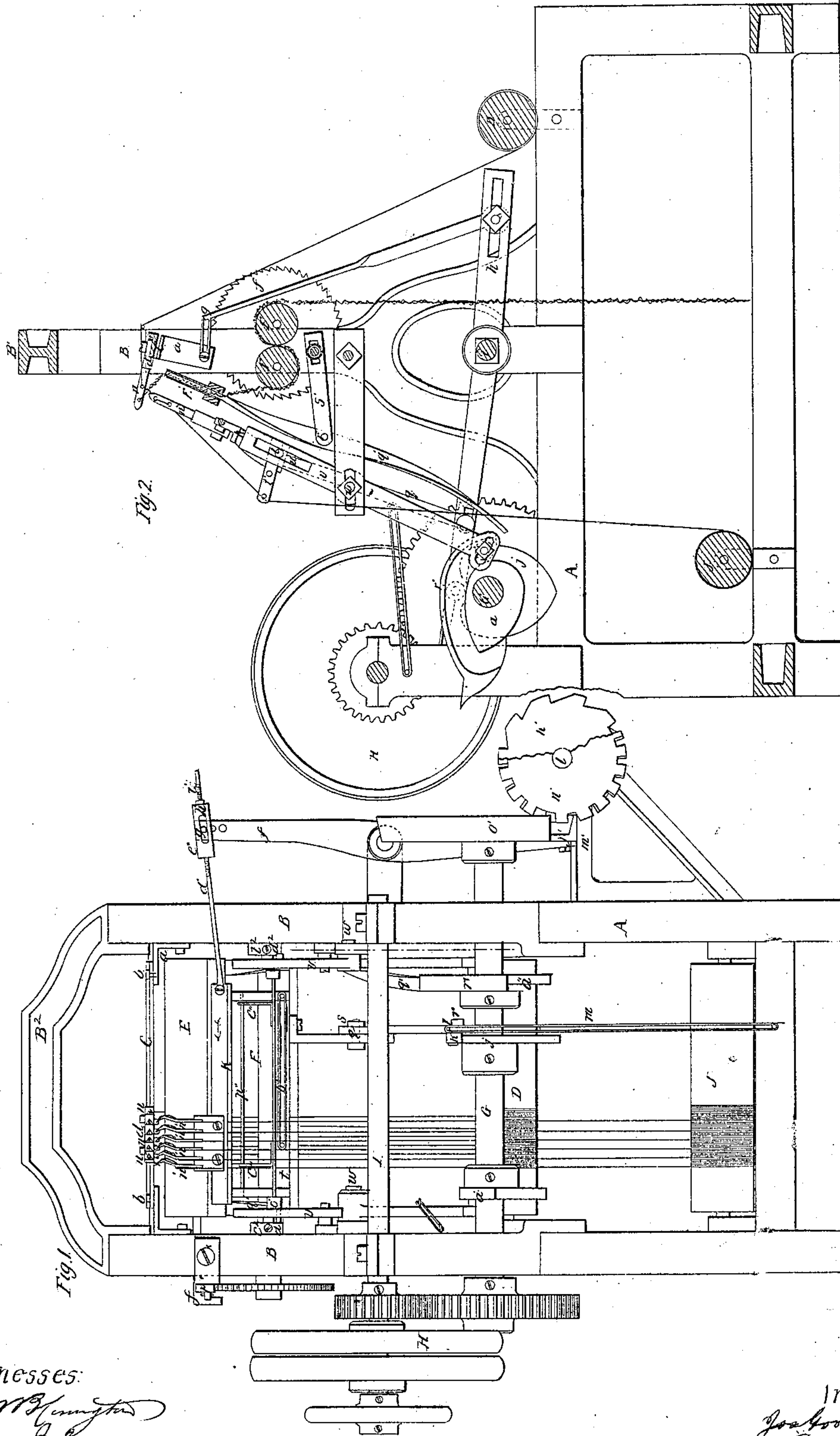


# J. Goodman. Knitting Mach.

Sheet 1. 2 Sheets.

N<sup>o</sup> 53,530.

Patented Mar. 27, 1866.



Witnesses:

*J. B. Huntington*  
*Wm. C. Lipp*

Inventor:

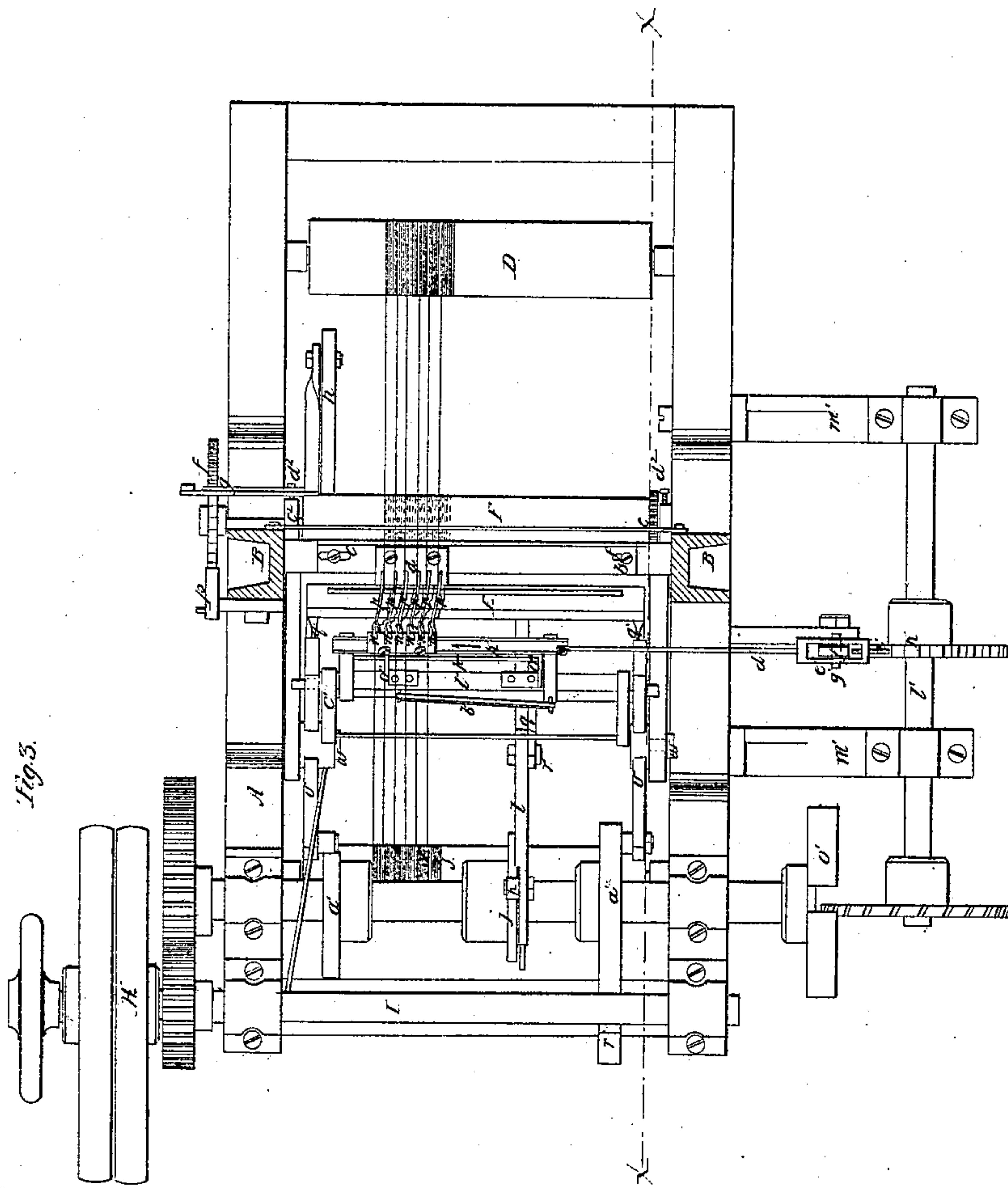
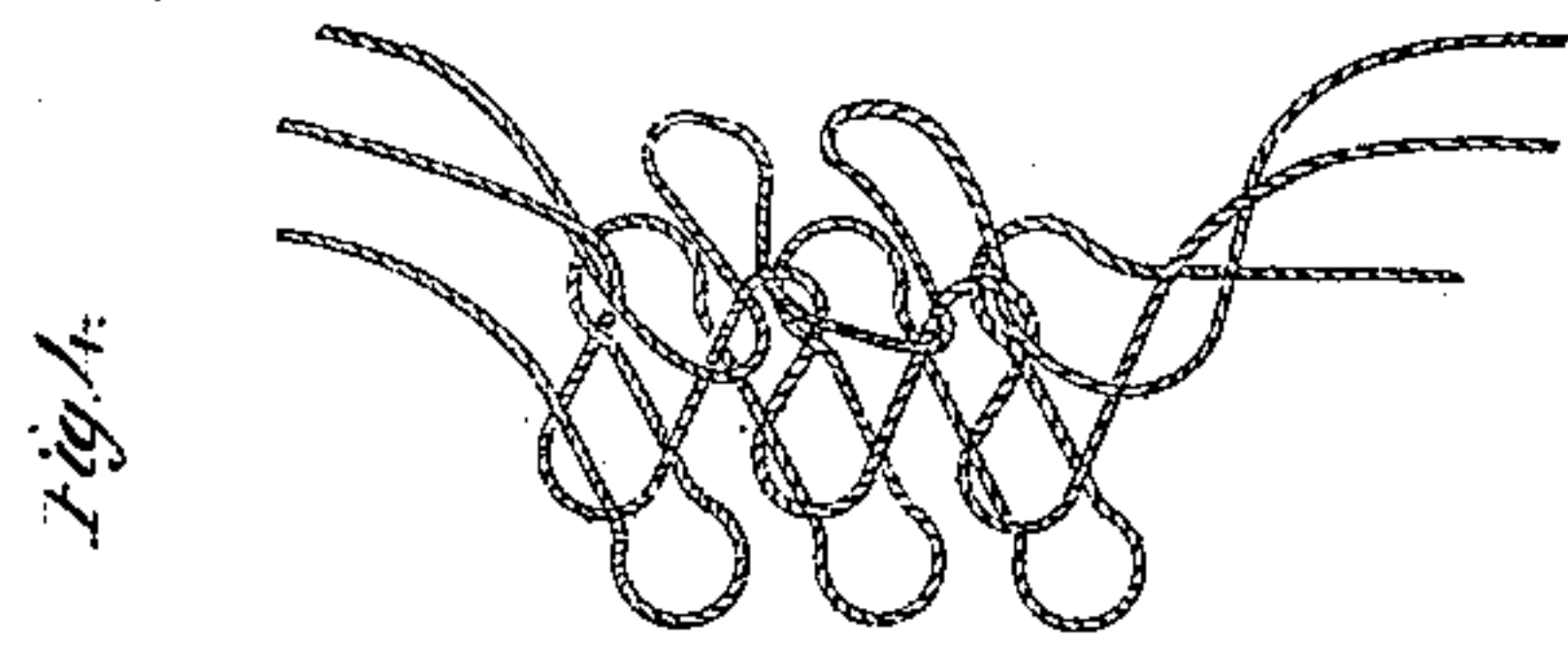
*Joel Goodman*  
*By M. W. L.*  
*Att'y*

Sheet 2. 2 Sheets.

J. Goodman.  
Knitting Mach.

N<sup>o</sup> 53,530.

Patented Mar. 27, 1866.



Witnesses:  
J. W. Langton  
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Inventor:  
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# UNITED STATES PATENT OFFICE.

JOSEPH GOODMAN, OF PAWTUCKET, RHODE ISLAND, ASSIGNOR TO HIMSELF AND RICHARD W. REYNOLDS, OF SAME PLACE.

## IMPROVEMENT IN KNITTING-MACHINES.

Specification forming part of Letters Patent No. 53,530, dated March 27, 1866.

*To all whom it may concern:*

Be it known that I, JOSEPH GOODMAN, of Pawtucket, in the county of Providence and State of Rhode Island, have invented a new and Improved Knitting-Loom; and I do hereby declare that the following is a full, clear, and exact description thereof, which will enable others skilled in the art to make and use the same, reference being had to the accompanying drawings, forming part of this specification, in which—

Figure 1 represents a front elevation of this invention. Fig. 2 is a longitudinal vertical section of the same, the line *x x*, Fig. 3, indicating the plane of section. Fig. 3 is a plan or top view of the same. Fig. 4 shows a diagram of the stitch formed by this machine.

Similar letters of reference indicate like parts.

This invention relates to a loom in which two sets of curved needles are used for the purpose of producing a fabric similar to that produced by ordinary knitting-machines. Each needle carries its own thread, and one set of needles is secured to a stationary bar, whereas the other set is mounted on a frame to which a triple motion is imparted—viz., a rising-and-falling, an oscillating, and a transversely-sliding motion—whereby the loops formed by the threads of one set of needles are dropped over the threads of the other set, and a fabric is produced of similar texture to ordinary knitted work and equal in width to the full width of the loom, or a series of strips can be knitted, the combined width of which is equal to the full width of the loom, and which when ready can be cut off from the wide knitted fabric and used for fringing ladies' jackets or other garments.

A represents a frame made of iron or any other suitable material, which forms the bearings for the several working parts of my loom. From the frame A rise two uprights, B, which are united by a yoke, B', and secured to uprights under the yoke are two angular brackets, *a*, which serve to support the needle-bar C. This bar extends clear across the space between the uprights, and it is held in place by screws *b* passing through slots *c*, (see Fig. 3,) so that said needle can be adjusted and the position of the needles regulated; and, further-

mormore, said needle-bar can, if desired, be readily removed and replaced by one with needles of different size. The needles *n* are divided in sections, each section being secured to a separate head, *d*, and one or more of these sections is retained according to the width of the fabric to be produced.

The needles *n* are curved, as shown in Fig. 3, and each needle carries its own thread, which is taken from the yarn-beam D, and which is represented in blue lines in the drawings. Said needles are provided with two eyes each, one behind and one in front of their bent or curved part, as shown in Fig. 2, and the threads are passed through the inner eye first, then over the back of the curve and through the eye next the point; thence, after being knitted, the fabric passes down through a guide-tube, E, (which, however, may be dispensed with,) and through between the feed-rollers F, by the action of which the knitted fabric is drawn in as the same is produced by the operations of the loom.

The feed-rollers F have their bearings in suitable boxes *c*<sup>2</sup>, secured to the inner sides of the uprights B and arranged with set-screws *d*<sup>2</sup>, by which said rollers can be adjusted so that they take a firm hold of the threads and of the fabric. The two feed-rollers are geared together by cog-wheels *e*, and the axle of one of them extends beyond the outer surface of the upright to which its bearing is attached, and it bears a ratchet-wheel, *f*. This ratchet-wheel receives an intermittent motion by the action of a spring-pawl, *g*, which is hinged to a slotted arm, *h*, that extends from a rock-shaft, *i*. This rock-shaft has its bearings in suitable boxes secured to the frame A, and an oscillating motion is imparted to it by the action of a cam, *j*, on a stud or a roller, *k*, secured in the slotted end of a lever, *l*, which is mounted on the rock-shaft, said roller or stud being held in contact with the circumference of the cam by a spring, *m*, which is secured to the loose end of the lever *l* and to a fixed portion of the frame A. The throw of the pawl *g* is adjusted by shifting it in the slotted arm *h* closer to or farther from the center of the rock-shaft on which said arm is mounted, and it may be still further regulated by shifting the position of the stud or roller *k* in the



lever *l*, and a stop-pawl, *p*, prevents the ratchet-wheel from turning back.

The cam *j*, which imparts to the rock-shaft *i* an oscillating motion, is mounted on the main shaft *G*, which has its bearings in suitable boxes secured to the frame *A*, and to which motion is imparted by a belt running over a pulley, *H*, which is mounted on a shaft, *I*, geared together with the main shaft by suitable cog-wheels, or motion may be imparted to said main shaft in any desirable manner.

The movable needles *n'* are arranged in sections similar to the stationary needle *n*, and they are of the same shape and threaded in the same manner, the threads for said movable needles being shown in red lines in the drawings and taken from a roller-beam, *J*, which has its bearings in the bottom part of the frame *A*.

The heads in which the needles *n'* are fastened are secured to the top bar of a carriage, *K*, which is supported by a square bar, *t*, resting on an upright standard, *q*, which rises from a pivot, *r*, that is adjustable in a slot in the lever *l*. The standard *q* is made in two sections, which are connected by a screw, *s*, passing through suitable slots, so that its length can be adjusted at pleasure, and the bar *t* with the carriage *K* can be raised or lowered to bring the needles *n'* in the proper position in relation to the needles *n*.

The ends of the bar *t* are round and they are fitted into slots *u* in levers *v*, which have their fulcrum on pivots *w*, and to which an oscillating motion is imparted by cams *a' a'\** mounted on the main shaft *G*. By this oscillating motion the bar *t*, with the carriage *K* and needles *n'*, are carried back and forth toward and from the stationary needles *n*, and at the same time a rising-and-falling motion is imparted to the needles *n'* by the action of the cam *j* on the lever *l*, and the amount of either of these motions can be regulated, the former by shifting the fulcrum of the oscillating levers *v*, and the latter by shifting the pivot *r*, which connects the standards *q* with the lever *l*.

The carriage *K* is fitted on the bar *t* so that it can slide thereon, and a spring, *b'*, has a tendency to draw the same in the direction of the arrow marked on it in Fig. 1 until it strikes an arm, *c'*, secured to the bar *t*.

From the carriage extends a rod, *d'*, provided with a slotted head, *e'*, which drops over the upper end of a lever, *f'*, being connected to the same by a pin, *g'*, that passes through the slots *h'* in the head and through one of the holes in the lever, several holes being provided in the same, so that the pin *g'* can be inserted closer to or farther from the fulcrum thereof, and the motion imparted to the head can be regulated. This motion is also adjusted by a set-screw, *i'*, which screws in the end of the head and bears against the edge of the lever *f'*, as shown best in Fig. 3. The lower end of this lever carries an adjustable pawl, *j'*, that gears in the teeth of a serrated wheel,

*k'*. This wheel is mounted on a shaft, *l'*, that has its bearings in boxes supported by brackets *m'*, which are secured to the side of the frame *A*. On the end of this shaft is mounted a worm-wheel, *n'*, provided with oblique teeth and doubled flanged cam, *o'*, which is mounted on the end of the main shaft *G*, gears in the teeth of said worm-wheel, and imparts to the shaft *l'* an intermittent rotary motion. By this motion the teeth of the serrated wheel *k'* are caused to act on the pawl *j'* and to impart to the lever *f'* an oscillating motion, causing the carriage *K* with the needles *n'* to move in a direction opposite to the arrow marked on said carriage in Fig. 3, and as soon as the pawl has passed one of the teeth the spring *b'* draws the carriage back to its original position, and causes the point of the pawl to drop in the cavity between the teeth.

In order to steady the carriage *K* two standards, *o''*, are secured to the upper surface of the rod *t*, and a guide-rod, *p''*, secured in these standards, passes through holes in the side pieces of the frame.

The guide-tube *E*, through which the knitted fabric passes as the same leaves the needle, is mounted on the upper end of two levers, *q'*, which swing on pivots *r'* secured to brackets *s'*, that are fastened to the inner surface of the uprights *B*. One of the levers *q'* extends down beyond its fulcrum, and it is acted upon by a cam, *r'*, mounted on the main shaft *G*, so as to impart to the guide-tube an oscillating motion.

The operation is as follows: After the needles *n* and *n'* have been threaded in the manner previously described, the machine is set in motion in the direction of the arrow marked on the pulley *H* in Fig. 3. By the action of the cam *j* on the lever *l* the needles *n'*, which are supposed to be in the position shown in Fig. 3, are caused to rise and to pass through between the needles *n* and their threads, the fabric as knitted extending down into the guide-tube *E* or to the feed-rollers *F*. As soon as the points of the needles *n'* have ascended beyond the upper edges of the needles *n*, the cams *a' a'\** begin to act upon the levers *v v*, imparting to the needles *n'* a retrograde movement toward the main shaft *G'*, and by this motion the threads of the needles *n* are carried back and formed into loops, which slip down on the needles *n'*. Just before these needles reach their highest position the cam *o'* takes action and causes the carriage *K* with the needles *n'* to move in the direction opposite the arrow marked on said carriage in Fig. 3. By this motion the points of the needles *n* come opposite the concave portions of the needles *n'*, and as these needles are permitted to advance again the needles *n* catch between the needles *n'* and these parts of their threads, extending from their upper eyes down into the guide-tube *E* or to the feed-rollers *F*. In entering between these threads and the needles *n'* the needles *n* are above the loops of their own threads formed on the needles *n'* by the previous operation,



and as the needles  $n'$  descend the loops of the threads of the needles  $n$  are caused to drop over the points of the needles  $n'$  and to catch over the threads of these needles, which, having been formed into loops, are retained by the needles  $n$ . After having reached their lowest point the needles  $n'$  are allowed to follow the action of the spring  $b'$ , which carries their points opposite the concave portions of the needles  $n$ , and as they ascend again they pass through between the needles  $n$  and their threads, as previously stated, and the same operation is repeated, and by continuing the operation a stitch is formed, as shown in Fig. 4 of the drawings. If all the needles are threaded a broad web is knitted, equal in width to the entire width of the loom; but at one edge of this web loose loops are formed which have to be secured by hand in a similar manner as the same would have been secured if the width of the web would be increased, the loops on the other end being locked by the action of the needles, and, if desired, a number of distinct strips may be produced by using several sections of needles, and each strip can be used with advantage for fringing ladies' jackets or other garments.

What I claim as new, and desire to secure by Letters Patent, is—

1. The combination of a set of stationary needles,  $n$ , constructed as described, with a set of movable needles,  $n'$ , having a triple motion—

viz., a rising-and-falling, an oscillating, and a transversely-sliding motion—substantially as and for the purpose set forth.

2. The transversely-sliding carriage  $K$ , in combination with the guide-bar  $t$ , adjustable rod  $d'$ , lever  $f'$ , and ratchet-wheel  $k'$ , constructed and operating substantially as and for the purpose described.

3. The carriage  $K$  and guide-bar  $t$ , in combination with the oscillating lever  $l$  and adjustable standard  $g$ , substantially as and for the purpose set forth.

4. The carriage  $K$  and guide-bar  $t$ , in combination with the slotted levers  $v$  and cams  $a'$   $a'^*$ , constructed and operating substantially as and for the purpose described.

5. The double-flanged cams  $o'$ , worm-wheel  $n'$ , and serrated wheel  $k'$ , in combination with the pawl  $j'$ , lever  $f'$ , and carriage  $K$ , constructed and operating substantially as and for the purposes set forth.

6. The rock-shaft  $i$  with levers  $l$   $h$ , in combination with the standard  $g$  and carriage  $K$ , and with the spring pawl  $g$ , ratchet-wheel  $f$ , and feed-rollers  $F$ , constructed and operating substantially as and for the purpose described.

The above specification of my invention signed by me this 29th day of August, 1865.

JOSEPH GOODMAN.

Witnesses:

M. M. LIVINGSTON,

C. L. TOPLIFF.