

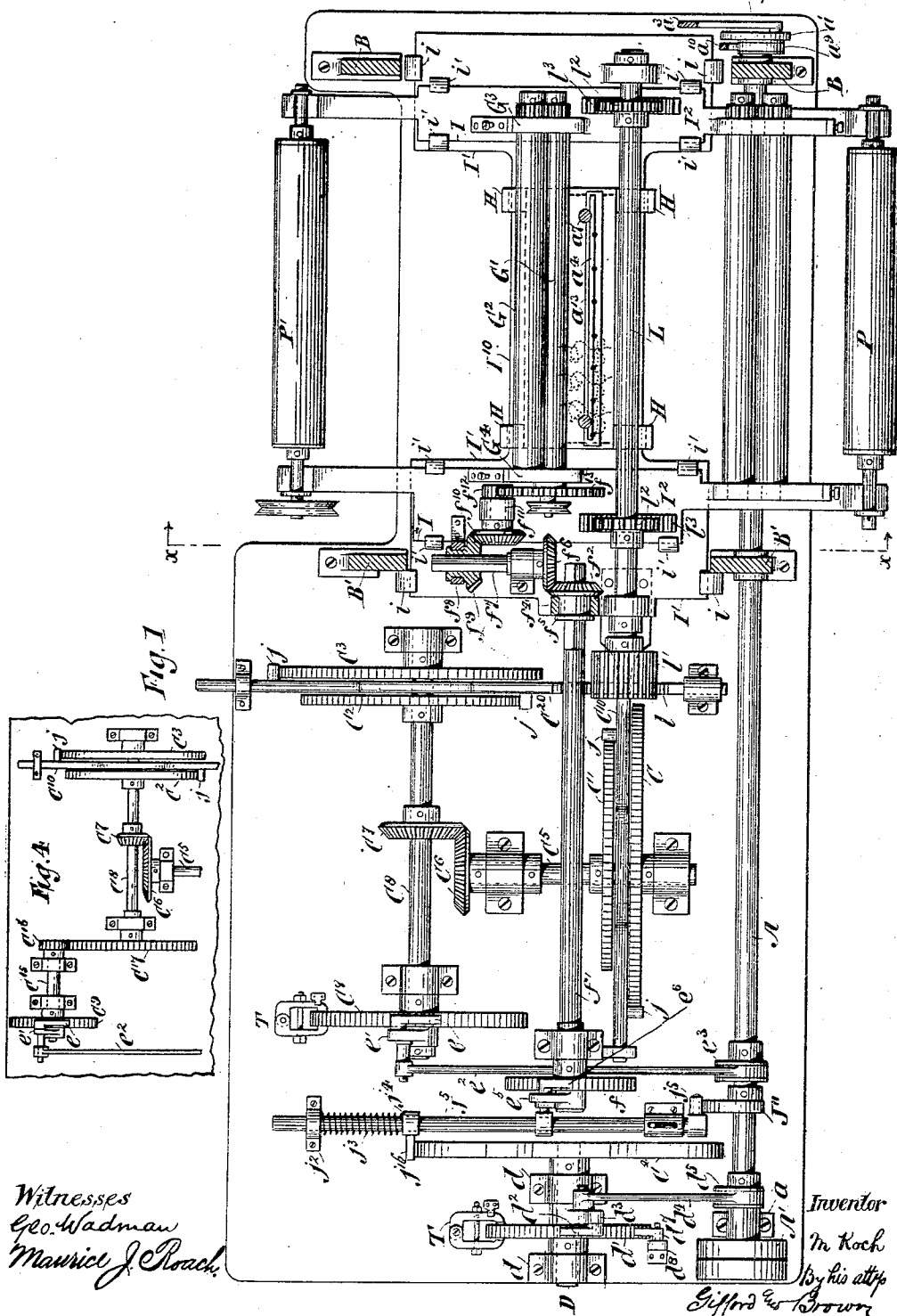
(No Model.)

3 Sheets—Sheet 1.

M. KOCH.
QUILTING MACHINE.

No. 447,570.

Patented Mar. 3, 1891.



Witnesses
Geo. Wadman
Maurice J. Roach.

Inventor
M. Koch
By his atty
J. Brown

(No Model.)

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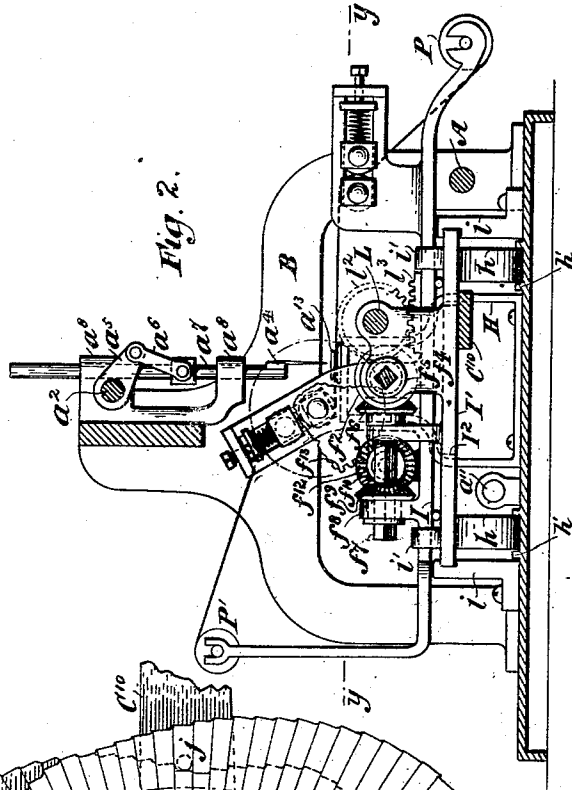
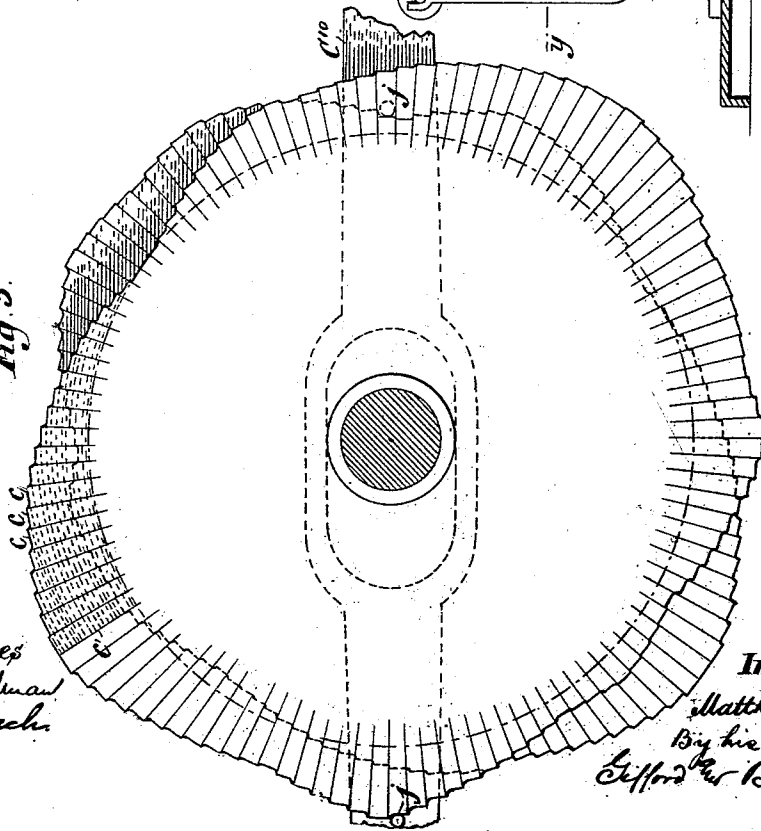


Fig. 3.



Witnesses
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Inventor
Matthias Koch
By his attorney
Coffin & Brown

(No Model.)

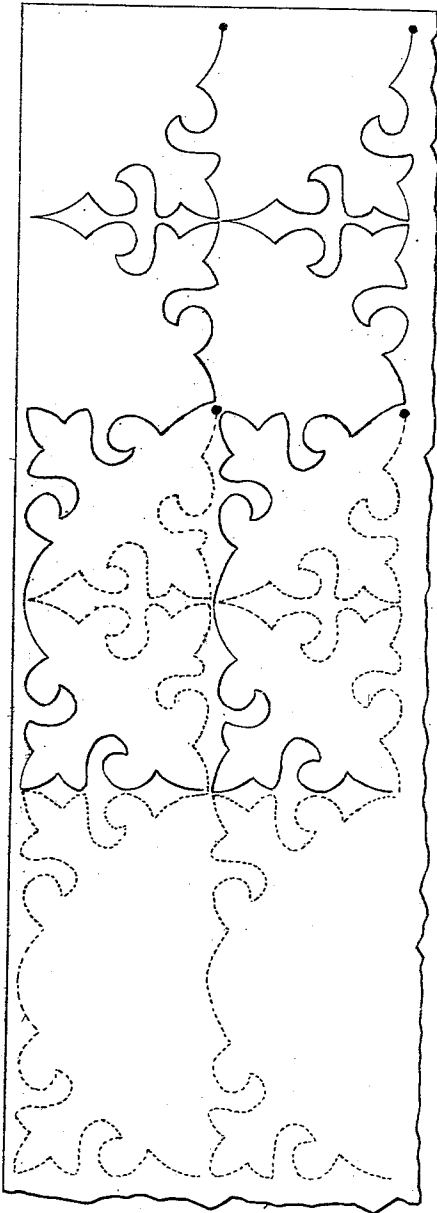
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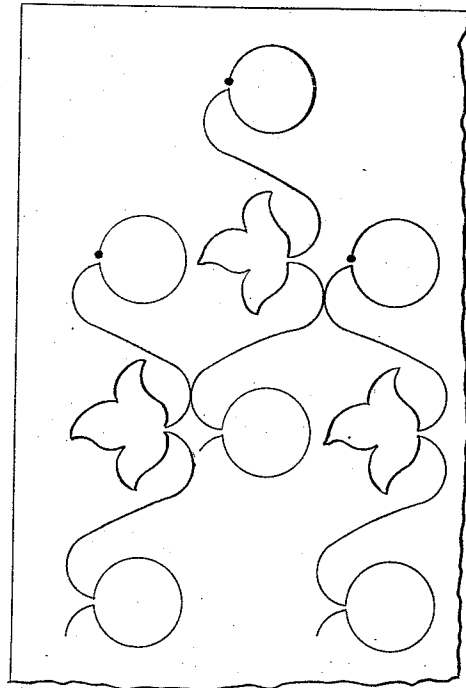
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Fig. 5



Witnesses
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Fig. 6



Inventor
Matthias Koch
By his attorney
Bufford & Bollen.

UNITED STATES PATENT OFFICE.

MATTHIAS KOCH, OF NEW YORK, N. Y., ASSIGNOR TO LOUIS SCHULTZ, OF SAME PLACE.

QUILTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 447,570, dated March 3, 1891.

Application filed February 10, 1888. Serial No. 263,559. (No model.)

To all whom it may concern:

Be it known that I, MATTHIAS KOCH, of New York, in the county and State of New York, have invented a new and useful Improvement in Sewing-Machines, of which the following is a specification.

My improved sewing-machine is designed to sew patterns of various forms upon fabrics. I employ a gang of needles which work in unison and all sew similar patterns. The goods to be sewed are borne upon a carriage, which has a four-way motion or a motion fore and aft and from side to side of the machine. The goods have also an independent forward feed.

I will describe the machine in detail, and then point out the novel features in claims.

In the accompanying drawings, Figure 1 is a plan or top view of the machine, partly in section, the parts shown in section being taken on the plane of the dotted line *yy*, Fig. 2. Fig. 2 is a vertical section of the machine, taken on the dotted line *xx*, Fig. 1, and looking in the direction of the arrows at the ends of said line. Fig. 3 is a detail view, on an enlarged scale, of certain pattern-cams employed in the machine. Fig. 4 illustrates a modification of certain parts. Figs. 5 and 6 illustrate different arrangements of needles and patterns, which may be sewed by such arrangements.

Similar letters of reference designate corresponding parts in all the figures.

A designates the main shaft, to which motion is imparted by a belt on a pulley A'. This shaft is journaled in suitable bearings *a*, extending upwardly from the bed of the machine, and also in side portions B B' of the frame of the machine. A crank *a'* is mounted upon the end of the main shaft beyond the portion B of the frame. This crank imparts motion to a rock-shaft *a*², through an intermediate crank-rod *a*³. The rock-shaft *a*² is journaled in suitable bearings in the portion B B' of the frame and imparts motion to a needle-bar *a*⁴, in which a gang of needles is secured. Motion is transmitted from the rock-shaft to the needle-bar by arms *a*⁵, rigidly keyed to the rock-shaft and pivotally connected to links *a*⁶, which are in turn piv-

otally connected to vertical sliding rods *a*⁷, working in suitable guides *a*⁸ in the frame. The needle-bar is rigidly secured to the rods *a*⁷.

Upon the main shaft, adjacent to the crank *a'*, is an eccentric *a*⁹, operating through an eccentric-rod *a*¹⁰ and rock-shaft *a*¹¹ to impart motion to shuttles. The shuttles and shuttle-drivers and other complementary mechanism for operating the shuttles I have not illustrated, as they do not form part of my invention and would only serve to obscure the drawings. They are of the usual or any desired construction. A presser-bar *a*¹³, operated by toes *a*¹⁴ on the rock-shaft coming in contact with projections *a*¹⁵ on the upper ends of rods *a*¹⁶, to which the presser-bar is secured, is used in conjunction with the machine.

As the features thus far described do not constitute part of my invention, I have referred to them thus briefly.

C C' C² C³ designate, respectively, pattern-wheels, by which the movements of the carriage upon which the goods are borne are regulated. The pattern-wheels C C' govern the forward and back movement of the goods other than the feed of the goods, and the pattern-wheels C² C³ govern the side-to-side movement of the goods. The pattern-wheels C C' are arranged at right angles to the pattern-wheels C² C³. Another pattern-wheel C⁴ is employed, by which the forward feed of the goods is controlled. The pattern-wheels C C' are mounted upon the horizontally-extending shaft C⁵, journaled in suitable bearings extending upwardly from the bed-plate of the machine. The shaft C⁵ bears near one end a beveled gear-wheel C⁶, which meshes with another beveled gear-wheel C⁷, rigidly keyed upon a shaft C⁸, extending in approximate right angles to the direction of the length of the shaft C⁵. The shaft C⁸ bears near one of its ends a ratchet-wheel C⁹. This ratchet-wheel derives motion from a pawl *e*, which pawl is mounted upon a rocking pawl-carrier *e'*, loosely hung upon the shaft C⁸. The pawl-carrier *e'* derives motion from an eccentric-rod *e*², which latter is actuated in turn from an eccentric *e*³ upon the main shaft A. It will be readily seen that when the main shaft is rotated rotary motion is transmitted to the

shaft C³, and consequently to the pattern-cams C C'. The pattern-cams C² C³ are rigidly keyed upon the shaft C³, and consequently derive motion from the eccentric e³ in the manner just described. The pattern-wheel C⁴ is mounted upon the shaft D, journaled in suitable bearings d, extending upwardly from the bed of the machine. The shaft D has also keyed upon it a ratchet-wheel d'. The ratchet-wheel d' receives motion from a pawl d², carried by a rocking pawl-carrier d³, deriving motion from an eccentric rod d⁴, which latter is in turn actuated from an eccentric d⁵ upon the main shaft A.

I have shown a friction device T, provided with jaws bearing against the sides of the ratchet-wheel d' and secured to the bed-plate of the machine, which will prevent the rotation of the ratchet-wheel d' in any but the desired direction. This friction device is of ordinary construction. I have also shown a stop-pawl d' for the same purpose mounted upon an upwardly-extending bracket d⁸ adjacent to the ratchet-wheel d'.

I will first describe the manner in which the goods are fed by the feed-rollers. When the ratchet-wheel d' is rotated, it of course transmits motion to the pattern-cam C⁴. This pattern-cam operates in conjunction with a sliding rod J⁵ to transmit motion to a ratchet-wheel f, mounted upon a shaft f', journaled in suitable bearings on the frame of the machine. The shaft f' is in the example of my improvement shown squared near one end and is adapted to slide freely through a squared aperture in a gear-wheel f², which gear-wheel is free to rotate in a bearing f⁴ on a carriage I', comprised in the machine. This gear-wheel is provided with a collar f⁵ upon its hub extending outside of the bearing f⁴, which prevents the gear-wheel from being moved lengthwise by the movement of the shaft f'. This gear-wheel f² meshes with a gear-wheel f⁶, mounted on a shaft f⁷, having in this example of my improvement a squared portion, which extends through a squared aperture in a gear-wheel f⁹, journaled in manner similar to the gear-wheel f² in a bearing f⁸ upon a carriage I, comprised in the machine. During the movement of the carriage I fore and aft the machine the gear-wheel f⁹ may be slid freely to and fro upon the shaft f⁷. The gear-wheel f⁹ meshes with a gear-wheel f¹⁰, mounted upon a shaft f¹¹, journaled in bearings upon the carriage I, which shaft bears a gear-wheel f¹². The gear-wheel f¹² meshes with a gear-wheel f¹³, mounted upon the axle of one of a pair of feed-rollers G' G². The feed-rollers G' G² are journaled in side portions G³ G⁴, extending upwardly from the carriage I. The rollers are geared together near one of their ends, so that they will rotate in unison. The feed-rollers G' G² always rotate in the same direction, or, in other words, to feed the goods forward or toward the rear of the machine. When the goods are being fed forward, the

feed is an intermittent one, a pause occurring each time the needles are passed into the goods, in order to facilitate the completion of the stitch by the shuttles. The conformation of the pattern-cam C⁴ is such that the speed with which the goods are fed forward may be varied at will, in order to provide for sewing irregular patterns upon the goods. The conformation of the pattern-wheels C C' C² C³ is such as to provide for the movement of the carriages I I' in such directions and at such rates of speed as shall accomplish the same result.

J⁵ designates a bar extending fore and aft the machine adjacent to the pattern-wheel C⁴. This bar extends near its rear end through a guide j² on a portion of the frame of the machine. The spring j³, surrounding the rod between said guide and a shoulder j⁴ on the rod, tends to force the rod toward the front of the machine. The rod bears at its front end a roller or bowl j⁵, which is acted upon by a cam J¹¹, mounted upon the main shaft A. As the main shaft rotates the shaft J⁵ is moved backwardly against the resistance of the spring j³. The rod bears upon it a pin or projection j¹⁶, which latter is held constantly in contact with the peripheral portion of the pattern-cam C⁴. The pattern-cam C⁴ is of peculiar construction—that is to say, it is provided upon its periphery with notches or indentations, into which during the rotation of said cam the pin or projection j¹⁶ may be sprung through the action of the spring j³. It will be quite clear that when such action takes place, or, in other words, when the pin drops into one of the indentations on the periphery of the cam, the rod J⁵ will be shot forward toward the front of the machine and the roller or bowl j⁵ moved into a position where it will be acted upon to a greater extent by the cam J¹¹ than is the case when the pin j¹⁶ is riding upon the periphery of the cam. When the pin j¹⁶ has thus dropped into a notch in the periphery of the cam, the cam J¹¹ operates to move the pawl-carrier e⁵, with which the rod J⁵ is connected, backwardly, and when the cam J¹¹ is rotated into such position as to be removed from contact with the roller or bowl j⁵ the rod J⁵ will be moved forward by the spring j³ to cause the rotation of the ratchet-wheel f through the medium of the pawl-carrier e⁵ and its pawl e⁶, and consequently of the feed-rollers G' G², in manner previously described. Of course it is to be understood that the forward feed of the goods does not in this machine transpire unless it is desired to feed the goods directly forward, so as to sew lines in the direction of the length of the goods. When the cam C⁴ has rotated far enough, the pin or projection j¹⁶ will ride up upon the periphery of the cam, and the roller or bowl j⁵ will not then be acted upon by the cam J¹¹ to cause a rotation of the ratchet-wheel f, and thus of the feed-rollers.

Before proceeding to a description of the mode of operation and construction of the

pattern-cams for varying the direction and degree of movement of the carriages I I', I will describe said carriages briefly. The carriages I I' constitute a support for the work to be sewed. The carriage I', or the lower of said carriages, is the one which receives motion from side to side of the machine. It consists, as herein shown, of plate-sections, one upon each side of the work-bed of the machine, joined together by a connecting-piece I¹⁰. The plate-sections are supported upon anti-friction rollers *h*, traveling in guideways *h'* on the base of the machine. Guides *i* on the base of the machine serve to guide the carriage I' in its to-and-fro movements. The carriage I consists of plate-sections I², mounted upon the carriage I', and adapted to be slid to and fro in guideways *i'* upon the carriage I'. The carriage I has a movement fore and aft the machine, which movement is independent of the movement imparted to the carriage I'. The carriage I', however, when it moves from side to side of the machine carries with it the carriage I. The carriages I I' constitute in effect a single carriage. It is necessary in order to sew a pattern such as I have illustrated that the motions of the carriages should be variable, or, in other words, should be capable of moving different distances in a given direction. In sewing the pattern shown, for instance, the carriage will move a portion of the time directly toward the right or left. At other times it will move directly toward the front or rear, and at other times the movement will be a combined side to side and forward and backward. When this combined movement transpires, it will be apparent that the deviation from lines running parallel with or at right angles to the direction of the forward feed of the goods will be very slight in some instances. In order to provide for these slight deviations and produce a symmetrical figure, I have divided each stitch into ten arbitrary equal parts, so that a deviation "from a right line which a stitch may take will equal one-tenth of a stitch taken at right angles to a line from which the first stitch deviates. Such deviation from a right line may equal any number of tenths of the length of a stitch which may be desired, according as the curve or angle of the pattern be slight or great.

The deviation of the stitches from a right line are produced as follows: Each figure of the pattern illustrated, for instance, contains one hundred and fifteen stitches. Each of the pattern-wheels C C' C² C³ is divided radially into one hundred and fifteen sections *c*, corresponding to the number of stitches in the pattern. Consequently when the pattern-wheels have made one complete revolution each of the needles has sewed a complete figure. Each separate movement of the pattern-wheels occasioned by the ratchet and pawl C⁹ *e* moves each of the wheels a distance equal to the length of one of the sections on the periphery of the wheel. The periphery of each of the wheels is stepped throughout,

each step corresponding to one of the radial sections *c* and representing a single stitch taken in the goods. The depth of these steps varies according as it is desired that the stitch shall deviate more or less from a right line.

In order to cause variation in the speed with which the carriages are moved, the contour of the periphery of the cams C C' C² C³ is irregular, the irregularity being such as will cause the movement of the carriages only in such direction and to such extent as is necessary to produce a desired pattern. Of course these pattern-cams may be changed at will in order to provide for the sewing of different patterns on the goods.

Extending from the carriage I' is an arm C¹⁰, which arm extends between the pattern-wheels C C'. Upon this arm are pins or projections *j*, one of which bears upon the periphery of the cam C and the other of which bears upon the periphery of the cam C' at diametrically-opposite points. The arm C¹⁰ is provided about midway in its length with a longitudinal slot, which extends about the shaft C⁵, whereby free longitudinal movement of said rod is permitted. As the cams C C' rotate, the pins or projections *j*, bearing upon their peripheries, are moved into and out of the steps upon the peripheries of the cams, and, according as the greater projection from the center of rotation of the cams is upon one side or the other, the arm C¹⁰ will be moved, and will consequently move the carriage C' to one side or the other of the machine, as the case may be. It is to be understood in this connection that the diametrical distance between those portions of the peripheries of the cams which are in contact with the pins *j* is always the same. In other words, an increased diameter upon one side of one of the cams is met by a correspondingly-decreased diameter upon the diametrically-opposite side of the other of said cams. One of the pair of cams C C' causes the carriage I' to move in one direction, while the other of said pair of cams causes the movement of said carriage in the other direction. As previously stated, the cams C² C³ cause the movement of the carriage I in a direction fore and aft the machine.

The construction of the cams C² C³ is like that of the cams C C', previously described, and they operate by similar means to transmit motion to the carriage I, excepting that the rod C²⁰, acting in conjunction with these cams, has upon it a rack *l*, which rack engages a gear-wheel *l'* upon a shaft L, journaled in bearings upon the carriage I'. The shaft L bears gear-wheels *l²*, engaging racks *l³* upon the carriage I. When the rod C²⁰ is moved longitudinally, it operates to rotate the shaft L, which latter, through the gear-wheels *l²* and racks *l*, causes a fore-and-aft motion of the carriage I. The gear-wheel *l'* is made with very long teeth, so that it may be slid along upon the teeth of the rack *l* during the side-to-side movement of the car-

riage I' without becoming disengaged from said rack.

I have shown the work-bed of the goods as upported upon an upright frame II, secured upon the base of the machine and extending upwardly and about a connecting-piece into a suitable position beneath the needles.

P designates a delivery-roller for the goods, and P' a take-up roller. These rollers are shown as journaled in suitable brackets in the carriage I'.

In Fig. 4 I have shown a different means for transmitting motion to the shaft C⁸. In this case instead of mounting the ratchet-wheel C⁹ upon the shaft C⁸, I mount it upon a separate shaft C¹⁵, journaled in suitable bearings on the base of the machine. On the shaft C¹⁵ is keyed a gear-wheel C¹⁶, which gear-wheel meshes with another gear-wheel C¹⁷, keyed upon the shaft C⁸. By this means motion is transmitted from the ratchet-wheel C⁹ to the shaft C⁸. The gear-wheel C¹⁶ contains a fewer number of teeth than the gear-wheel C¹⁷, and by varying the size of the gear-wheel C¹⁶ any desired degree of speed may be imparted to the shaft C⁸. This arrangement therefore enables me to use larger ratchet-teeth on the ratchet-wheel C⁹, whereby a very positive and uniform intermittent movement will be imparted to the pattern-cams. When this arrangement of parts is used, I do not consider it essential that the peripheries of the cams C C' C² C³ should be "stepped," as described.

Any number of rows of needles may be used, and these may be operated in any desired manner. In Figs. 5 and 6 I have shown that more than one row of needles may be employed in the machine. In Fig. 5 two rows of needles are indicated, the needles of one row being arranged directly behind those of the other row. In Fig. 6 two rows of needles are delineated, the needles of one row being at a distance from and intermediate of the needles of the other rows, so that a line drawn between the needles of the two rows will be a zigzag line. The resultant movement of the goods beneath the needles is such as to produce the respective patterns delineated.

I have filed an application for United States Letters Patent, Serial No. 199,412, of April 19, 1886. In said application I show and describe a work-supporting carriage and mechanism for imparting motion thereto in two lines at right angles to each other in a single plane. I do not herein claim anything claimed therein.

In pending applications numbered, respectively, 199,412, 263,560, 286,110, and 291,320, I have shown and claimed mechanism similar to that shown, but not claimed herein.

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

1. In a sewing-machine, the combination, with sewing mechanism, of a support for the work, a main shaft, a shaft extending parallel with the main shaft and deriving motion

therefrom, two pattern-cams mounted on said second shaft, a third shaft deriving motion from the second-named shaft and extending at right angles thereto, two pattern-cams mounted on said third-named shaft, and gearing, substantially such as described, operated from the pattern-wheels mounted on the second-named shaft, for causing a fore-and-aft motion of the said work-support, and an arm operated from the pattern-wheels mounted on the third-named shaft for causing a side-to-side movement of said work-support, substantially as specified.

2. In a sewing-machine, the combination, with a sewing mechanism, of a support for the work, a main shaft, two pairs of pattern-cams for imparting motion to said work-support, and arms extending between said pattern-cams, each of said arms bearing two pins or projections, one of which pins or projections bears upon one of the cams of the pair with which it co-operates and the other of said pins or projections bears upon the other of said pair of cams, said arms serving to transmit motion to the work-support, substantially as specified.

3. In a sewing-machine, the combination, with sewing mechanism, of a support for the work, a pair of pattern-cams, a shaft upon which said cams are mounted, an arm provided with projections bearing upon the peripheries of said cams, said arm being provided with a rack, a gear-wheel with which said rack engages, a shaft upon which said gear-wheel is mounted, other gear-wheels mounted on said shaft, and racks upon the work-support, with which the last-named gear-wheels engage, substantially as specified.

4. In a sewing-machine, the combination, with sewing mechanism, of a support for the work, a rack and pinion for imparting a movement to the support, a shaft upon which said pinion is mounted, a pinion provided with elongated teeth, also mounted on said shaft, a rack engaging said last-named pinion, and pattern-wheels imparting a longitudinal movement to said last-named rack, substantially as specified.

5. In a sewing-machine, the combination, with sewing mechanism, of a support for the work, a pair of pattern-cams, a shaft upon which said cams are mounted, an arm provided with projections bearing upon the peripheries of said cams, said arm being provided with a rack, a shaft mounted on the work-support so as to move with the latter, a gear-wheel engaging said rack and mounted on the last-named shaft so as to move with the same, other gear-wheels mounted on said last-named shaft, and racks upon the work-support, with which said last-named gear-wheels engage, substantially as specified.

6. In a sewing-machine, the combination, with sewing mechanism, of a support for the work, a shaft, a pattern-cam controlling the rotation of said shaft, a gear-wheel rotated by said shaft, a second gear-wheel rotated by the

gear-wheel first named, a shaft mounted upon the said work-support and bearing the gear-wheel last named, a third gear-wheel rotated by the second-named shaft, said gear-wheels and shafts being connected to have a relative sliding movement, feed-rollers, and gearing intermediate of said last-named gear-wheel and the feed-rollers for transmitting motion to the latter, substantially as specified.

- 10 7. In a sewing-machine, the combination, with sewing mechanism, of a support for the work, a shaft, a pattern-cam controlling the rotation of said shaft, feed-rollers, a second

shaft, intermittently-operating bevel gear-wheels for transmitting motion from the first-named to the second-named shaft, other intermittently-operating bevel gear-wheels for transmitting motion from the second-named shaft to the feed-rollers, one of said last-named gear-wheels being movable lengthwise on the second-named shaft, substantially as specified.

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Witnesses:

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EDW. J. GALLAGHER.