

(No Model.)

3 Sheets—Sheet 1.

M. GERNSHYM.  
CIRCULAR KNITTING MACHINE.

No. 462,546.

Patented Nov. 3, 1891.

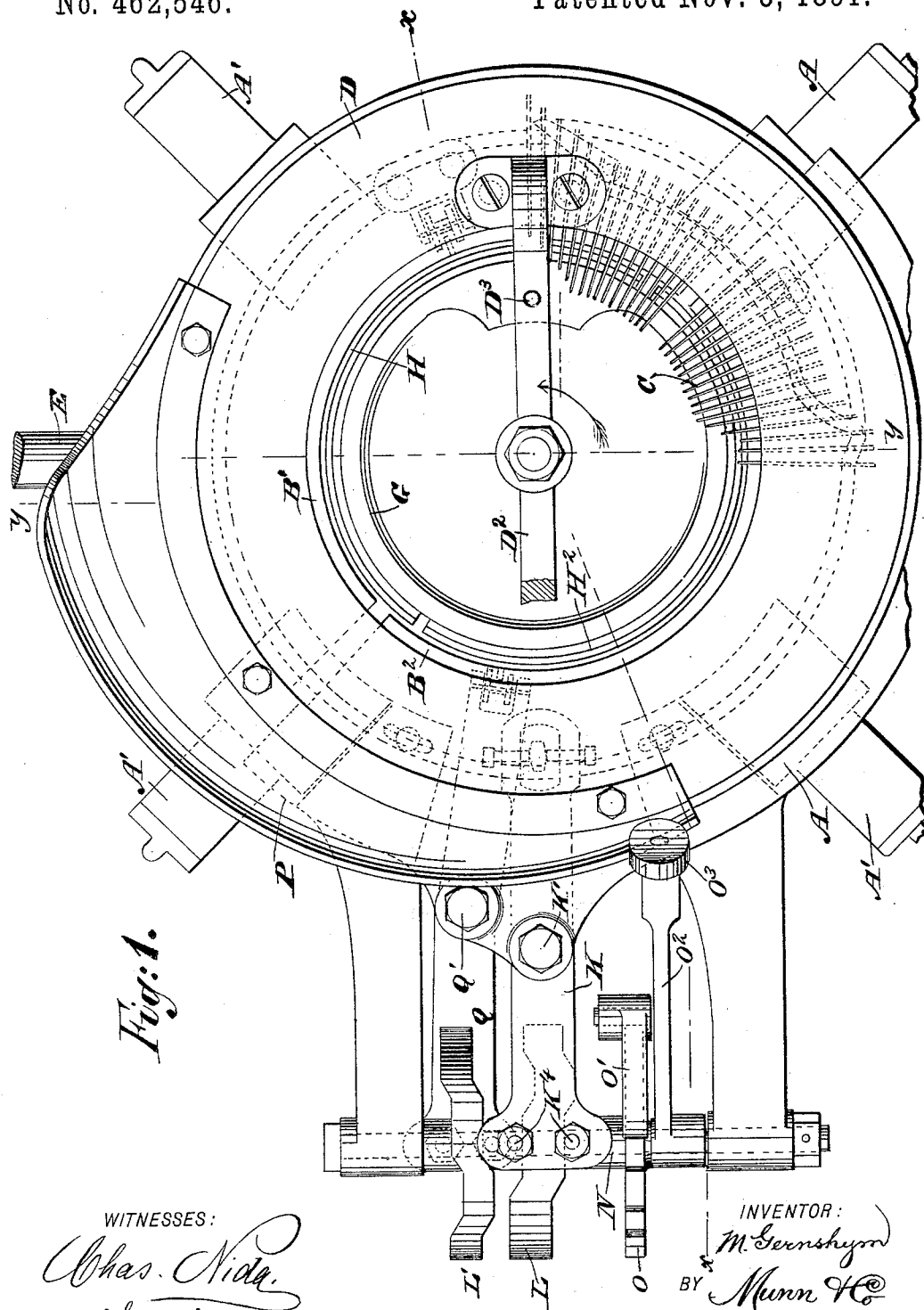


Fig. 1.

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INVENTOR:

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BY *Munn & Co*

ATTORNEYS

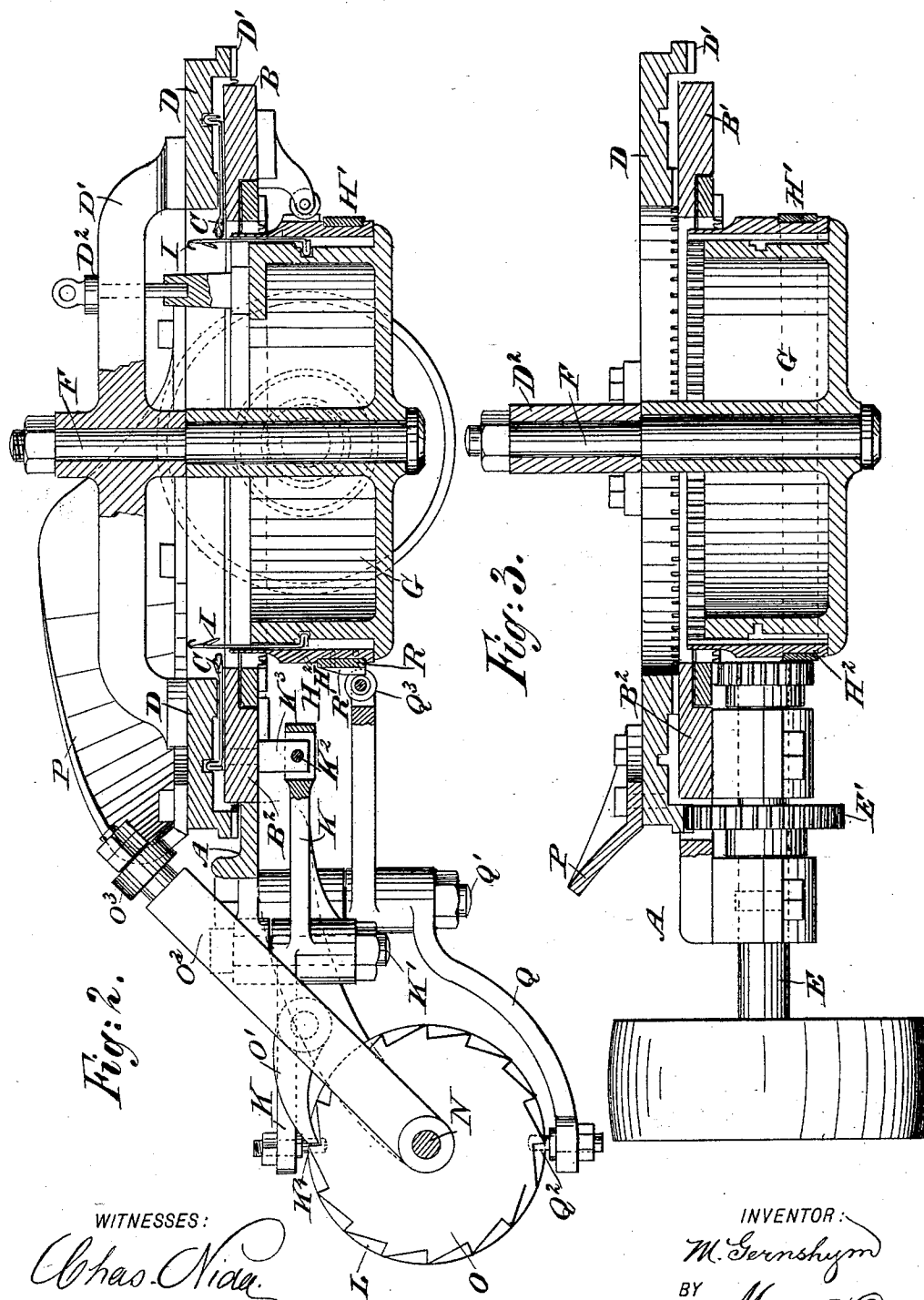
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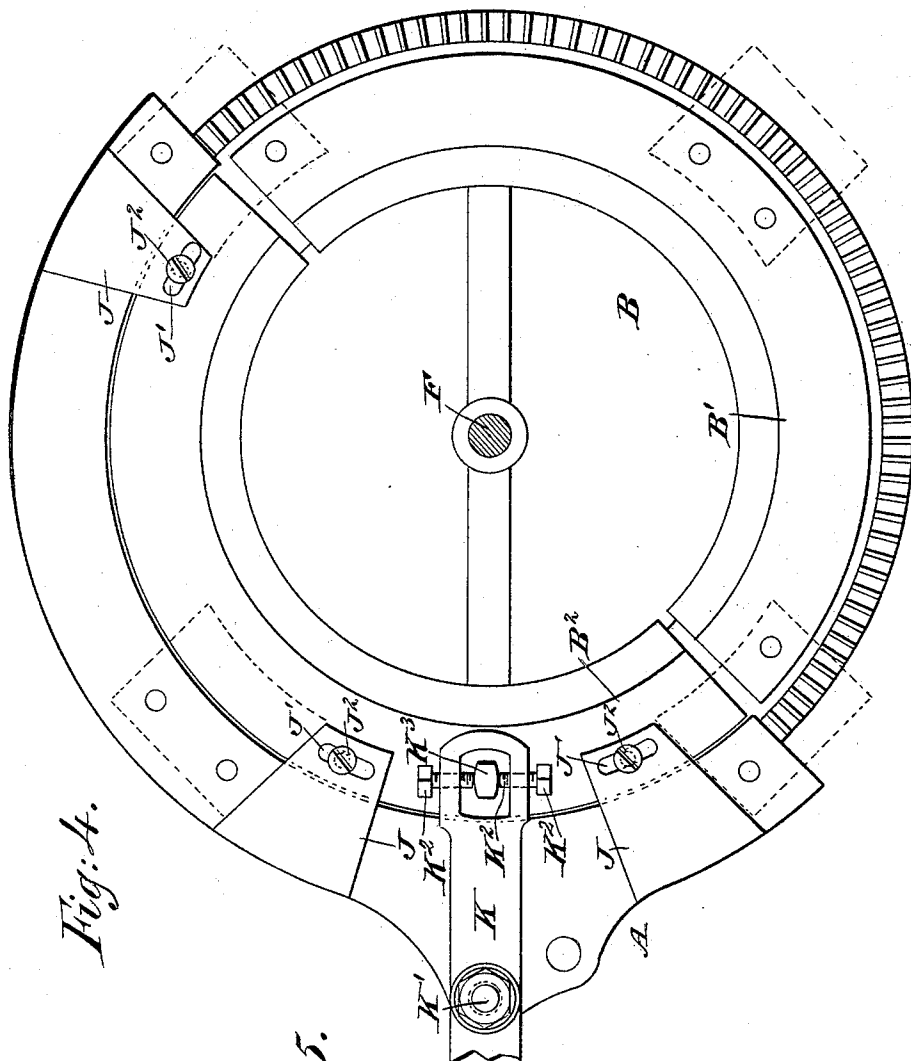
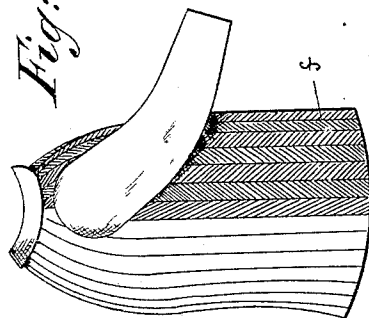


Fig. 4.

Fig. 5.



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# UNITED STATES PATENT OFFICE.

MAX GERNSHYM, OF BROOKLYN, NEW YORK.

## CIRCULAR-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 462,546, dated November 3, 1891.

Application filed June 17, 1891. Serial No. 396,562. (No model.)

*To all whom it may concern:*

Be it known that I, MAX GERNSHYM, of Brooklyn, in the county of Kings and State of New York, have invented new and useful Improvements in Circular-Knitting Machines, of which the following is a full, clear, and exact description.

The invention relates to circular-knitting machines having plate-needles and cylinder-needles for producing ribbed tubular fabrics.

The object of the invention is to provide certain new and useful improvements in circular-knitting machines, whereby part of the tubular fabric produced is formed with a figured design according to a predetermined pattern, while the rest of the fabric is knitted in the usual manner in plain ribs with Cardigan or other stitch.

The invention consists in forming either the cylinder or plate, or both, in sections, of which one is shifted to change the relative position of part of the cylinder and plate needles.

The invention further consists of pattern-wheels governing the movement of the movable section to reproduce on the fabric the pattern represented by the pattern-wheel.

The invention also consists of certain parts and details and combinations of the same, as will be hereinafter described, and then pointed out in the claims.

Reference is to be had to the accompanying drawings, forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a plan view of the improvement as applied, detailed parts of the ordinary knitting-machine being omitted. Fig. 2 is a sectional side elevation of the same on the line  $x x$  in Fig. 1. Fig. 3 is a transverse section of the same on the line  $y y$  in Fig. 1. Fig. 4 is an inverted plan view of the improvement, and Fig. 5 is a side elevation of the fabric produced.

The improved knitting-machine is of the ordinary circular type and is provided with the usual bed-plate A, mounted on suitable legs A' and carrying in its middle part the needle-plate B, on the top of which are fitted to slide the plate-needles C, receiving their horizontal sliding motion in the usual manner from the cam D, mounted to revolve and

provided with gear-teeth D' in mesh with the gear-wheel E', secured on the main shaft E, mounted to turn in suitable bearings on the bed-plate A.

The needle-plate B is made in two sections B' and B<sup>2</sup>, of which the section B' is fixed, while the section B<sup>2</sup> is fitted to slide, one or two needles being omitted at the adjoining ends of the said sections to permit sufficient movement of the section B<sup>2</sup>. The cam D for the plate-needles C is provided with the usual spider D<sup>2</sup>, mounted to turn on the spindle F, on the lower end of which is mounted to turn the cam-cylinder G, surrounded by the needle-cylinder H, carrying the vertical or cylinder needles I, operating in conjunction with the plate-needles C to produce the fabric. It will be seen that when the movable section B<sup>2</sup> of the needle-plate is shifted its needles change their position relative to the vertical or cylinder needles extending along the inner edge of the said movable section B<sup>2</sup>. Thus by varying the distance the section B<sup>2</sup> is shifted relative to the vertical or cylinder needles I, a different design or pattern-work may be produced in that part of the fabric knitted by the needles contained in the section B<sup>2</sup> and the corresponding vertical needles. The section B<sup>2</sup> may be shifted, so that one of its needles moves the distance between two, three, four, or more vertical needles I to vary the design, as may be desired. A variation may also be produced by forming the needle-cylinder H of two sections H' and H<sup>2</sup>, of which the section H' is fixed and the other section H<sup>2</sup> is shifted circularly on the cylinder G. The section H<sup>2</sup> is arranged in line with the section B<sup>2</sup>, so that the two sections, when shifted in opposite directions, shift the relative position of their needles to produce certain pattern-work. A like result may be produced by shifting the section H<sup>2</sup> only, the section B<sup>2</sup> remaining stationary or forming an integral part of the other section B', as in ordinary knitting-machines. It is understood that this shifting of the section B<sup>2</sup> or H<sup>2</sup>, or both, at the same time takes place, preferably, at every revolution of the cylinder G and the cam D, and at the time the needles C are in their innermost position and the needles I in their lowermost position. The cylinder G is carried along by a pin D<sup>3</sup>, engaging a projec-

tion on the said cylinder and held removably in the spider  $D^2$  of the cam D. (See Fig. 2.)

The segmental section  $B^2$  of the needle-plate B is held in place by a series of plates J, fastened to or forming integral parts of the bed-plate A, as plainly illustrated in Fig. 4. Each plate projects under the segmental section  $B^2$ , and is provided with a slot  $J'$ , through which passes a screw  $J^2$ , screwing in the section  $B^2$ . The plates J thus form a bearing with the bed-plate A for the movable section  $B^2$ , and the slots  $J'$  permit movement of the screws  $J^2$ , carried by the section  $B^2$ . The shifting of the movable section  $B^2$  is accomplished by means of a lever K, fulcrumed at  $K'$  on the bed-plate A and provided at its inner end with a recess and set-screws  $K^2$ , engaging a projection  $K^3$  extending downward from the movable section  $B^2$ . The outer end of the lever K carries two pins or friction-rollers  $K^4$ , engaging opposite faces of a pattern-wheel L, secured on a shaft N, mounted to turn in suitable bearings held in brackets projecting from the bed-plate A.

The shaft N carries a ratchet-wheel O, engaged by a pawl  $O'$ , pivoted on a lever  $O^2$ , fulcrumed loosely on the shaft N, and carrying at its free end a friction-roller  $O^3$ , engaging a cam P, fastened to the cam D for the plate-needles. Thus when the cam D rotates the cam P imparts a swinging motion to the lever  $O^2$ , so that its pawl  $O'$ , engaging the ratchet-wheel O, turns the latter, and consequently the shaft N, carrying the pattern-wheel L. The latter is shaped on its faces according to the movement desired to be given the section  $B^2$ , so that the rotation of the said pattern-wheel L imparts a swinging motion to the lever K, which, by engaging the section  $B^2$ , shifts the latter forward or backward to change the relative positions of the plate-needles carried by the section  $B^2$  relative to the corresponding vertical or cylinder needles operating in conjunction with the plate-needles carried by section  $B^2$ .

The cam P is arranged opposite that part of the cam-groove in the cam D by which the inward-sliding motion of the needle C is accomplished. (See Fig. 1.) If the section  $H^2$  of the needle-cylinder H is shifted for changing the design of part of the fabric, then a similar device is employed as above described, in reference to the section  $B^2$ —that is, a lever Q for shifting the said section and a pattern-wheel  $L'$  for operating the said lever Q.

The lever Q is fulcrumed at  $Q'$  on the bed-plate A, and carries at its outer end pins or friction-rollers  $Q^2$ , engaging opposite faces of the pattern-wheel  $L'$ . The inner end of the lever Q carries a grooved friction-roller  $Q^3$ , engaging a vertical rib  $R'$ , formed in the ring R, attached to the section  $H^2$  of the needle-cylinder H. It is understood that the connection between the lever Q and the section  $H^2$  is made in this manner, so that the fabric can pass down over the said needle-cylinder—that is, between the friction-roller

$Q^3$  and the ring R, at the same time permitting the lever Q to shift the section  $H^2$  whenever the said lever is actuated from the pattern-wheel  $L'$ .

It is understood that both sections  $B^2$  and  $H^2$  can be operated simultaneously, but in opposite directions, by their levers K and Q and the pattern-wheels L and  $L'$ , respectively. Either of the levers K or Q, however, may be disconnected from its respective pattern-wheel, so that only one lever at a time operates its respective section to produce a figured or pattern part on the fabric. It will further be seen that instead of making either the needle-plate or the needle-cylinder each in two sections, as above described, and illustrated in the drawings, each may be made in three or more sections to produce figured or pattern work on different parts of the fabric.

It is understood that in case more than two sections are employed several may be movable and the rest fixed, according to the work designed to be finished on the machines. The fixed and movable sections are then preferably arranged alternately.

As illustrated in Fig. 5, the fabric produced is a Cardigan jacket, which is made in tubular form by the knitting-machine, then the front is cut open, then the sleeves are inserted, and the same attached in the usual manner; but the front of the cardigan has a design or pattern work, while the rear or back part is of the ordinary ribbed style.

I am aware that circular-knitting machines have been constructed in which the entire needle-cylinder is shogged for forming a circular commencing course or a circular border on the fabric, and I am further aware that straight-knitting machines provided with sections capable of being shogged have been in use; but such construction and the results obtained thereby are foreign to my invention, and I do not claim the same.

The fabric produced by this machine forms the subject-matter of a separate application filed by me under date of July 22, 1891, Serial No. 400,294.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. A circular-knitting machine provided with a set of plate-needles, a set of cylinder-needles, and means for circularly shifting part of the said plate-needles and part of the said cylinder-needles, substantially as shown and described.

2. A circular-knitting machine provided with a set of cylinder-needles, and means for circularly shifting part of the said set of cylinder-needles, substantially as shown and described.

3. A circular-knitting machine provided with a set of plate-needles, and means for circularly shifting part of the said plate-needles, substantially as shown and described.

4. A circular-knitting machine provided with a circular needle-plate composed of fixed

and movable segmental sections, substantially as shown and described.

5 5. A circular-knitting machine provided with a circular needle-plate composed of a fixed segmental section and a movable section, and means for circularly shifting the movable section, substantially as shown and described.

6. A circular-knitting machine provided with a needle-cylinder made of fixed and movable segmental sections, substantially as shown and described.

7. A circular-knitting machine provided with a needle-cylinder composed of fixed and movable segmental sections, and means for circularly shifting the said movable sections, substantially as shown and described.

8. A circular-knitting machine provided with a needle-cylinder made in fixed and circularly-movable sections, and a needle-plate composed of a fixed section and a section circularly movable relative to the said movable needle-cylinder section, substantially as shown and described.

9. In a circular-knitting machine, the combination, with a needle-plate composed of fixed and movable segmental sections, of a lever engaging the said movable section to move the same circularly, and a pattern-wheel for actuating the said lever, substantially as shown and described.

10. In a circular-knitting machine, the combination, with a needle-plate composed of a fixed section and a circularly-movable section, of a lever engaging the said movable section, a pattern-wheel for actuating the said lever, a plate-needle cam, and means for actuating the said pattern-wheel from the said cam, substantially as shown and described.

11. In a circular-knitting machine, the combination, with the cylinder-needles, the needle-cylinder, and means for operating the cylinder-needles, of the cam for the plate-needles, the needle-plate made in sections, of which one is fixed and the other movable, and means for imparting motion to the movable section, substantially as shown and described.

12. In a circular-knitting machine, the combination, with the cylinder-needles, the needle-cylinder, and means for actuating the cylinder-needles, of the cam for the plate-needles, the needle-plate made in fixed and movable segmental sections, and means, substantially as described, for imparting motion to the said movable section, comprising a lever connected with the said movable section, and a pattern-wheel for actuating the said lever and receiving its motion from the said cam for the plate-needles, substantially as shown and described.

13. In a circular-knitting machine, the combination, with the cylinder-needles, the needle-cylinder, and means for actuating the cylinder-needles, of the cam for the plate-needles, the needle-plate made in fixed and movable segmental sections, means, substantially as described, for imparting motion to the said movable section, comprising a lever connected with the said movable section, and a pattern-wheel for actuating the said lever and receiving its motion from the said cam for the plate-needles, and intermediate mechanism for connecting the said cam for the plate-needles with the said pattern-wheel, substantially as shown and described.

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Witnesses:

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