(No Model.) 5 Sheets—Sheet 1.

G. MÜLLER.

EMBROIDERING MACHINE.

No. 563,200. Patented June 30, 1896.

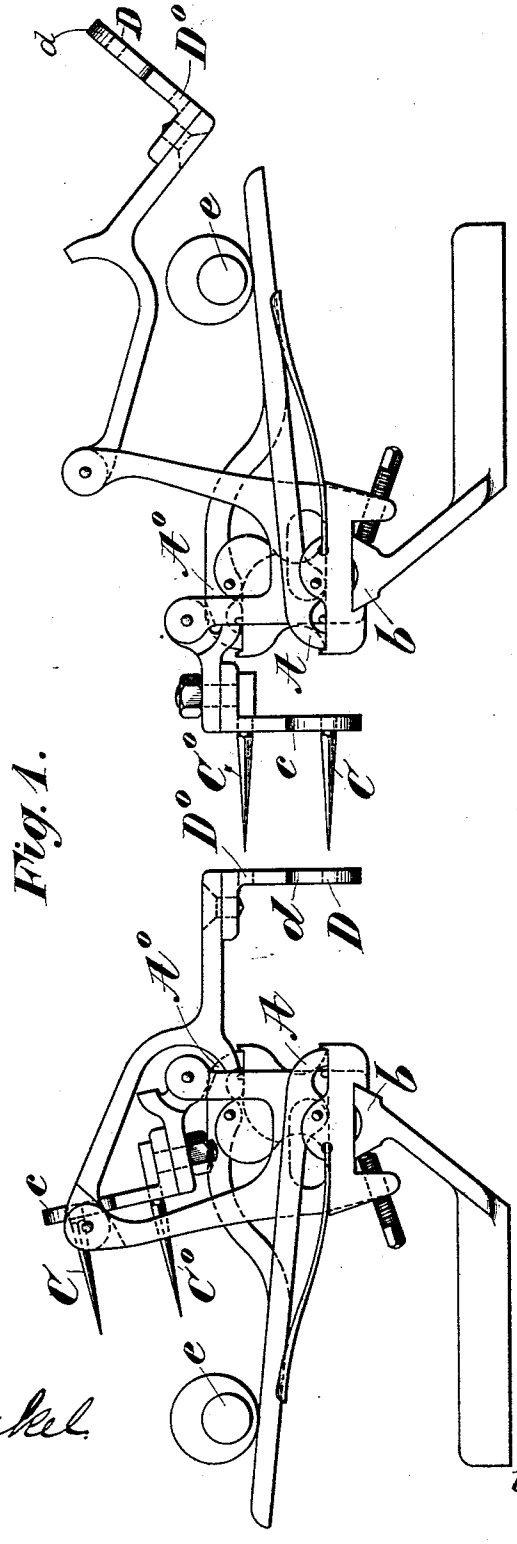

Fig. 1.

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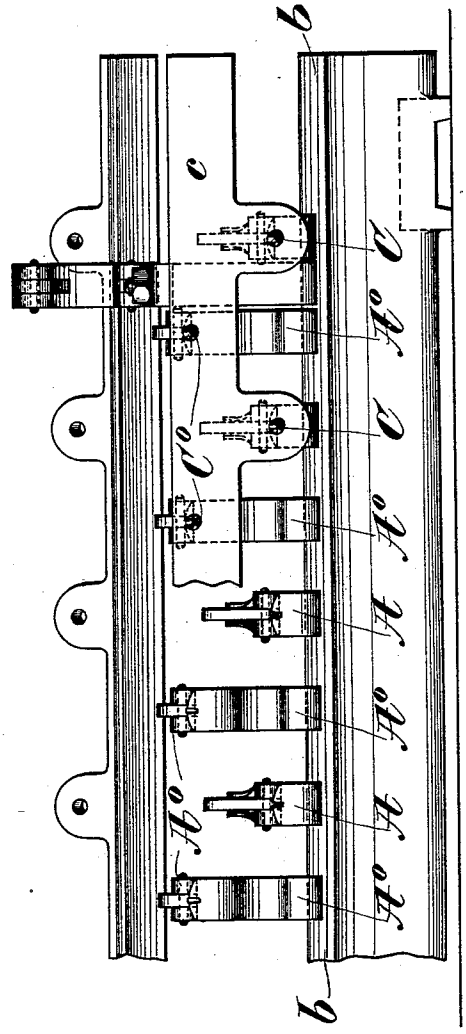

Fig. 2.

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G. MÜLLER.

EMBROIDERING MACHINE.

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Fig. 7.

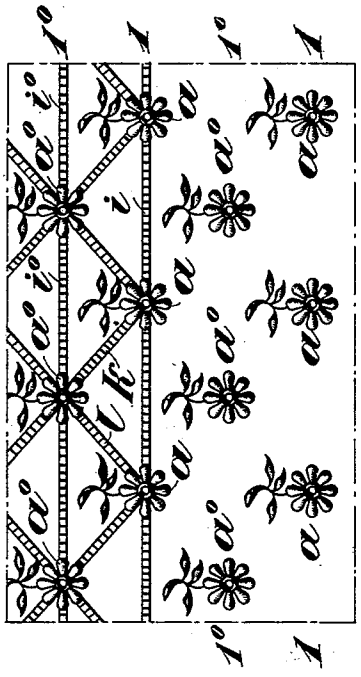


Fig. 3.

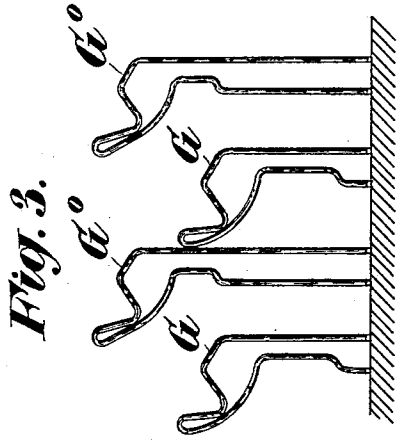
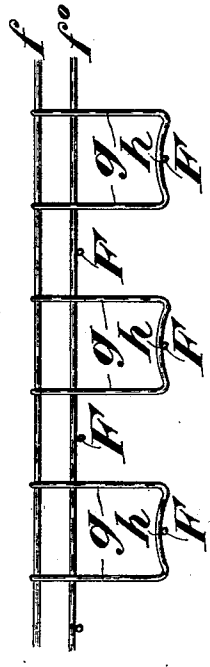


Fig. 4.



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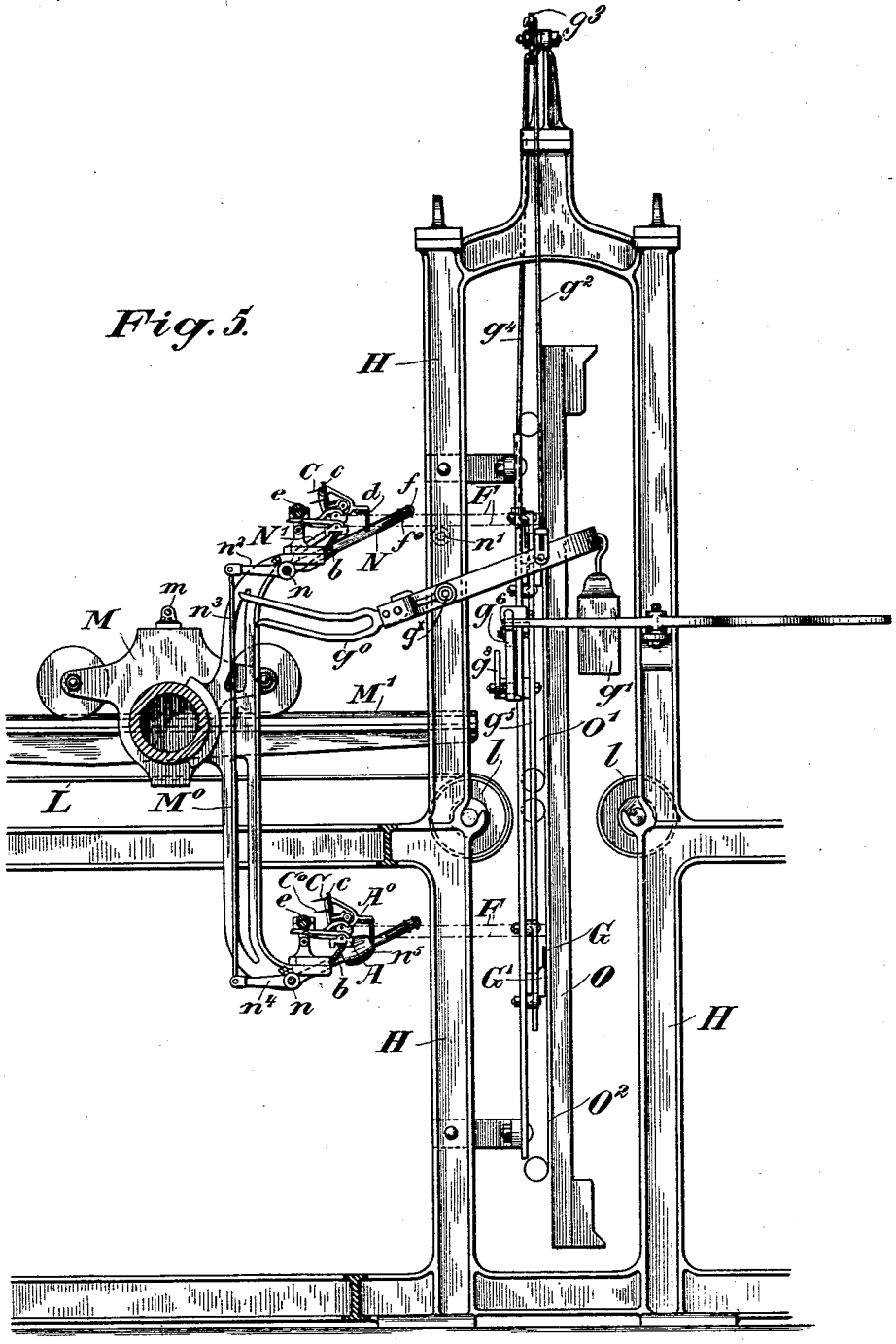
EMBROIDERING MACHINE.

No. 563,200. Patented June 30, 1896.

Fig. 5.



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(No Model.)

5 Sheets—Sheet 5.

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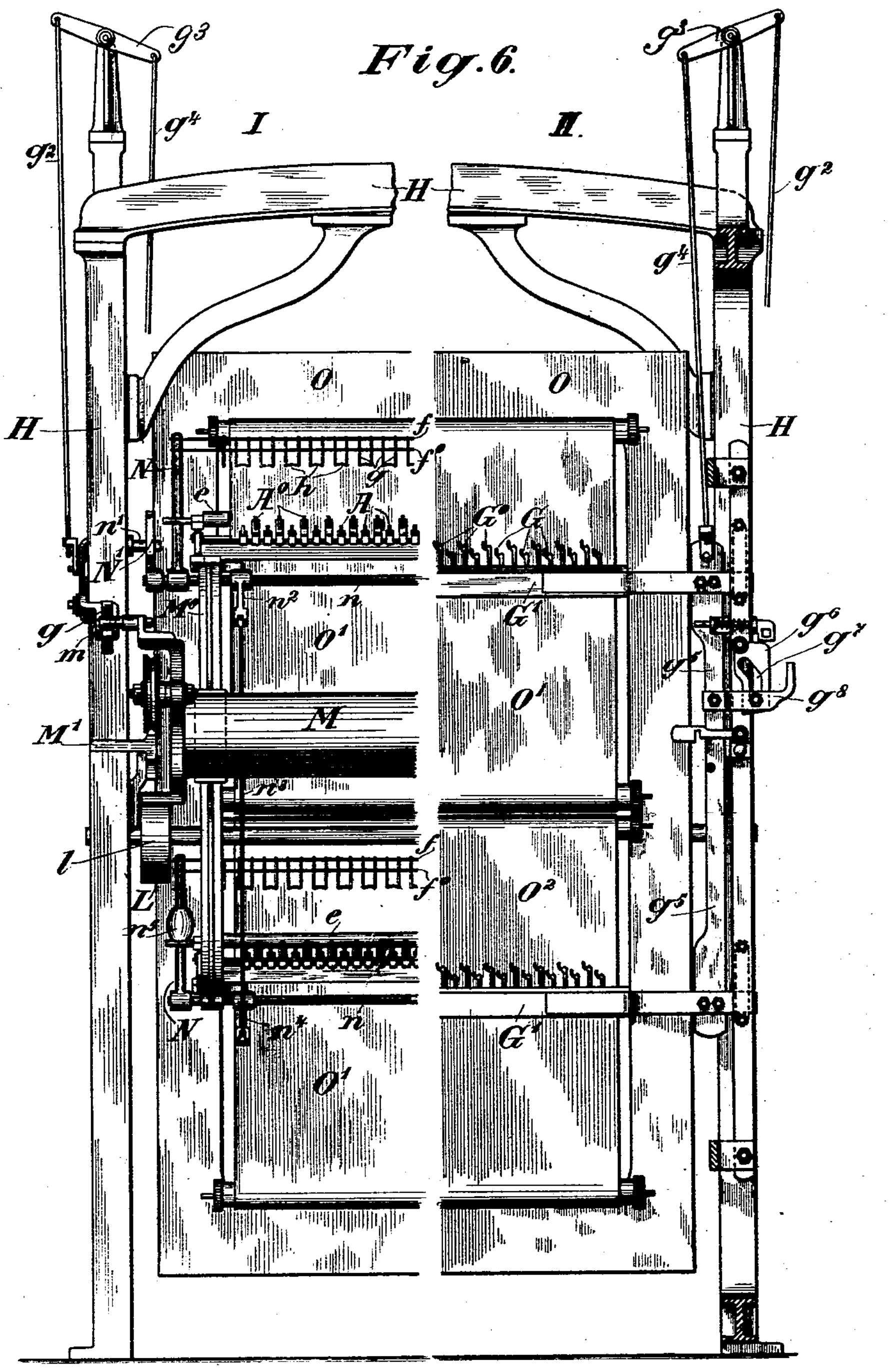
EMBROIDERING MACHINE.

No. 563,200. Patented June 30, 1896.



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UNITED STATES PATENT OFFICE.

GOTTFRIED MÜLLER, OF HERISAU, SWITZERLAND.

EMBROIDERING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 563,200, dated June 30, 1896.

Application filed September 21, 1895. Serial No. 563,249. (No model.) Patented in Switzerland January 23, 1895, No. 9,623.

To all whom it may concern:

Be it known that I, GOTTFRIED MÜLLER, a citizen of the Republic of Switzerland, residing at Herisau, in the Canton of Appenzell, Switzerland, have invented certain new and useful Improvements in Embroidering-Machines, (for which I have obtained a patent in Switzerland, No. 9,623, bearing date January 23, 1895,) of which the following is a specification.

This invention has reference to certain improvements in the well-known Swiss embroidering-machines, by which can be accomplished the embroidering of various designs, which consist of a single or multiple repetition of a row or line of figures in which, however, the alternate parallel series of rows or lines of figures are transposed so as to be shifted sidewise of but symmetrically with respect to the other rows. If, for instance, each row or line of figures consists of a number of pattern-figures, the figures of one row or line are located either below or above and almost intermediately between those of the adjacent row of figures.

By my improved attachment for embroidering-machines the figures of two adjacent but relatively shifted or transposed parallel rows are simultaneously embroidered. For this purpose the attachment consists of a full set of embroidering mechanisms, such as needle-holders, piercers, counter-pressure rails, festooning-forks, &c., and a second set of these embroidering mechanisms, which, when the first set has produced a row of pattern-figures, simultaneously produces a second adjacent but relatively shifted or transposed parallel row of pattern-figures. For the carrying out of this object, the two simultaneously-operating embroidering mechanisms are transposed or shifted relatively but substantially parallel and symmetrically with respect to each other.

In the accompanying drawings, Figure 1 represents a side elevation of one form of attachment to embroidering-machines, by which shifted or transposed parallel rows of pattern-figures can be produced. Fig. 2 is a front elevation of the two sets of embroidering mechanisms. Fig. 3 shows some of the festooning-forks in side elevation. Fig. 4 represents a broken detail view of the thread-separating device. Fig. 5 represents a sectional side elevation of an embroidering-machine embodying my improvements and showing the relative arrangement of the embroidering mechanisms in connection with the main parts of the machine, and in which the festooning-forks, which are located immediately in front of the embroidering-frame, are covered by the actuating mechanisms and are consequently not visible, while the carriage on the right-hand side of the machine, which is the same in all its details as the carriage on the left-hand side, is omitted. Fig. 6 is a front elevation of the embroidering-machine shown in Fig. 5, the left-hand half showing especially the arrangement of the operating mechanisms which are used in the embroidering operation, while the right-hand half omits some of said operating mechanisms to show clearly the embroidering-frame and fabric to be embroidered, together with the festooning-forks; and Fig. 7 is a sample of a design as embroidered by my improved attachment for embroidering-machines.

Similar letters of reference indicate corresponding parts.

The type of machine shown in Figs. 5 and 6 of the annexed drawings, and in connection with which my improvements illustrated in Figs. 1 to 4, inclusive, are shown, is well known as "Heilmann's embroidering-machine."

H indicates the frame of the machine, and M the carriage, only one of which is shown on the left-hand side, said carriage being reciprocated on the rail M′ by means of a belt L, which is guided over rollers *l*.

O represents the embroidering-frame, which is connected in the usual manner, by means of a pantograph, with the original design and is shifted by the same in a plane at right angles to the direction of movement of the carriage M.

O' O^2 are the fabrics which are stretched upon the embroidering-frame.

In embroidering-machines heretofore constructed, in which two or more rows of needle-clamps are arranged in tiers one above the other, it is only possible to embroider one row of designs upon the fabric at a time, while for every width of fabric only one row of needle-clamps on the carriage and a single set of festooning or looping forks are arranged in front

of the embroidering-frame. In my invention, however, it is possible to embroider line 1 of pattern-figures *a* (shown in the lower part of Fig. 7) simultaneously with a second row or line of figures 1^0, whose pattern-figures are identical with those of the line or row 1, but shifted sidewise or laterally of, so as to be arranged intermediately between but parallel and symmetrically with relation to the pattern-figures of the row 1. For the simultaneous embroidering of the two lines or rows, each needle-clamp support *b* of the embroidering-machine has mounted thereon a row of regularly-arranged needle-clamps A, and a second corresponding and parallel row of needle-clamps A^0, which are supported, however, higher than the clamps A, and which are shifted relatively thereto, so as to be located approximately midway between the same. (See Figs. 1 and 2 in addition to Figs. 5 and 6.) In like manner the piercer rail or bracket *c* is provided with two sets of piercers C C^0, and the corresponding counter-pressure rail or bracket *d* with two rows of holes D D^0, of which one row is parallel with and located laterally of, but above and symmetrically to, the other row. The spring-actuated rear ends of the upper members of all of the needle-clamps A A^0, which are disposed on one common support or bracket, are so arranged that they are located in one plane and are actuated by one common prolongated cam *e*. Corresponding to the two rows of needle-clamps of each support or bracket *b* the festooning-forks, which serve for the catching of the loops and keeping them open, are likewise arranged in a row so that some of the same will be higher than the others, as shown in Fig. 3, enlarged, and on a reduced scale in Fig. 6. For this purpose short forks G are made to alternate with higher forks G^0, the former corresponding to the rows of embroidering mechanisms A C D, while the latter corresponds to the additional rows of embroidering mechanisms A^0, C^0, and D^0. These festooning-forks are usually arranged in front of the embroidering-frame O, upon a horizontal bar or row G′, which during the festooning operation is moved by a suitable mechanism laterally but in upwardly-inclined or oblique direction, whereby the forks are caused to catch the loops of thread and draw them in upward direction. After the loops of thread are moved upwardly, they are again released as soon as they are engaged by the next stitches, whereupon the forks are again lowered by the bar or rail G′. For producing this movement of the bar or rail G′ and the festooning-forks carried thereby, I arrange at the side of the frame a forked operating-lever g^0, hung on a pivot $g^\times$ on the frame of the machine, which lever is provided at its rear end with a balance-weight g'. When the festooning or looping is to be accomplished, the forked operating-lever g^0 is moved downwardly through the medium of a pin *m*, that projects laterally from the frame of the carriage, which pin during the forward motion of the carriage is moved between the correspondingly-curved bifurcations of the forked lever, whereby the same is turned upon its pivot $g^\times$. With this forked lever is pivotally connected a system of levers and rods $g^3 g^3 g^4$, of which the connecting-rod g^4 is connected at its lower end with a vertical arm g^5, connected in turn with the horizontal bar or rail G′, whereby an inclined upward motion is imparted to the latter through the directing action of a fixed guide-plate g^6, provided with a cam-groove g^7, in which a suitable projection on an arm g^8, attached to the vertical arm g^5, engages.

For preventing the needle-threads, which are arranged closer together in an embroidering-machine provided with my improvements, namely, with the double set of needle-clamps, than in the embroidering-machines heretofore in use, having single rows of needle-clamps, from getting mixed up with each other, either during the embroidering or the festooning operation, there is used for every width of fabric, in place of the usual single-wire cross-rods, a wider frame constituting what may be termed a "thread-separating" frame. Said frame folds or swings in a downward direction over the threads during the outward motion of the carriage, and serves to separate the threads from one another, it being returned into its former initial position when the carriage arrives immediately in front of the embroidering-frame O. These thread-separating frames, which are attached to oscillating levers N, that are arranged on the transverse shaft *n* of the needle-clamping frame M^0, consist of parallel wires *f* f^0 and regularly-arranged and separated **U**-shaped wire yokes *g*, supported by the wire *f*, said yokes being concaved at their bridge portions *h*, so as to serve as thread-guides for the needle-clamps A, while those portions of the wire f^0 which are located between the yokes *g* form thread-guides for the needle-clamps A^0. F F (shown in Fig. 4) represent the rows of embroidering-threads, which are passed through the holes pierced into the fabric to be embroidered. These thread-separating frames are operated so as to be raised by an inclined fork N′, which is mounted on the shaft N, said fork abutting, during the forward motion of the carriage, against a pin n' on the frame of the machine. This pin n' passes in between the bifurcations of the fork N′, moving the latter and imparting thereby to the oscillating lever N a motion in upward direction, whereby the upper shaft is turned and its movements, through the medium of the connections $N^2 N^3 N^4$, transmitted to the lower shaft *n*, so that both of the thread-separating frames are simultaneously moved back into their upper position.

The oscillating lever N carries a balance-weight n^5, which accomplishes during the return motion of the carriage, at the time when the fork N′ recedes from the pin n', the down-

ward motion of the thread-separating frames upon the rows of threads. The double set of embroidering mechanisms, which are relatively shifted or transposed one toward the other so as to be arranged laterally one of the other but offset one from the other, are operated in the same manner as the single embroidering mechanisms in embroidering-machines and require no special description of their exact operation, for the same will be readily understood by those skilled in embroidering-machines.

It may be mentioned that the design is not required to be formed of figures that are separated from each other, as is shown at the lower part of Fig. 5, for the figures can also be formed into a connected design, as shown at the upper part of Fig. 5. Such a connected design is so formed that the needles of one row of needle-clamps A make, for instance, the figure *a* of row 1 or the connecting portion *i*, while simultaneously the needles for the row of needle-clamps A^0 produce the figures a^0 or the connections i^0 of row 1^0. With the present single arrangement of the embroidering mechanisms each row 1 or 1^0 is required to be embroidered singly and one after the other, while by my improved double embroidering mechanisms, which are shifted or transposed laterally relatively to each other and symmetrically, the two rows or lines of pattern-figures can be embroidered simultaneously and parallel, whereby the productive capacity of embroidering-machines of this class can be doubled in a given time.

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

1. In an embroidering-machine, a double set of embroidering mechanisms, of which the upper set is arranged substantially parallel with and offset symmetrically toward the lower set, so that both sets form simultaneously two similar but symmetrically-transposed pattern-figures, substantially as set forth.

2. In embroidering-machines, the combination, with a supporting rail or bracket, of two rows of needle-clamps, of which one row is located above and offset symmetrically and substantially parallel with the other, and in which the rear ends of the upper members of the spring-actuated needle-clamps are located in one plane, and a cam common to the upper members of the spring-actuated needle-clamps for acting on the rear ends of the same, substantially as set forth.

3. In embroidering-machines, a supporting-rail provided with a double set of festooning-forks, some of which alternate with and are higher than the others, substantially as set forth.

4. In an embroidering-machine, the combination, with a double set of needle-clamps, of a corresponding set of thread-separating frames or guides composed of two parallel wires, one of which is provided with spaced yokes, substantially as set forth.

5. In an embroidering-machine, the combination, with a double set of needle-clamps, of a corresponding set of thread-separating frames, composed of two parallel wires, of which one is provided with **U**-shaped yokes having concaved connecting-bridges, substantially as set forth.

In testimony whereof I hereunto sign my name, in the presence of two subscribing witnesses, this 12th day of August, 1895.

GOTTFRIED MÜLLER.

Witnesses:
H. RABHART,
MORETZ VEITH.