No. 657,401. Patented Sept. 4, 1900.

G. H. DIMOND & W. F. DIAL.

HEMSTITCHING SEWING MACHINE.

(Application filed Jan. 16, 1899.)

(No Model.) 3 Sheets—Sheet 1.

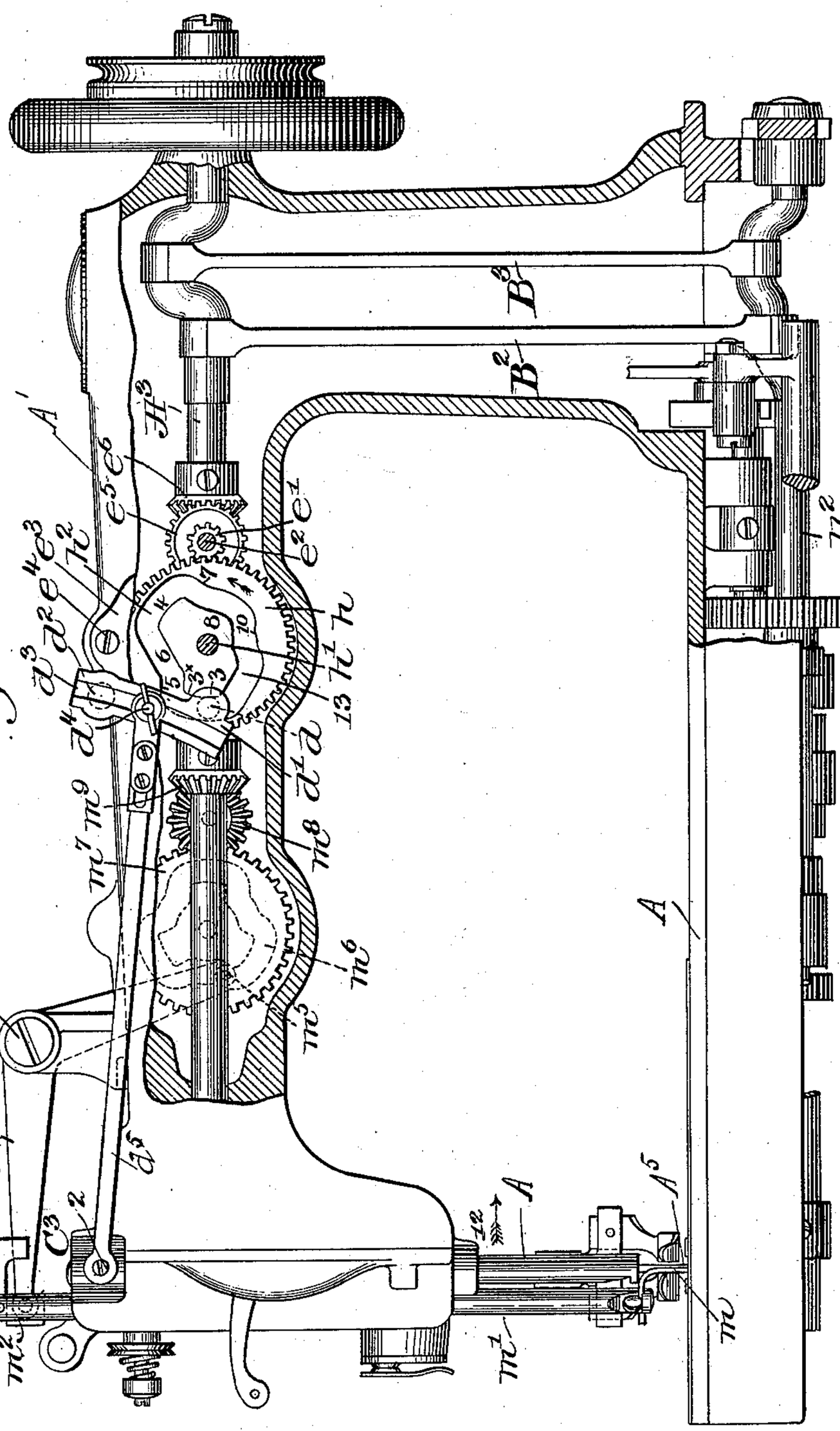

Fig. 1.

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Fig. 2.

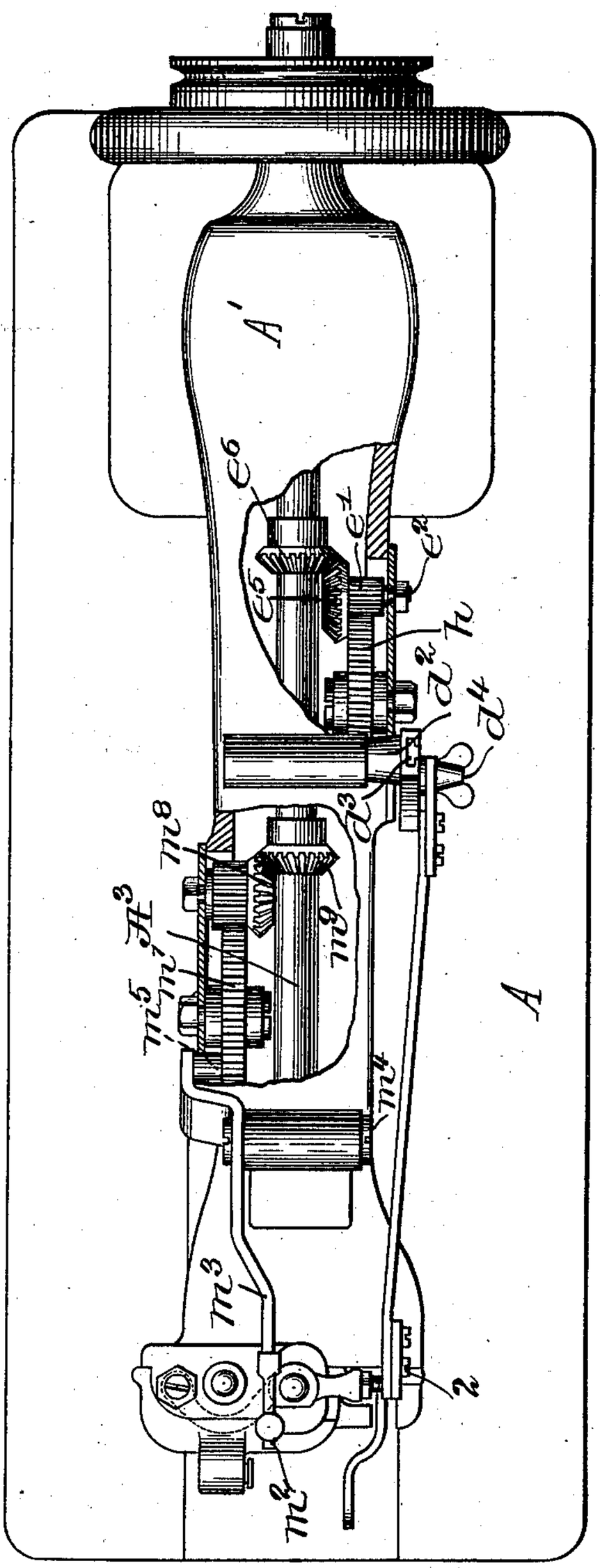

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Fig. 3.

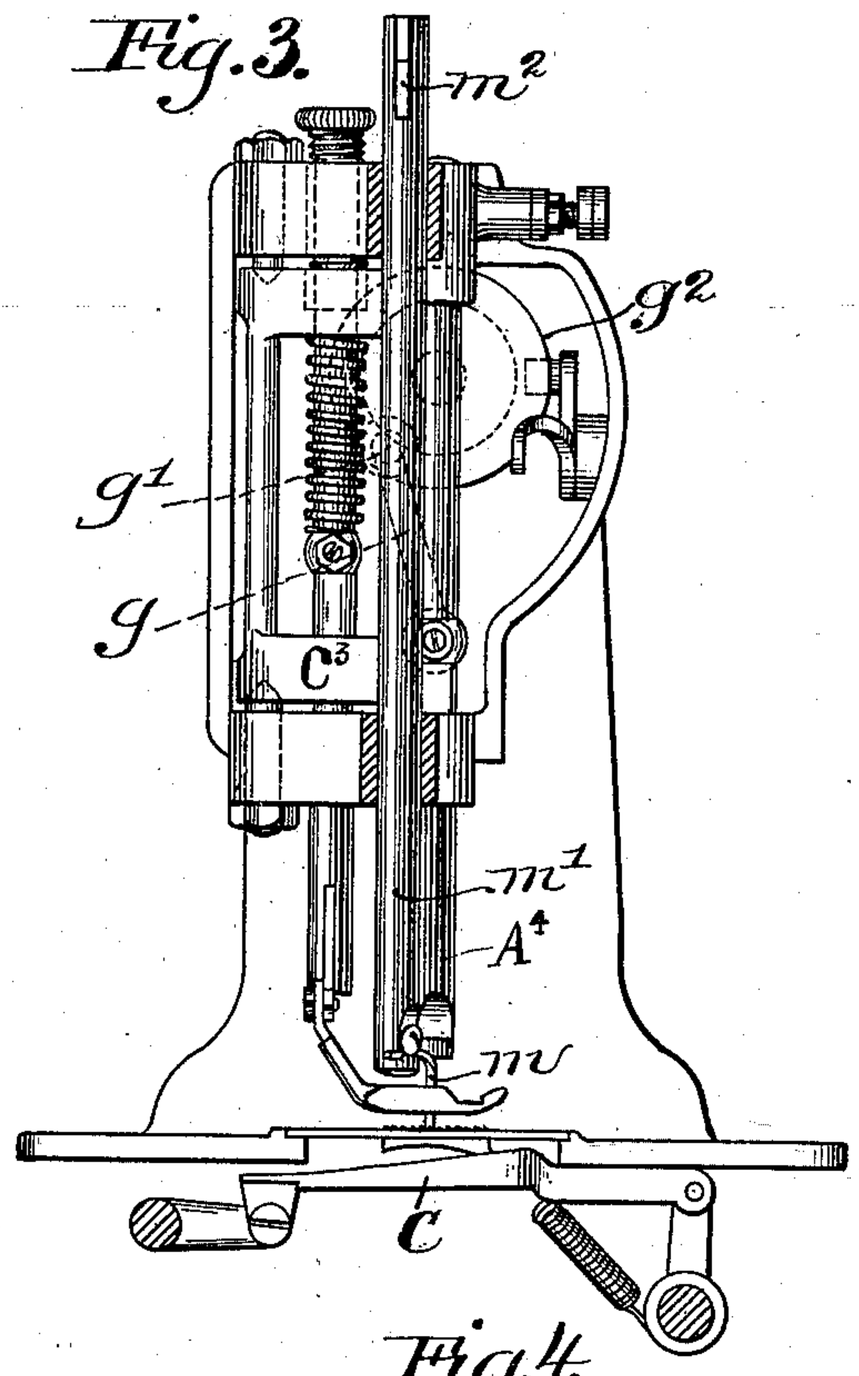
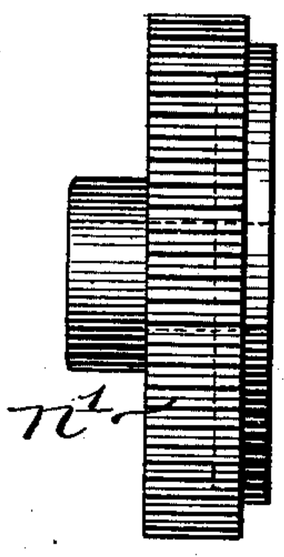


Fig. 4.



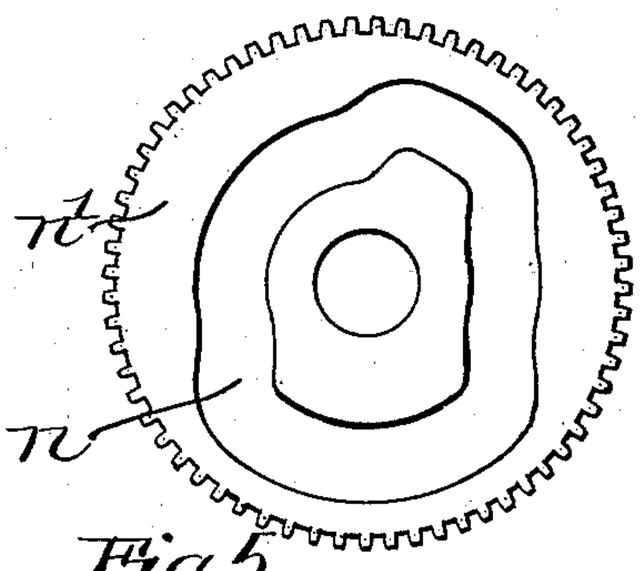
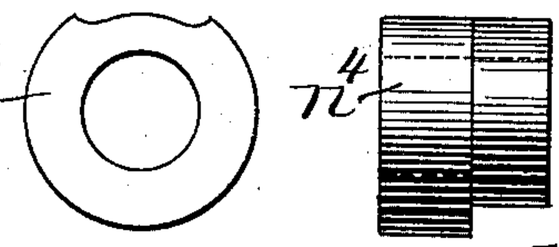


Fig. 5.



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UNITED STATES PATENT OFFICE.

GEORGE H. DIMOND AND WILBUR F. DIAL, OF BRIDGEPORT, CONNECTICUT, ASSIGNORS TO THE WHEELER & WILSON MANUFACTURING COMPANY, OF SAME PLACE.

HEMSTITCHING SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 657,401, dated September 4, 1900.

Application filed January 16, 1899. Serial No. 702,206. (No model.)

To all whom it may concern:

Be it known that we, GEORGE H. DIMOND and WILBUR F. DIAL, of Bridgeport, in the county of Fairfield, State of Connecticut, have invented an Improvement in Hemstitch Sewing-Machines, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

United States Patent No. 605,700, dated June 14, 1898, shows and describes a hemstitch sewing-machine in which the needle-bar is given a lateral or "wigwag" motion in a direction transverse to the line of seam when the needle is in the material off the hem, and therein the feed has two forward strokes and one back stroke, the figure of the stitch being that known as a "three-stitch" figure. In that patent the hole off the hem made by the needle was enlarged by the wigwag motion of the needle. In the patent granted to us July 26, 1898, No. 608,152, we have shown and described a hemstitch sewing-machine wherein the needle-bar and needle have a lateral motion, so that the needle makes two stitches off from the hem and one in the hem, and coöperating with said needle-bar, which does not have any wigwag motion while in the goods, we have employed a piercer, it entering the material off the hem prior to or just in advance of the descent of the needle through the material off the hem, said piercer enlarging the hole off the hem and compacting the threads of the material of single thickness, so that the stitch made effectually binds together the connecting threads, making a stitch resembling substantially the hemstich such as made when the threads of the material have been previously drawn out. In the Patent No. 688,152 referred to the piercer is grooved and the needle works in a groove or sprocket of the piercer, and the direction of the feed is always forward, the stitch being somewhat different from the stitch made in the patent referred to. Our present application is intended as an improvement upon the mechanisms disclosed in the two patents before mentioned, and herein we have so organized the stitch-forming mechanism that the needle-bar has imparted to it a wigwag motion at every descent of the needle in the material off the hem, and we have combined with this needle-bar and needle having the wigwag motion a piercer which descends in unison with the needle, it entering the material off the hem at each descent of the needle-bar both when the needle-bar descends through the material off the hem and when it descends through the material of the hem. The piercer, while reciprocating once for each stroke of the needle-bar, need not have and herein is not represented as having imparted to it any wigwag motion; but on the contrary it remains in the hole, bracing one side thereof, while the needle is being moved toward the hem in its wigwag motion. So, also, prior to the invention to be herein described a machine has been devised and described in United States Patent No. 520,977, dated June 5, 1894, in which a needle connected with a needle-bar is made to descend through the material of double thickness and through the material off the hem of single thickness, and when the needle descends through the material of single thickness then and then only a spreader descends with it and stands in the material of single thickness, said spreader coöperating with the needle to make a larger hole. In that patent, however, provision was made to arrest the descent of the spreader when the needle descended through the material of double thickness. In the invention to be herein described we have dispensed with the arresting device to stop the descent of the spreader at every third stitch, as described in said patent, and we have so devised the piercer that it acts at every descent of the needle through the material of single thickness off the hem and through the material of double thickness; but said piercer enters only the material of single thickness off the hem. In the patent last referred to neither the needle or spreader had any lateral movement whatever when standing in the material off the hem. In practice we find great advantage to result from the use with a piercer standing in a hole off the hem in the material of single thickness, while the needle also in said material of single thickness off the hem has given to it a wigwag motion, such provision and method of operation improving the appearance of the hemstitch and making it more

nearly like that produced by handwork. We have herein shown the piercer as actuated by a cam entirely independent of the cam employed to move the needle-bar gate, and the piercer-bar is actuated vertically, as herein shown, by means independent of the needle-bar.

The features of this invention will be hereinafter described, and pointed out in the claims at the end of this specification.

Figure 1 represents a side elevation, partly in section, of a sewing-machine embodying our invention in one form. Fig. 2 is a top or plan view thereof, partly in section. Fig. 3 is a front end elevation. Fig. 4 shows two views of the feed-controlling cam—that is, the cam for moving the feed backward and forward—while Fig. 5 represents in two views the feed-lifting cam.

It will be understood that the bed A, overhanging arm A′, the pivoted needle-bar gate C^3, needle-bar A^4 therein, the needle A^5, the stitch-forming mechanism complemental thereto, but not shown under the bed A, the feeding mechanism C, and its actuating means—such, for instance, as the gear n', having in one of its sides the groove n, it constituting the feed-driving cam or the cam for controlling the feeding of the material for the first stitch of the figure in a backward direction and then consecutively twice in a forward direction to complete the figure, and the feed-lifting cam n^4 to lift the feed at the proper times, they being carried on a shaft n^2, deriving its motion of rotation from the links B^2 B^3, connected with the double crank of the main shaft A^3—are and may be all as shown in United States Patent No. 605,700, so need not be herein more specifically described or illustrated.

The main shaft A^3 has applied to it a beveled gear e^6, which engages a second bevel-gear e^5, having an attached pinion e', loose on a stud e^2, and said pinion engages the teeth of a path-cam h, mounted to rotate about a stud h', carried by the overhanging arm of the machine, said gear having in its face a peculiar cam h^2, shaped as shown in Fig. 1, said cam being so shaped to impart to the needle while in the material off the hem and while the needle is rising from the material off the hem a wigwag motion toward the hem, so that said needle as it rises from the material after each descent in the material off the hem enlarges the hole in the material off the hem, the wigwag motion being substantially at right angles to the direction of the length of the hem and acting to pack or slip some of the threads under and toward the edge of the hem. The face of the needle-vibrating cam is in practice covered by a plate e^3, (partially shown in Fig. 1,) attached by suitable screws e^4, said plate being provided with a suitable slot through which is extended a stud d, carried by a rocker-arm d', connected with a rock-shaft d^2, mounted on the top of the arm of the sewing-machine, said rocker-arm having a slot or way d^3, which receives a sliding or adjustable bolt or stud d^4, attached to a link d^5, connected at 2 with the usual needle-bar gate C^3, common to said Patent No. 605,700, said gate carrying the needle-bar. These parts for moving the needle-bar gate laterally are substantially the same as in said patent, except as to the shape of the groove h^2. The cam h^2 is for the purpose of controlling the lateral movement of the needle-bar gate and needle, and it is rotated in the direction of the arrow thereon, Fig. 1, and the stud d enters said cam, the latter at the proper times effecting the lateral movement of the needle, as will be hereinafter described. This cam has two high parts, (marked 3 4.) The leading corner 3 of the high part of the cam in its rotation contacts with the stud substantially as the needle-bar completes its ascent, and as the said portion acts against said stud the needle-bar is caused to descend through the material off the hem, the needle substantially completing its descent as the corner $3^\times$ of said high part arrives at the stud, and then the portion 5 of the cam acts quickly to turn the gate and move it and the needle-bar laterally, the latter being yet in the material off the hem, the needle in such movement packing or pushing the threads of the material toward the hem, making an enlarged hole therein. As the part 6 of the cam arrives over the stud d the needle-bar and needle rise from the material off the hem and substantially as the needle leaves the material the last part of the portion 6 of the cam acts to again move the gate and needle-bar and needle laterally away from the hem, the needle-bar completing its ascent substantially as the leading corner of the second high part 4 arrives at the stud d. As the cam continues to move the needle-bar and needle again descend, while the high part 4 of the cam travels opposite the stud d, and the needle having descended into the material the second time off the hem, it being in the material as the rear corner of the high part travels past the stud, the part 7 of the cam again acts, as did the part 5, to move the needle-bar and needle yet in the material off the hem toward the hem, and in the continued further rotation of the cam h the portion 8 of the cam acts on the stud while the needle-bar is rising, the latter, however, rising at this time in substantially a straight line, and in the further rotation of said cam h the part 10 of the cam acts on the stud after it has commenced to descend on its third stroke and moves the needle-bar gate, needle-bar, and needle yet farther in the direction of the arrow 12, Fig. 1, so that as the needle-bar descends at this stroke it penetrates the material of the hem, and as the needle-bar rises from the hem the part 13 of the cam h acts on the stud and puts the needle-bar and its needle by the time that the leading point of

the cam 3 reaches the stud *d* again in a path where the needle is placed over the material of single thickness off the hem ready to again descend, as hereinbefore described. Immediately following the rise of the needle from the material at the hem the feed acts to move the material away from the operator in a forward direction, and immediately following the first rise of the needle from the material off the hem the feed acts to move the material backwardly toward the operator, and immediately following the third rise of the needle from the material, this being off the hem, the feed acts again in the forward direction to move the material away from the operator, and at its next descent the needle penetrates the material of the hem.

The needle penetrates the material of the hem once and off the hem twice in a succession and in the production of a three-stitch figure; but this invention is not limited to the exact number of stitches made for each figure. The needle-bar derives its vertical reciprocation from the usual link *g*, connected with the stud *g'*, herein shown at one end of the cam g^2, actuating the take-up, all as in Patent No. 605,700 referred to. In the particular embodiment of invention herein set forth it will also be noticed that the needle always penetrates the material of single thickness at substantially the same distance from the edge of the hem, and it has imparted to it a lateral motion only toward the hem when in the material or as the needle rises in the first part of its stroke, this differing somewhat from the plan described in the said patent, for therein the needle-bar had given to it an out-and-back vibration while in the material of the single thickness.

The piercer *m*, connected with the piercer-bar *m'*, having, as herein shown, its bearings in a part of the machine independent of the needle-bar gate, is shown as slotted at its upper end to receive a block m^2, mounted loosely upon the end of a lever m^3, having its fulcrum on a stud m^4, said lever having at its opposite end a roller or other stud m^5, which is actuated by a second path-cam m^6, to be described, said path-cam deriving its motion from a pinion m^7, connected, as herein shown, with a bevel-gear m^8, actuated by a bevel-gear m^9, fixed on the main shaft. The parts herein briefly described are found substantially in said Patent No. 608,152; but herein the cam-groove is entirely differently shaped to insure an entirely-different method of operation in the production of the hemstitch, and we will now describe the novel features in connection with said path-cam. The path-cam herein shown has three high points, so that said piercer has one complete reciprocation to each complete stroke of the needle-bar and needle. In Fig. 1 one of the high points has just acted to depress the piercer to its lowest point, and the said piercer is represented as about starting upwardly on its rising movement, and it is at this time or immediately thereafter and while the piercer stands in the material of single thickness or is rising that the needle-bar is rising as described with its needle and is having imparted to it the lateral movement toward the hem to thereby act upon the threads located between, say, the left-hand side of the piercer and the edge of the hem and separate said threads, packing them by a lateral movement substantially under the hem, such movement of the needle while the piercer is in the material effectually and cleanly enlarging the hole, so that the stitch is made to inclose uniformly the threads of the material extending laterally from the hem, the said stitch tying those threads evenly together.

The lever m^3 constitutes in this present invention an intermediate device between the cam and the piercer-bar to actuate the latter.

The stitch herein made may be substantially as represented in said Patent No. 605,700.

Having described our invention, what we claim and desire to secure by Letters Patent, is—

1. An organized sewing-machine containing a needle-bar provided with an eye-pointed, thread-carrying needle, means for reciprocating said needle-bar and needle, means for imparting to said needle-bar and needle a lateral movement that it may penetrate the material in two different vertical planes, said means imparting to the needle-bar and needle while the latter is in the material off the hem a lateral motion with relation to the edge of the hem; a piercer-bar and piercer, and an independent cam and intermediate devices to operate said piercer-bar and piercer, causing it to descend with each descent of the needle-bar and needle, said piercer, however, entering only the material off the hem and remaining therein while the needle then in the material off the hem is moved laterally with relation to the edge of the hem, to enable said needle to enlarge the hole in the material, the piercer holding the material from moving with the needle.

2. In a sewing-machine for hemstitching, the following instrumentalities, viz: a needle-bar provided with a needle, a needle-bar gate, means to reciprocate said needle-bar in said gate, and to impart to said gate and needle-bar a lateral movement while the needle is out of the material so that it may be put into position to descend not only through the hem but also through the material off the hem, and to move said gate, needle-bar and needle, causing said needle while in the material off the hem, or rising therefrom, to be moved laterally, a piercer-bar and piercer, an independent cam, and intermediate devices to actuate said piercer-bar at each descent of the needle and needle-bar that the piercer may enter only the material off the hem, said piercer standing in and hold-

ing the material while the needle in the material off the hem is moved laterally to enlarge the hole therein.

3. In a sewing-machine, a needle-bar having an eye-pointed needle, means to reciprocate said needle-bar and needle, an independent cam, and mechanism actuated thereby to move said needle-bar and needle laterally that it may penetrate the material in two different vertical planes, the needle in one of its descents entering the material in one of said planes, and in other of its descents entering the material in the other of said planes, said cam being shaped to impart to the needle-bar and needle a lateral movement while the needle is in the material in the first of said planes, combined with a piercer-bar and piercer, and means to reciprocate said bar and cause the piercer to enter the material only in the first of said planes at each descent of the needle-bar and needle, the lateral movement of the needle in the material taking place while the piercer remains in the material, such lateral movement of the needle enlarging the hole made by joint operation of both the piercer and the needle, the threads of the material being moved aside and packed together by said lateral movement of the needle.

4. In an organized sewing-machine, a work-support to sustain the material, a piercer-bar provided with a piercer, means to reciprocate said piercer-bar and cause the piercer to penetrate the material at each descent; combined with a needle-bar provided with a needle, and means to reciprocate said needle to penetrate the material, and while said needle and piercer are in said material to impart to said needle a lateral movement, whereby the needle is actuated to enlarge the hole occupied by both the piercer and needle, the piercer preventing lateral movement of the material while the needle is being moved laterally.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

GEORGE H. DIMOND.
WILBUR F. DIAL.

Witnesses:
ISAAC HOLDEN,
GEO. CORNWELL.