

No. 608,152.

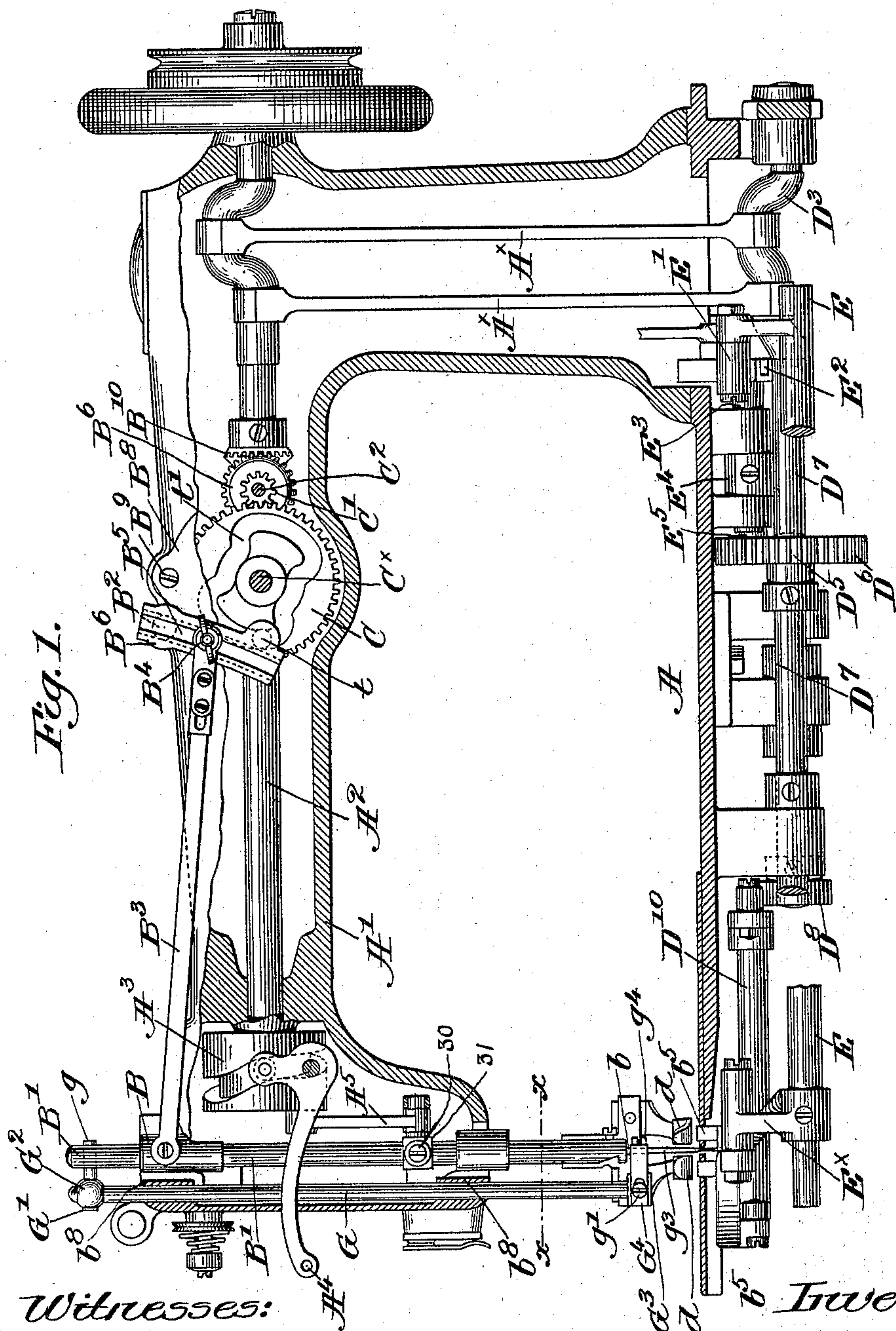
Patented July 26, 1898.

G. H. DIMOND & W. F. DIAL.
HEMSTITCH OR OPEN WORK SEWING MACHINE.

(Application filed Sept. 16, 1897.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:

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2 Sheets—Sheet 2.

Fig. 2.

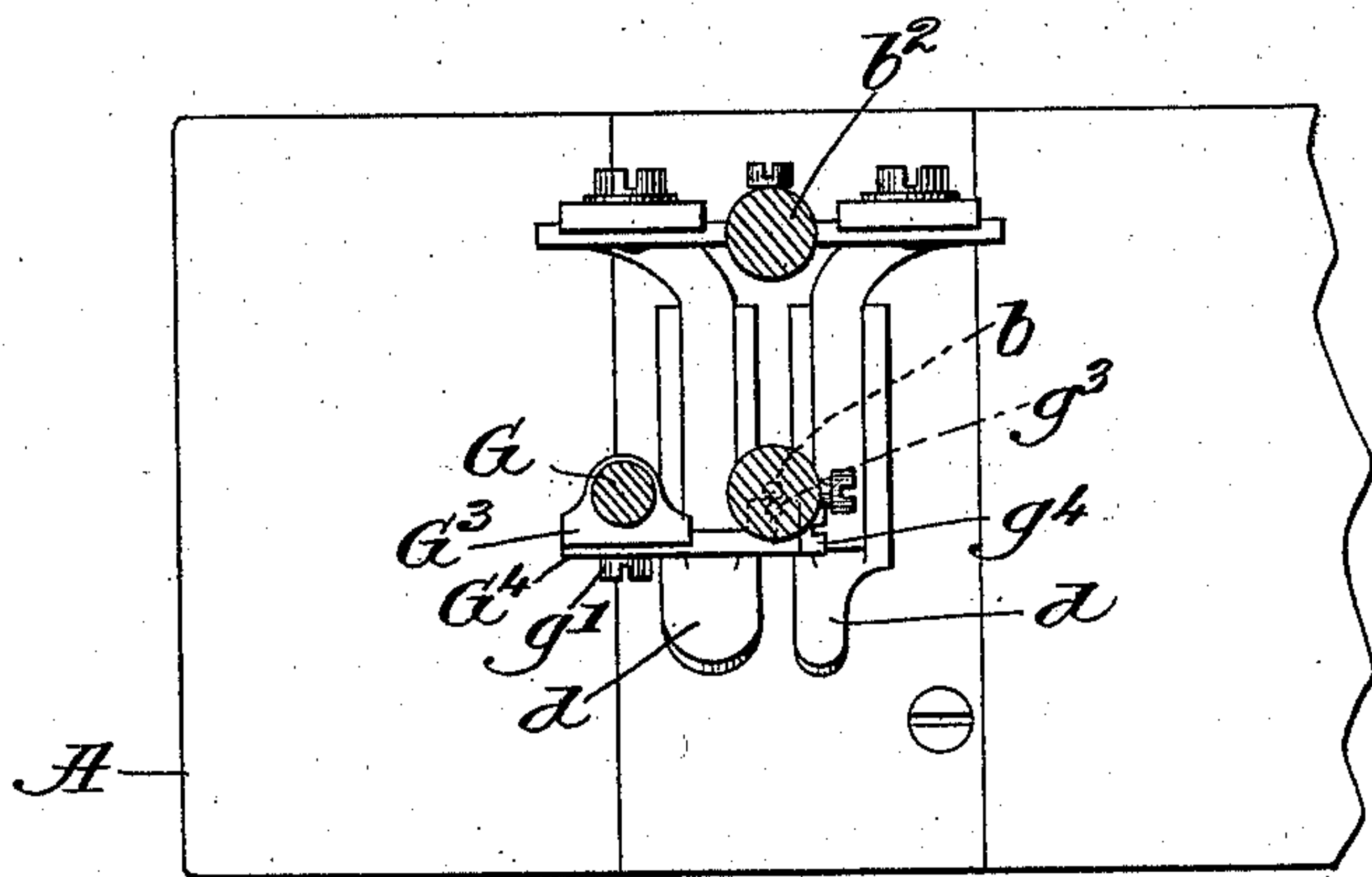


Fig. 3.

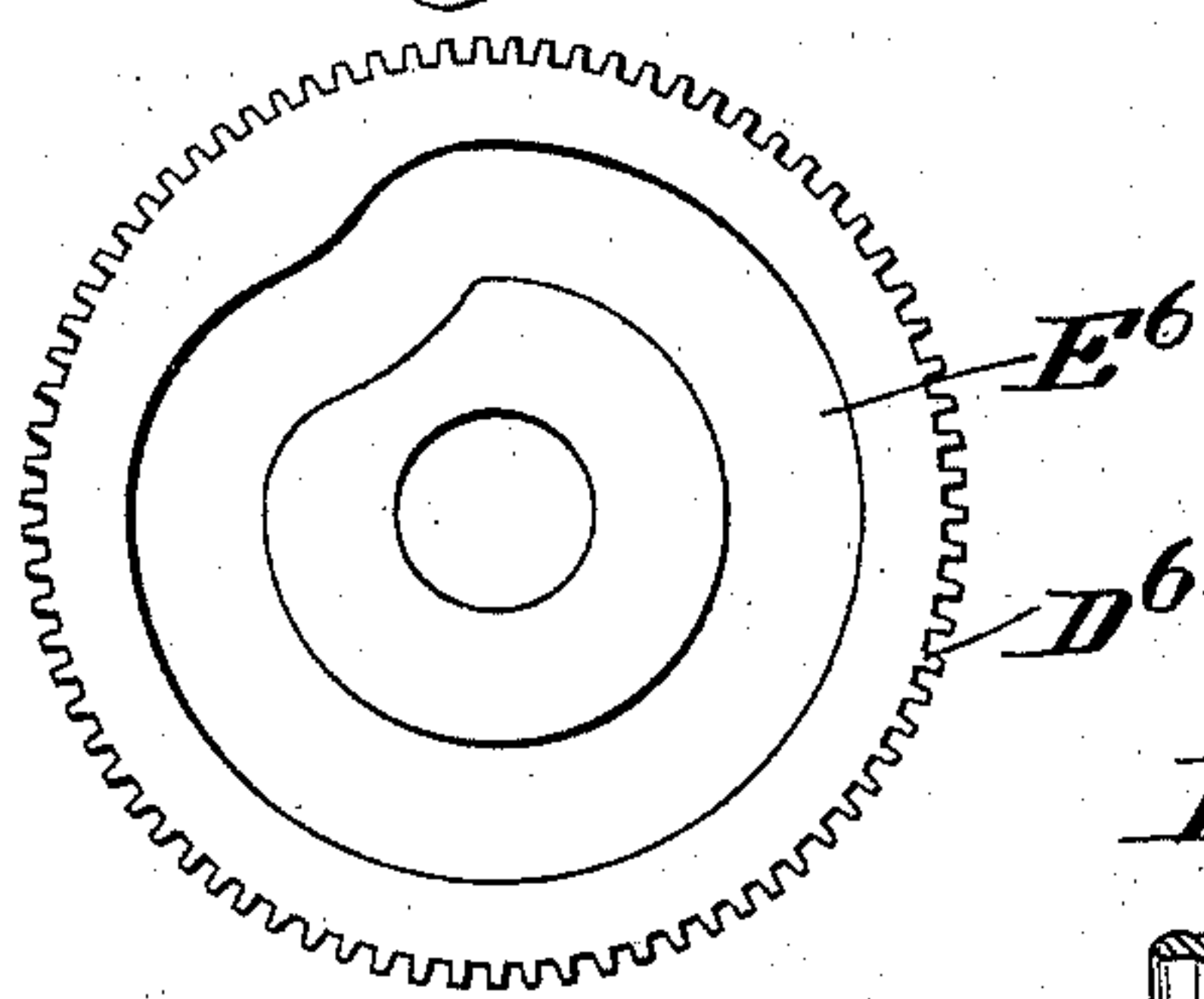


Fig. 4.

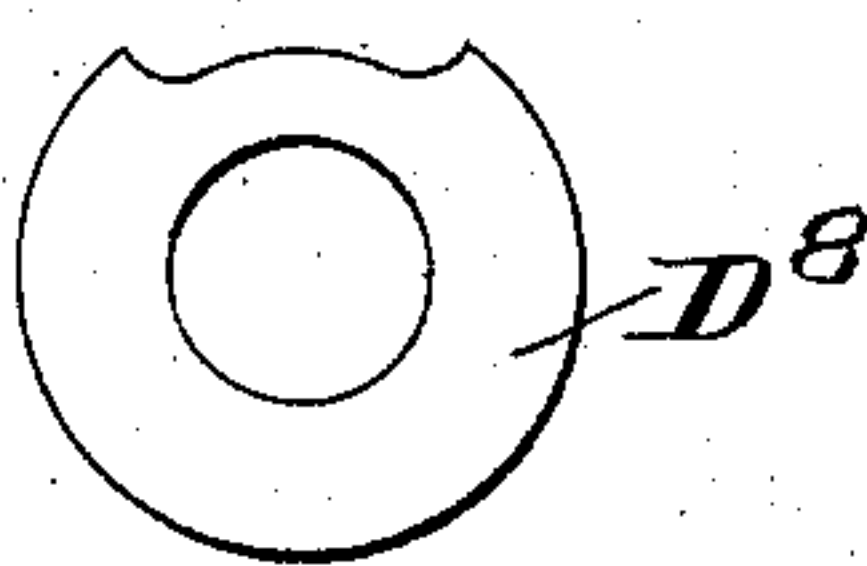


Fig. 5.

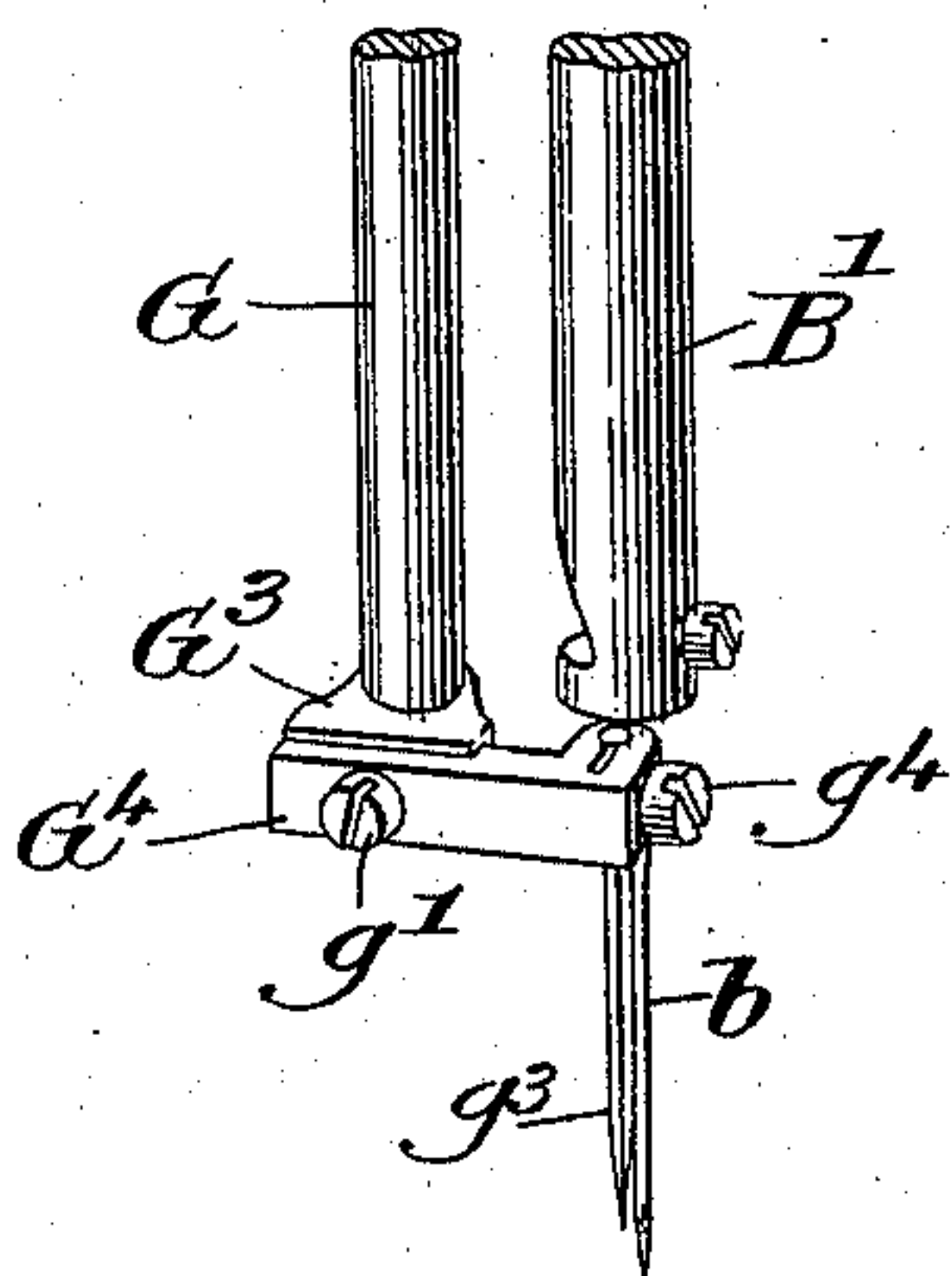
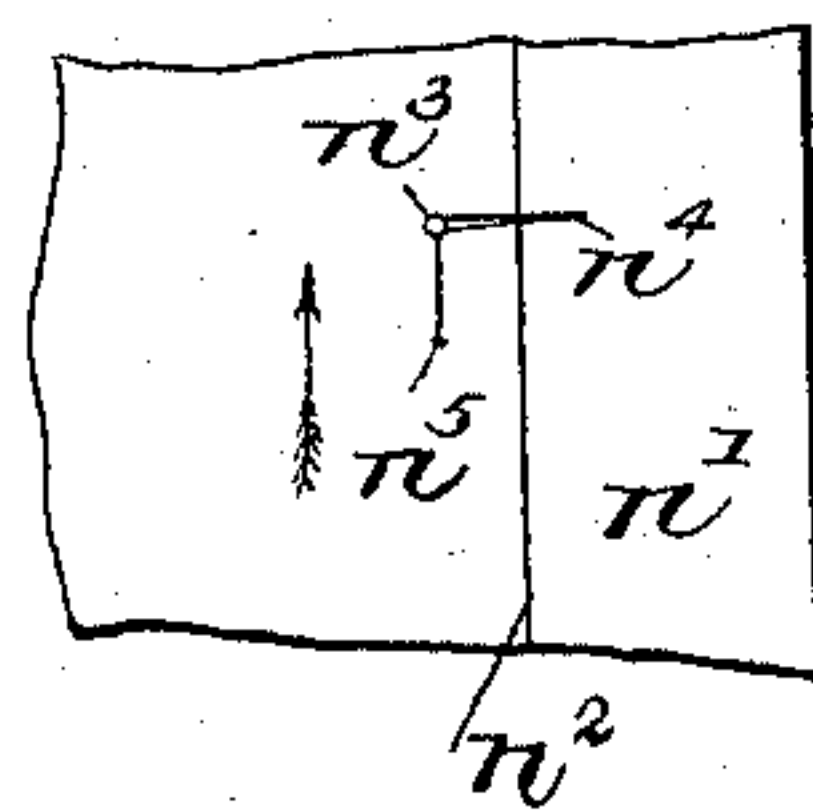


Fig. 6.



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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.

HEMSTITCH OR OPEN-WORK SEWING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 608,152, dated July 26, 1898.

Application filed September 16, 1897. Serial No. 651,825. (No model.)

To all whom it may concern:

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

This invention has for its object the production of a novel machine for so-called "hemstitch" or "open-work" stitching, stitching such as employed in connection with hems of pocket-handkerchiefs, sheets, pillow-cases, &c.

The machine to be herein described employs a needle-bar having an eye-pointed needle, and said needle-bar, besides its usual reciprocating motion, is vibrated laterally. Let it be supposed that the needle has just risen from the material of one thickness outside the edge of the hem and that a new stitch is to be made. To do this, the material will be fed for one stitch, and the needle-bar will then descend and again penetrate the material of single thickness outside the hem in the line of the seam, and then it will again rise, be moved laterally, and descend through the hem near its edge, and then will again rise, be moved laterally, and descend again in the material of one thickness outside the hem, it entering again the same hole from which it arose, these three operations completing a stitch. During the last three penetrations of the needle described the material remains stationary; but as the needle rises after this third descent the feed is again operated to move the material forward for one stitch; but while the feed is taking place the needle is not vibrated, and consequently at its next descent it penetrates again the material of single thickness outside the edge of the hem, repeating the described stitch.

In the class of work wherein a series of openings are to appear in the single thickness of material parallel with the edge of the hem such openings have heretofore been made by feeding the material while the nee-

dle stood in it, thus enabling the needle to hold back some of the threads of the material and leave a somewhat elongated opening, and so also the needle when in the material of single thickness has been vibrated laterally to enlarge the hole in which it stood, and in both these instances the feed of the material has been two stitches forward and one backward; and so, also, a needle-bar and needle having a vertical motion and a lateral motion when out of the goods has had coöperating with it a spreader longer than the needle, said spreader always descending with the needle, and when the needle descended through the material of single thickness the spreader passed through the material in advance of the point of the descending needle; but when the needle descended in the edge of the hem said spreader did not follow it, but stood in such relation to the needle that a line intersecting the needle and spreader would cross the edge of the hem at substantially a right angle.

In the plan last above referred to the spreader is so connected with its bar that it must always descend in just the same position relatively to the edge of the hem and needle, and no provision is made for varying the position of the spreader to provide for changes in the vibration of the needle and its bar, as required by the particular material being acted upon.

In this our invention we employ a needle-bar and needle and impart both vertical and lateral motions to the needle, the lateral motion being, however, when out of the material, and we have combined with this needle-bar a piercer-carrying bar which is moved vertically in unison with it, said bar having at its lower end an adjustable arm provided at its free end with a straight but pointed piercer, the point of the piercer being of such length as to penetrate the material of single thickness only after the needle has entered the material, and said shorter piercer always enters the material of single thickness at that side of the needle next the operator, so that said piercer makes and opens a hole for the needle in the direction of the length of the seam, the said piercer defining a hole in advance of the

hole in which the needle enters in making the stitch.

In this our invention we may adjust the piercer with relation to the needle in the direction of the length of the seam, and it may also be adjusted to occupy a position closer to or farther from the edge of the hem, according to the lateral throw of the needle, or, in other words, the piercer may be adjusted freely in any direction with relation to the point of the needle.

In this our invention the feed takes place only once for each three penetrations of the needle, and the feed is only in the forward direction, this plan of feeding effectually doing away with the shocks due to reversing the feed at high speed and the liability of "missing" threads in the backstitch, the missing of threads being due to the failure of the feed to accurately move the material backwardly to enable the needle to enter a previously-made hole, the missing of threads seriously marring the symmetry, uniformity, and appearance of the openings at the edge of the hem, and dispensing with the back feed also does away with any puckering of the overturned part of the hem on its body, and, further, because of the feed being always in one direction the operator may guide and handle the work with the greatest ease, whereas when the back-stroke feed is used the operator has to adjust the movements of her hands and eyes rapidly to the backward and forward movements of the material, which is very wearing. So, also, by reason of the fact that the piercer and needle occupy tandem position, one in advance of the other, in the direction of the length of the seam, the tendency of the material to be thrown out of proper straight-line movement is practically done away with.

Figure 1 shows a front side elevation of the machine embodying our invention. Fig. 2 is an enlarged section taken below the dotted line *x*, Fig. 1. Fig. 3 is a face view of the cam for controlling the direction of movement of the feed device. Fig. 4 shows the feed-bar-lifting cam. Fig. 5 is an enlarged detail showing parts of the needle-bar and needle and piercer-carrying bar, its arm and attached piercer. Fig. 6 is a diagram delineating the stitch to be made.

The bed A, the overhanging arm A', containing the needle-bar-operating crank-shaft A², having at its forward end a cam-hub A³ for operating the take-up A⁴, the needle-bar gate B, containing the needle-bar B', provided with an eye-pointed needle *b* and reciprocated by the link A⁵, said gate being pivotally mounted on usual vertical trunnions or pivots and having connected to it a link B³, adjustably connected by a stud B⁴ in a slot B⁵ of a rocking arm B⁶ of a shaft B², which is vibrated at suitable times by or from a suitable cam C, mounted in a stud C^x, said arm having a roller-stud *t*, entering the cam-slot *t'*, the presser-foot bar b², having, as herein

shown, two presser-feet *d*, the two like connecting-rods A^x, the under rotating crank-shaft D³, having in practice at its front end a suitable crank, which in its rotations will actuate any usual or suitable circularly-moving loop-taker, (not shown,) said shaft having a pinion D⁵, which engages a toothed gear D⁶ on a short shaft D⁷, having at its front end a feed-lifting cam D⁸, (shown separately in Fig. 4,) which at the proper time moves the feed-dog, raising and lowering rock-shaft D¹⁰, it having a space to let the usual feed-dog *b*⁵ drop and be moved back under the work preparatory to being again lifted to feed the material when the feed is to again take place, and the rock-shaft E, having an arm E^x, to which one end of the feed-dog is pivotally connected, said rock-shaft having a second arm connected with a feed-regulating link E', having a roller or other stud entering a segmental groove E² in an arm projected from one end of a shaft E³, said shaft having a second arm E⁴, provided with a pin E⁵, having a roller or other stud to enter the cam-groove E⁶ in the toothed wheel D⁶, said cam-groove determining the time of the forward feed with relation to the number of stitches made by the needle, are and may be all substantially as now employed in the Wheeler & Wilson sewing-machines and as represented in United States Patent No. 479,739, dated July 23, 1892, and in application, Serial No. 448,193, filed October 8, 1892, with the exception of slight differences in shape of the cam-groove in the toothed wheel D⁶ and of the shape of the cam C, to be described, or, in other words, in the shape of the particular cam-paths of the cams employed for vibrating the needle-bar gate and for determining the forward direction of the feed with relation to a predetermined number of stitches.

The cam C, as represented best in Fig. 1, is so made that it is rotated once to each three complete rotations of the needle-bar-actuating shaft, and supposing that the needle-bar is elevated and that said cam occupies such position as to enable the needle to stand above the material at one side of the edge of the hem the operation will be as follows, viz: The feed will take place, the needle-bar will descend through the material of one thickness near the edge of the hem, and then it will rise and the needle-bar will be moved laterally, so that at its next descent it will pass through the hem near its edge, and rising from the said hem the needle-bar will be again moved laterally, it descending a second time in the same hole in the material of single thickness from which it arose prior to entering the hem near its edge. The second descent of the needle in this same hole in the material of single thickness enables two stitches to be made in the same hole, and after this the feed again take place and a stitch is next made in the next hole in the direction of the length of the seam. Said last stitch, when tightened in the thin part of the material, tends to draw

together the material of the thin part between the two distinct holes in the line of the seam, such drawing taut of the stitch enlarging and defining with accuracy the holes to be made parallel with the edge of the hem, the tightening of the stitches effectually tying the parts in position. Coöperating with this needle-bar and needle we have provided the inner side of the face-plate of the machine with two lugs b^8 , which we have bored to constitute bearings for, as herein shown, a round bar G , which we designate the "piercer-bar." The upper end of this bar has adjustably secured to it by a set-screw G' a collar G^2 , having a stud g , the said stud entering loosely a hole made transversely through the upper end of the needle-bar, said needle-bar thus reciprocating the bar G in unison with it.

The lower end of the bar G has adjustably secured to it by a clamp-screw g' a block G^3 , the said block being preferably grooved at its front side for the reception of the adjustable piercer-carrying arm G^4 , provided at its inner end with the piercer g^3 , said block being adjustable horizontally to provide for any change in lateral throw of the needle-bar to thereby bring it nearer to or farther from the edge of the hem by or through the same clamp-screw g' , and the piercer may also be adjustable vertically in its arm by means of a set-screw g^4 , and by loosening the set-screw G' in the collar G^2 the said bar G may be turned in said collar to thus move the piercer somewhat toward or from the side of the needle toward the operator, such adjustment placing the piercer more or less distant from the side of the needle next the operator.

The needle-bar B' has connected to it by screw 30 a block 31, which carries a stud which is embraced by the lower end of the link A^5 , which is employed to reciprocate the needle-bar. This screw 30 may be loosened in case of any wear between the stud g and the hole in the upper end of said bar, and the said bar may be slightly turned in the said collar 31, which will cause both sides of the hole in said needle-bar to come in contact with the said stud, thus compensating for any looseness due to wear.

From the foregoing it will be seen that the piercer has only a vertical movement, that it always occupies a position between the line of vertical movement of the needle through the material of single thickness and the operator, and that it always penetrates the material of single thickness a stitch in advance of the point where the needle penetrates the material to make a stitch, so that said piercer makes and defines at least a stitch in advance of the hole to be entered by the needle, and it will also be noticed that the piercer enters twice the same hole made by it, just as the needle, as before stated, enters twice the same hole when making the stitch before described.

By connecting the needle-bar and the piercer-carrying bar by means of a collar

having a stud the said stud is enabled to perform two functions—viz., one to cause the piercer-bar to rise and fall in unison with the needle-bar and yet permit the needle-bar to be vibrated with the gate, and at the same time the piercer-bar is kept from rotation, yet it may when occasion requires be turned axially in the said collar to position the piercer with relation to the needle, which could not be done if the piercer-carrying bar were square and were reciprocated in a box-like groove.

The cam C is engaged by a toothed gear C' on a stud C^2 , extended from the plate B^8 , attached to the overhanging arm A' by suitable set-screws B^9 , said plate being partially broken away in Fig. 1.

The toothed gear C^2 has fixed to it a bevel-gear B^6 , which is engaged and rotated by a bevel-gear B^{10} , fast on shaft A^2 .

Referring to Fig. 6, let n represent a piece of material having a hem n' laid over upon it, the line n^2 representing the edge of the hem. We will describe the method of making one complete three-stitch figure. Let it be supposed that the needle has just risen from the material of one thickness outside the edge of the hem. Now the first step is to feed the material in the direction of the arrow, Fig. 6, and the needle will then descend, the needle penetrating the material off the hem at the point n^3 . Then the needle will rise, the gate will be moved laterally, and the needle will penetrate the material of the hem at the point n^4 , and then the needle will again rise from the material and the needle-bar gate will be moved in the opposite direction, again putting the needle in exactly the same position that it stood in when it made the penetration designated n^3 , the needle again descending through the same hole n^3 . In each of these descents a suitable under thread will lock the loop of needle-thread, and having risen a second time from the hole n^3 the three-stitch figure will be completed and the material will be again fed, the needle next descending at the point n^5 in the material of single thickness off the hem. To better illustrate this stitch, Fig. 6, we have slightly separated the needle-thread between the points n^3 and n^4 , so as to show two lines of thread; but in practice these two lines of thread will lie substantially parallel and will both come out of the same hole n^3 in the material.

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

1. In a sewing-machine for hemstitching, the following instrumentalities, viz: a four-motion transverse-feed bar, means to actuate it to move the material only in a forward direction; a needle-bar provided with an eye-pointed thread-carrying needle, a needle-bar gate to contain said needle-bar; means to move said gate laterally transverse to the feed movement of the material; means to move said needle-bar vertically in said gate; a piercer-

carrying bar located at one side of said needle-bar in the direction of the lateral movement of said bar, an arm connected to said bar and projecting therefrom in a line transverse to the direction of the feed movement, a piercer attached to said arm, fixed guides for said piercer-carrying bar; and means to reciprocate said piercer-carrying bar and said needle-bar in unison, said piercer making an opening in the material in advance of the needle in the line of the seam, substantially as described.

2. A needle-bar having an eye-pointed needle; a needle-bar gate; means to hold said needle-bar gate in position to enable the needle to descend in the material off the hem, and then to move said gate to enable the needle to descend through the material of the hem, and then to move said gate to enable the needle to again enter the material off the hem in the same hole previously made by the needle; feeding mechanism to feed the material for one stitch only in the direction of the length of the seam between the two descents of the needle in the same vertical plane; a piercer-carrying bar, an arm extended therefrom horizontally transverse to the feed, and adjustably connected to said piercer-carrying bar, a piercer attached to said arm, and means to reciprocate said piercer-carrying bar and said needle-bar in unison, said piercer making an opening in the material in advance of the needle in the direction of the length of the seam for the reception of the needle in making a succeeding stitch, substantially as described.

3. In a sewing-machine, a head having fixed bearings; a piercer-carrying bar fitted to slide in said bearings, a piercer, a horizontally-extended arm to which said piercer is attached, and means to connect said arm adjustably with said piercer-carrying bar, whereby the arm and piercer may be adjusted not only transversely but axially on said piercer-carrying bar, to thereby control the exact relative positions between the said piercer and needle when penetrating the material off the hem, substantially as described.

4. In a sewing-machine, a needle-bar gate, means to move it laterally, a needle-bar therein having a needle; means to reciprocate said needle-bar, a piercer-carrying bar movable in bearings connected with the head of the machine, a piercer, a horizontally-extended arm to which said piercer is attached, and means to connect said arm adjustably with

said piercer-carrying bar, whereby the arm and piercer may be adjusted not only transversely but axially on said piercer-carrying bar, to thereby control the exact relative positions between the said piercer and needle when penetrating the material off the hem, substantially as described.

5. In a sewing-machine, a needle-bar gate, means to move it laterally, a needle-bar provided with a needle and mounted in said gate, means to move said needle-bar vertically in said gate, a piercer-carrying bar occupying a position parallel to said needle-bar and having its bearings in the head of the sewing-machine, an arm connected to said piercer-carrying bar, and provided with a piercer, combined with a stud on one of said bars entering a hole in the other of said bars, said stud being adjustable axially around or with relation to the bar carrying it to permit the adjustment of said bars axially as required, substantially as described.

6. In a sewing-machine, a needle-bar gate, means to move it laterally, a needle-bar mounted in said gate, and provided with a needle, means to move said needle-bar vertically in said gate, a piercer-carrying bar having attached to its lower end an arm provided with a piercer, bearings for said piercer-carrying bar, said bearings being in the head of the sewing-machine, a stud having at one end an orifice to surround one of said bars, the stud entering a hole in the other of said bars, and a set-screw to fix said stud in adjusted position on one of said bars, both of said bars occupying a position side by side in a plane transverse to the direction of the feed, the loosening of the set-screw holding said stud in position enabling the said piercer-carrying bar to be turned axially to place the piercer more or less close to the side of the needle carried by the needle-bar, substantially as described.

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 for George H. Dimond:

ISAAC HOLDEN,
GEO. CORNWELL.

Witnesses for W. F. Dial:

GEO. W. GREGORY,
LAURA MANIX.