

No. 753,715.

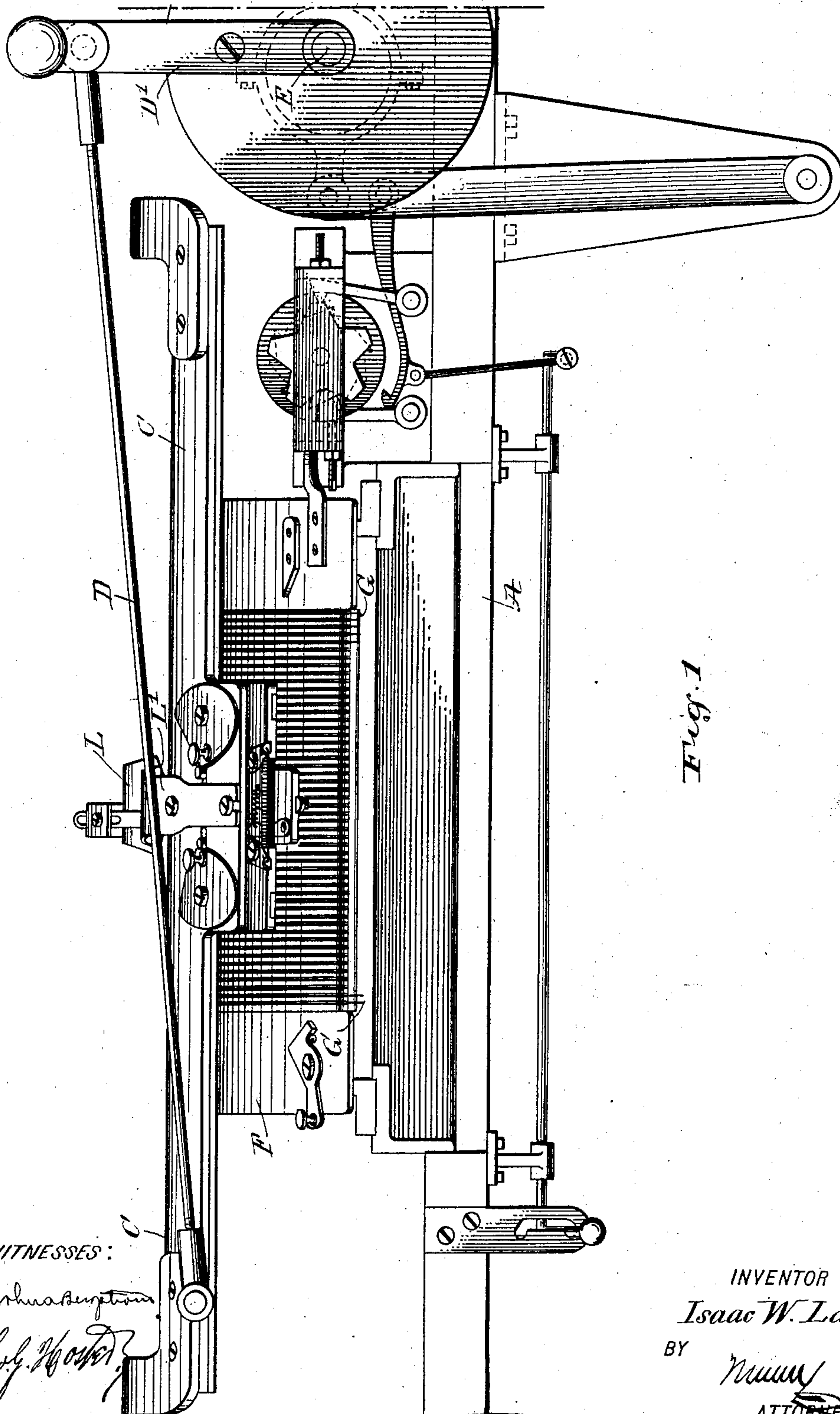
PATENTED MAR. 1, 1904.

I. W. LAMB.
KNITTING MACHINE.

APPLICATION FILED MAR. 21, 1902.

NO MODEL.

4 SHEETS—SHEET 1.



WITNESSES:

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INVENTOR
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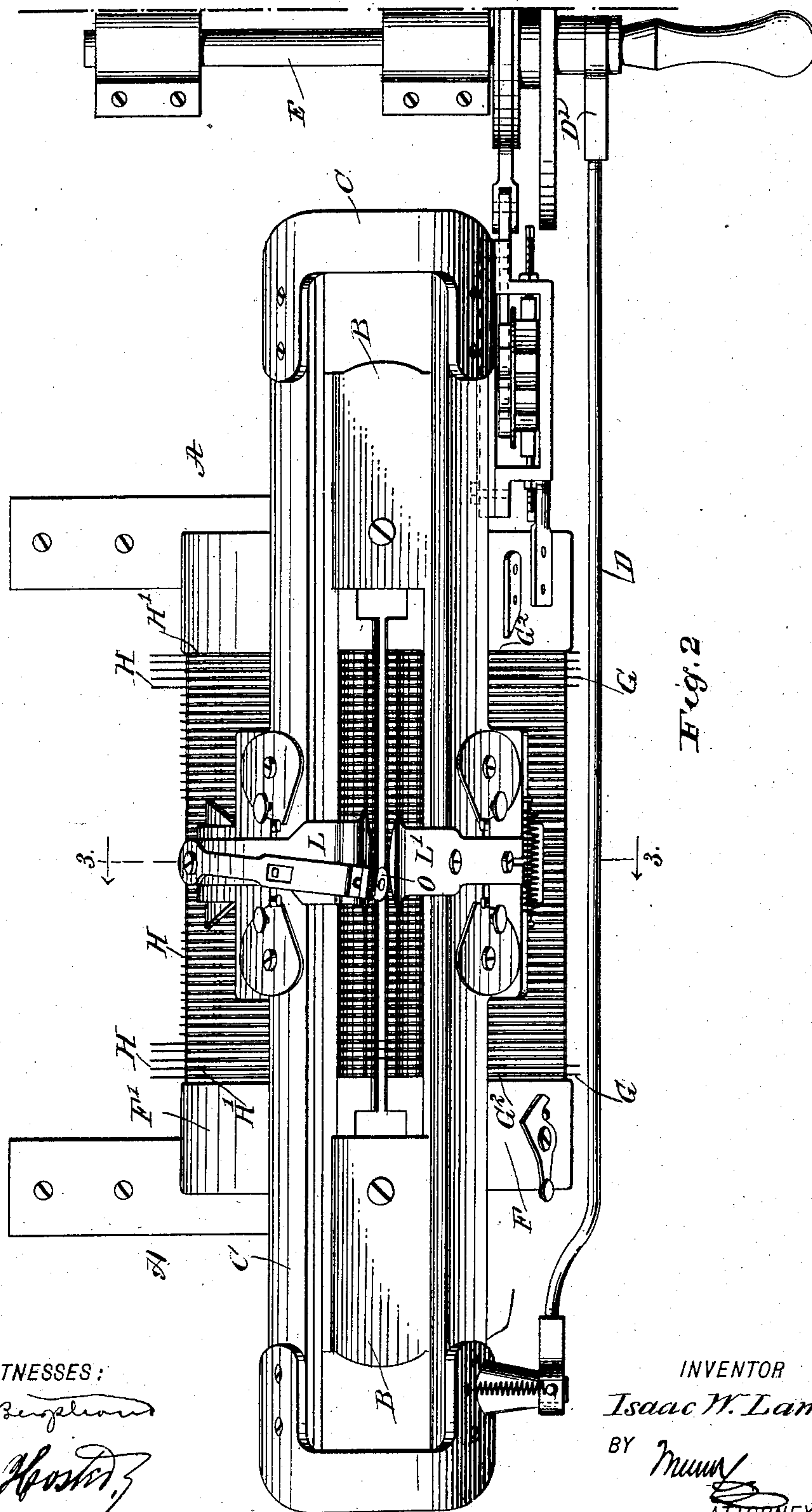


Fig. 2

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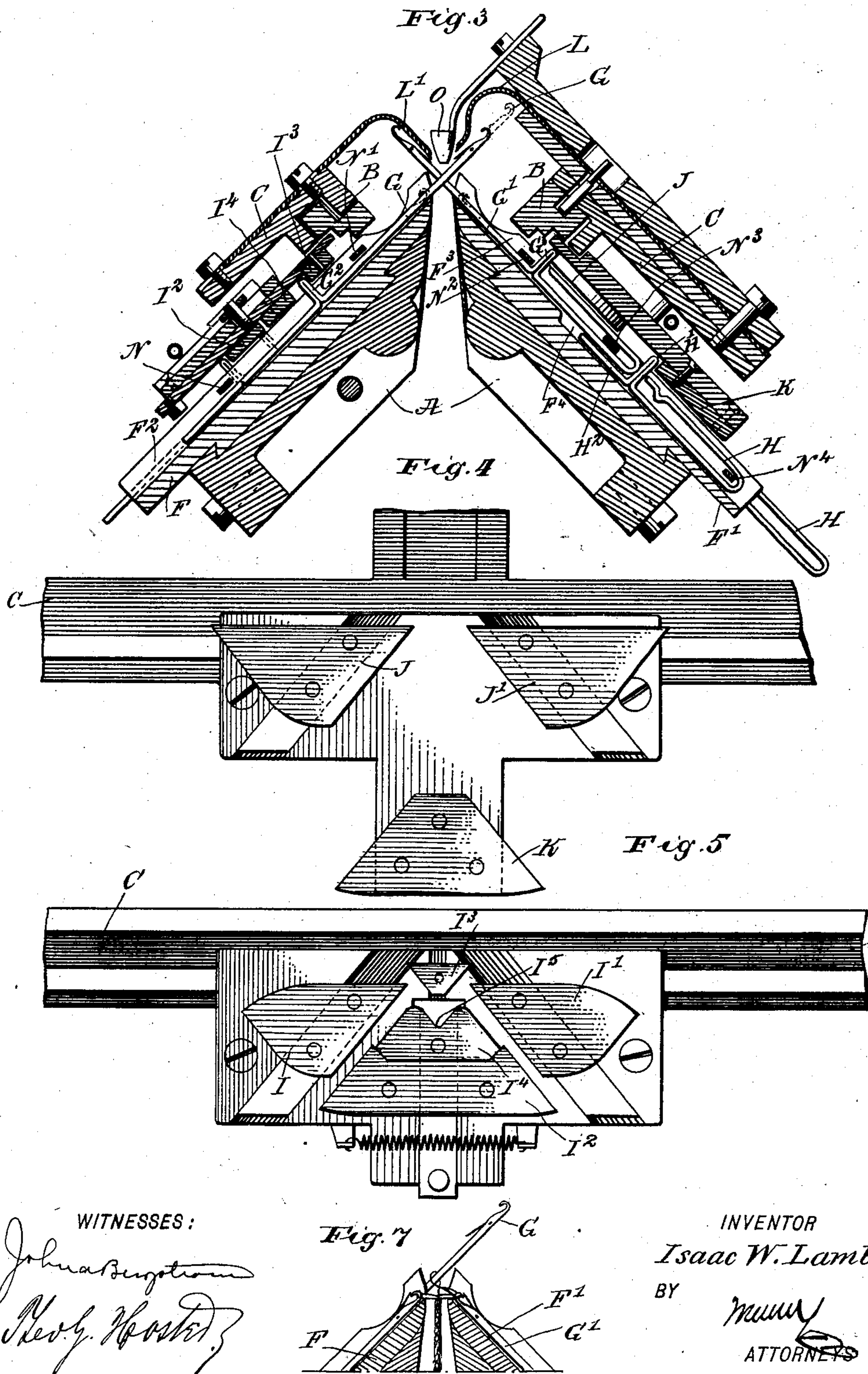
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4 SHEETS—SHEET 3.



WITNESSES:

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Fig. 7

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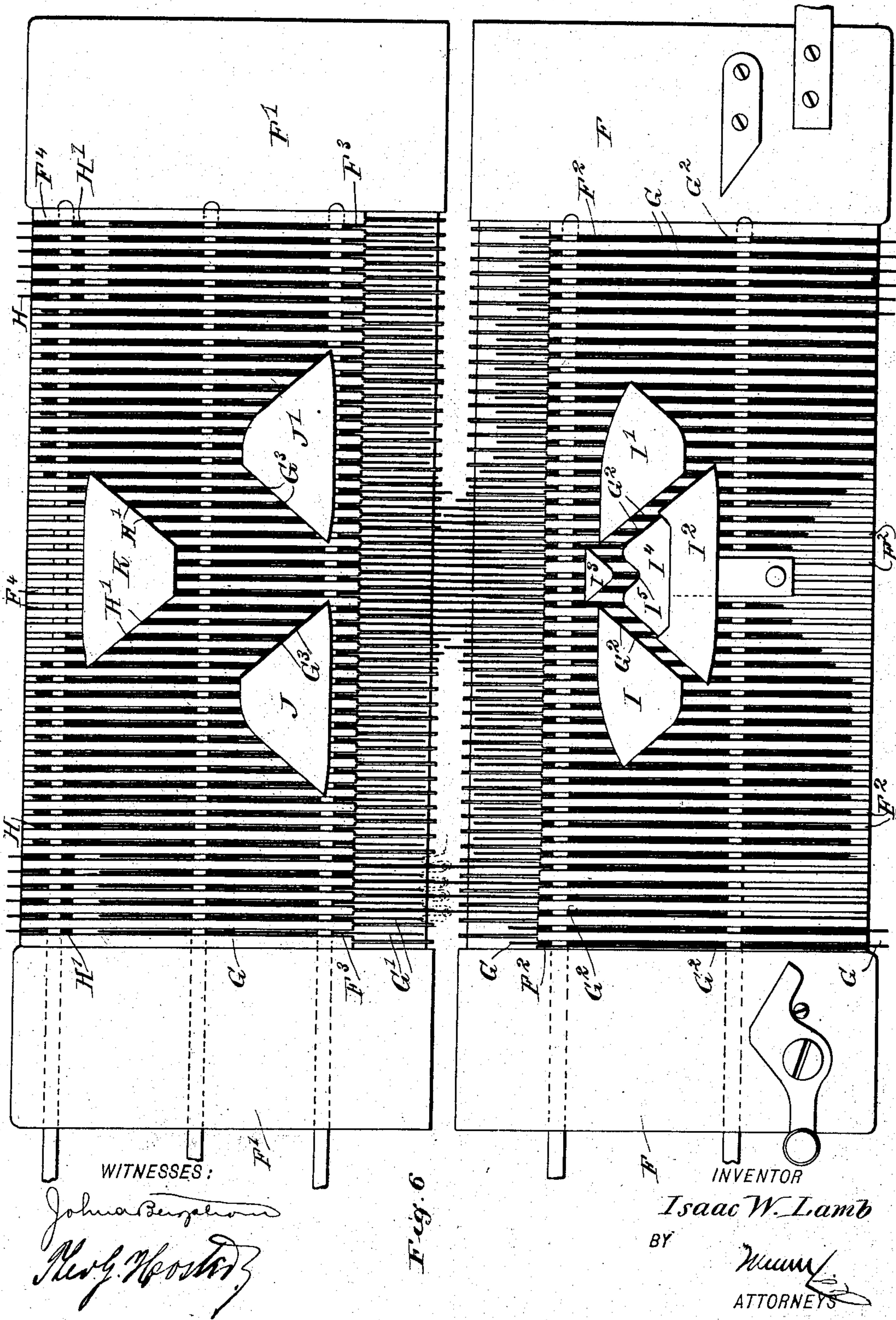
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4 SHEETS—SHEET 4.



UNITED STATES PATENT OFFICE.

ISAAC W. LAMB, OF PERRY, MICHIGAN, ASSIGNOR TO THE PERRY GLOVE AND MITTEN COMPANY, OF PERRY, MICHIGAN.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 753,715, dated March 1, 1904.

Application filed March 21, 1902. Serial No. 99,253. (No model.)

To all whom it may concern:

Be it known that I, ISAAC WIXOM LAMB, a citizen of the United States, and a resident of Perry, in the county of Shiawassee and State of Michigan, have invented a new and Improved Knitting-Machine, of which the following is a full, clear, and exact description.

The invention relates to knitting-machines of the Lamb type for two straight rows of needles arranged on opposite sides of the machine and between which rows of needles the work passes, as shown, for instance, in the Letters Patent of the United States No. 611,130, granted to me September 28, 1898, and No. 611,862, granted to me October 4, 1898.

The object of the invention is to provide a new and improved knitting-machine more especially designed for producing mittens, sweaters, and other garments having main and auxiliary parts, the arrangement being such that the needles or any portion thereof can be rendered inoperative or dormant without removing the loops from such dormant needles to allow of knitting a glove, for instance, in such a manner that after the hand or wrist portion is knit the work can be run off of any portion of the needles desired, or it can be retained on any desired portion of the needles, while the knitting is continued with another portion of the needles, to form the separate fingers.

The invention consists of novel features and parts and combinations of the same, as will be more fully described hereinafter and then pointed out in the claims.

A practical embodiment of the invention is represented in the accompanying drawings, forming a part of this specification, in which similar characters of reference indicate corresponding parts in all the views.

Figure 1 is a side elevation of the improvement. Fig. 2 is a plan view of the same. Fig. 3 is an enlarged transverse section of the same on the line 3-3 of Fig. 2. Fig. 4 is an enlarged inner face view of the cams for the needles and needle-lifters on the rear needle-plate. Fig. 5 is a like view of the cams for the needles on the front needle-plate. Fig. 6 is a plan view of the needle-plates shown dis-

posed in a horizontal plane, the needles, needle-lifters, and the cams for working the needles and needle-lifters being also shown in position; and Fig. 7 is a cross-section of part of the machine, showing the fabric and a loop retained on one of the needles on each side.

The improved knitting-machine is mounted on a main frame A, supporting a gib-frame B, on which reciprocates a carriage C, connected by a pitman D with the crank-disk D', secured on the transverse shaft E, adapted either to be turned by hand or connected with suitable machinery for imparting a rotary motion to the said shaft E to cause the crank-disk D' and pitman D to impart a reciprocating motion to the carriage C on the gib-frame B. Of the two needle-plates F and F' the front needle-plate F is fitted to slide longitudinally in suitable bearings on the frame A at the front of the machine, and the said needle-plate F is adapted to be held either stationary or to receive an intermittent sliding motion, according to the work in hand, by means of a needle-plate-shifting device actuated from the main shaft. The other or rear needle-plate F' is rigidly secured to the frame A.

The detail construction of the parts so far referred to is the same as the one shown and described in the Letters Patent of the United States above referred to, so that it is not deemed necessary to describe the parts in detail.

The needle-plates F F' are provided with suitable guideways or grooves F² F³ for the sets of needles G G' to slide in, and the guideways F³ terminate in somewhat deeper guideways or grooves F⁴, in which are mounted the needle-lifters H for moving the needles G' upwardly, as hereinafter more fully described.

The needles G on the front needle-plate F have nibs G², adapted to be engaged both for the upward and downward movement of the needles by a set of cams I, I', I², and I³, (see Fig. 5,) held on the front under side of the carriage C, and the needles G' on the rear needle-plate F' are provided with nibs G³, adapted to be engaged for the downward movement of the needles G' by the cams J J', (see Fig. 4,) the entire upward movement of

the said needles G' being accomplished by the use of the needle-lifters H , having nibs H' , adapted to be engaged by a cam K , secured with the cams J J' to the rear under side of the carriage C . The cams I I' are the usual side cams, while the cam I^2 is the middle or cardigan cam, having a movable section I^4 for giving a full or only a partial stroke to the needles G for producing a great variety of work, as more fully described in the Letters Patent of the United States No. 611,862, above referred to.

The movable section I^4 is formed in its apex with a V-shaped recess I^5 , adapted to engage the correspondingly-shaped top cam I^3 at the time the section I^4 is moved into a closed position. The top cam thus holds the movable section against accidental movement. The top cam I^3 serves to draw dormant retaining-needles back into a correct working position after they have been partly pushed downward from an uppermost position by the operator.

It is understood that the auxiliary top cam carries a needle down into the working cam after a needle has been started, say, about one-quarter of an inch by hand.

The notch I^5 in the cardigan-cam section I^4 is provided in order that the cardigan-cam section may be moved upward against the side cams and leave no space between the side cams and the cardigan-cam. Without this notch in the cardigan-cam section the latter is liable to strike the top auxiliary cam I^3 before the space between the cardigan-cam section and the side cams would be closed.

The needle-lifter cam K and the needle-cams J J' are arranged relative to the nibs H' and G^3 in such a manner that when the nib H' is engaged by a side of the cam K then the nibs G^3 of the corresponding needles G' are moved upward along the inner side of the cam J or J' to properly give an upward movement of the needles G' by the action of the needle-lifter H . (See Fig. 6.) The needle-lifters H (see right-hand side of Fig. 3) are each provided with an arm H^2 , extending upwardly from the nib H' to reach under the lower end of the corresponding needles G' to insure a proper retention of the needle-lifters in their grooves F^4 by the needles G' , acting as gibs or retainers to hold the lifters in their grooves.

Now when the machine is in operation and all the needles G and G' are in working position, then the reciprocation of the carriage C causes the cam devices on both sides of the carriage to actuate all the needles in the regular order—that is, the cams I and I' impart both an upward and downward movement to the needles G , while the cams J and J' impart a downward movement to the needles G' , and the needle-lifters H , actuated by the cam K , impart the full upstroke to the said needles G' .

When it is desired to run off some of the work, then the corresponding needles G are moved

by the operator into a downward inactive or dormant position, and the needle-lifters H for the corresponding needles G' are moved into a lowermost position, so that said needles G and G' are not actuated and remain dormant during the reciprocation of the carriage C . The nibs H' are then below the lower end of the cam K , and when it is desired to use any desired number of needles G and G' as retaining-needles for retaining the work while the knitting is continued with the remaining working needles in active position, the operator pushes such retaining-needles G upward into an extreme uppermost position so that the nibs G^2 are above the cam I^3 and the needle-lifters H for the corresponding retaining-needles G' are moved into a lowermost position, so that both sets of retaining-needles G and G' remain dormant, with the retaining-needles G in an extreme uppermost position and the retaining-needles G' in their normal resting position. On pushing a needle G into an extreme uppermost position its loop engages the needle-shank and reaches over near to the corresponding dormant retaining-needle G' , as will be readily understood by reference to Fig. 7. The retaining-needles G' remain dormant in their resting position, as their needle-lifters H are out of action, and the cams J J' only act on the needles G' when they are in an upper position to push the needles down from the uppermost or knitting position to the position of rest. The latch-opener L for the needles G is extended at its upper end, so that the needles G , which form retaining-needles and are pushed up into an extreme uppermost position, are not disturbed by the latch-opener L during the reciprocation of the carriage C . The latch-opener L' for the needles G' is of the usual construction.

In order to stop the needles G when moved downward by the operator into an inactive position at the time it is desired to run off some of the work, I provide a bar N , slidable lengthwise on the needle-plate F (see Fig. 3) over the needle-shanks, the said bar forming a stop for the nibs G^2 . A like stop-bar N' is provided in the upper portion of the needle-plate F for the nibs G^2 to abut against, when the needles G are moved into an extreme uppermost position by the operator to hold the loops in position. Three stop-bars N^2 , N^3 , and N^4 are arranged to slide lengthwise on the needle-plate F' , the stop-bar N^2 serving as a stop for the nibs G^3 at the time the needles G' are moved into an uppermost position by the needle-lifters H , the stop-bar N^3 limiting the downward movement of the nibs G^3 and needles G' , while the stop-bar N^4 serves to limit the downward-sliding movement of the needle-lifters H when the latter are moved downward by the operator for the purpose above described. The bar N^4 also holds one end of the needle-lifters down in its groove.

For producing fancy-work the front needles

dle-plate F is intermittently reciprocated by the same mechanism as the one described in the Letters Patent of the United States No. 611,862, above referred to, so that further description thereof is not deemed necessary.

The thread-carrier O is of the ordinary construction and extends between the latch-openers L and L', as indicated in the drawings. The means for regulating the length of the stitches is also of the usual construction, so that further description thereof is not deemed necessary.

It is understood that when the needles G are moved up by the operator into an extreme uppermost position then the loops carried by said needles open the latches thereof and the needle-shanks freely slide up through the loops, so that the latter remain in position without being unduly strained. (See Fig. 7.) When it is again desired to bring these needles and their loops into an active position, then the operator pushes these needles G back a short distance, so that the nibs G² are acted on by the cam I³ to draw the needles farther down into an active position. The loops on the retaining-needles G naturally lie about half-way between the two rows of needle-lifters, so that the distance from the hook of a back-retaining needle G' to the loop on the shank of a front-retaining needle G is comparatively short, and there is consequently no strain on either front or back loops by the passage of the cams over the back-retaining needles G'. It is further understood that for narrowing the work the corresponding needles G and G' are pushed downward by the operator until the nibs G² abut against the stop-bar N and the nibs G³ abut against the stop-bar N³, so that the nibs G³ pass between the cams J, J', and K without being touched by either on the reciprocation of the carriage. The needle-lifters for the needles G' thus pushed down are likewise pushed down by the downward movement of their needles until they abut against the stop-bar N⁴ and their nibs are below the bottom edge of the cam K. As shown in Fig. 6, some of the extreme right-hand needles and some of the extreme left-hand needles G G' are shown down or dormant for narrowing the work, and some of the needles G next to the extreme left-hand needles are shown in an extreme uppermost dormant position, but retaining their loops, with the corresponding opposite needles G left dormant in resting position by their corresponding needle-lifters H, drawn into a lowermost position.

In using the machine for knitting a glove, for instance, the wrist and hand portion is knitted with the necessary number of needles G G', and then a portion of the work is run off of the corresponding needles, and another portion of the work is retained on corresponding needles, while the knitting is continued with the remaining working needles. The

best economy is obtained by knitting first the wrist, then the hand, then throwing the work off the needles between the forefinger and the little finger, then knitting the forefinger while the work for the little finger is retained on the corresponding needles, then knitting the little finger, and, finally, removing the work from the machine. The middle fingers are then knit on a separate machine made expressly for that purpose. If the work is begun at the finger end, then one finger can be knit and the needles for such finger put out of working position. Then the next finger can be knit and the corresponding needles put out of working position, and this operation is repeated until all the fingers of the glove are knit without necessitating removal of any part of the work from the machine. The hand and wrist portions are finally knit, so that the entire glove is knit in one piece.

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

1. A knitting-machine having a needle-plate, needles movable thereon, a set of cams for imparting movement to the needles at the time the latter are in working position, one of the cams having a movable apex-section provided with a recess, in the apex, and a fixed auxiliary cam for moving the needles into the working position, the auxiliary cam being adapted to be engaged by the recess in the apex of said movable section, when the latter is raised to its highest position, as set forth.

2. A knitting-machine having a set of cams for actuating the needles on the needle-plate, the cams comprising side cams, a V-cam between the side cams and having a movable apex-section provided with a recess in apex, and a fixed top cam adapted to be engaged by the recess of the said movable section, as set forth.

3. A knitting-machine having a needle-plate formed with needle-grooves and needle-lifter grooves, the latter being in alinement with the needle-grooves and deeper than the latter, needles mounted to slide in the said needle-grooves, means for sliding the needles downward in their grooves, needle-lifters mounted to slide in the needle-lifter grooves, means for sliding the needle-lifters upward in their grooves, such needle-lifters being always in line with the needles and in position to be slid upward, and adapted when slid upward to abut against the rear ends of the said needles to slide the needles upward while having no positive attachment to the needles, as set forth.

4. A knitting-machine, having a needle-plate formed with needle-grooves and needle-lifter grooves, the latter being in alinement with the needle-grooves and deeper than the latter, the needle-lifter grooves being of the same depth from end to end, needles mounted to slide in the said needle-grooves, means for sliding the needles downward in their grooves, needle-lifters mounted to slide in the needle-lifter grooves, means for sliding the needle-lifters

upward, in their grooves, such needle-lifters being always in line with the needles and in position to freely slide upward, and adapted when slid upward to abut against the rear ends of the said needles to slide the needles upward, while having no positive attachment to the needles, the needle-lifters having extensions reaching under the needles so that the latter will retain the upper ends of the needle-lifters in their grooves, as set forth.

5. A knitting-machine having a set of needles for each side of the machine, cams for directly engaging the needles on one side of the machine to move the needles in this set both up and down, the said needles being adapted to be moved upward out of the path of the cams to render the needles inoperative while retaining their loops on the body of such needles, means for limiting the movement of said needles, needle-lifters for the other set of needles to move the latter in the upward direction, a cam for actuating the needle-lifters, cams for moving the said second set of needles in the opposite direction, the needle-lifters being adapted to be moved downward out of the path of the actuating-cam to render such needle-lifters and their needles dormant, while the needles retain their loops on their hooks, and means for limiting the movement of the needle-lifters, as set forth.

6. A knitting-machine having a set of needles for each side of the machine, means for directly engaging the needles on one side of the machine to move the needles in this set both up and down, stop-bars for limiting the movement of the said needles, needle-lifters for the other set of needles to move the latter in one direction only, the said needle-lifters being mounted to slide, means for actuating the needle-lifters, means for moving the second set of needles in the opposite direction, the needle-lifters being adapted to move out of the path of their actuating means, a stop-bar for the second set of needles when moved into an uppermost position, a stop-bar for limiting

the downward movement of said needles, and a third stop-bar for limiting the downward sliding movement of the needle-lifters, the latter bar serving to hold one end of the needle-lifters in position, as set forth.

7. A knitting-machine having a needle-plate, needles movable thereon, a set of cams for imparting movement to the needles at the time the latter are in working position, the cams comprising side cams, a V-cam between the side cams and having a movable apex-section provided with a recess in the apex, a fixed top cam in line with the said movable section and adapted to be engaged by the recess of the said movable section, and stop-bars for limiting the movement of the needles, as set forth.

8. A knitting-machine, having a set of needles for each side of the machine, means for directly engaging the needles on one side of the machine to move the needles in this set both up and down, the needles of this set being adapted to be moved upward out of the path of the operating means, whereby any of said needles may be rendered inoperative while retaining the loops on the body of the needles, needle-lifters for the other set of needles to move the latter in the upward direction, means for actuating the said needle-lifters, and means for moving the said second set of needles in the opposite direction, the needle-lifters being adapted to be moved downward out of the path of the actuating means, whereby any desired number of said needle-lifters and their corresponding needles can be rendered dormant, the said needles when in the dormant position retaining their loops on the hooks of the needles, as set forth.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

ISAAC W. LAMB.

Witnesses:

L. A. SPALDING,
FRANCIS M. FRY.