

(No Model.)

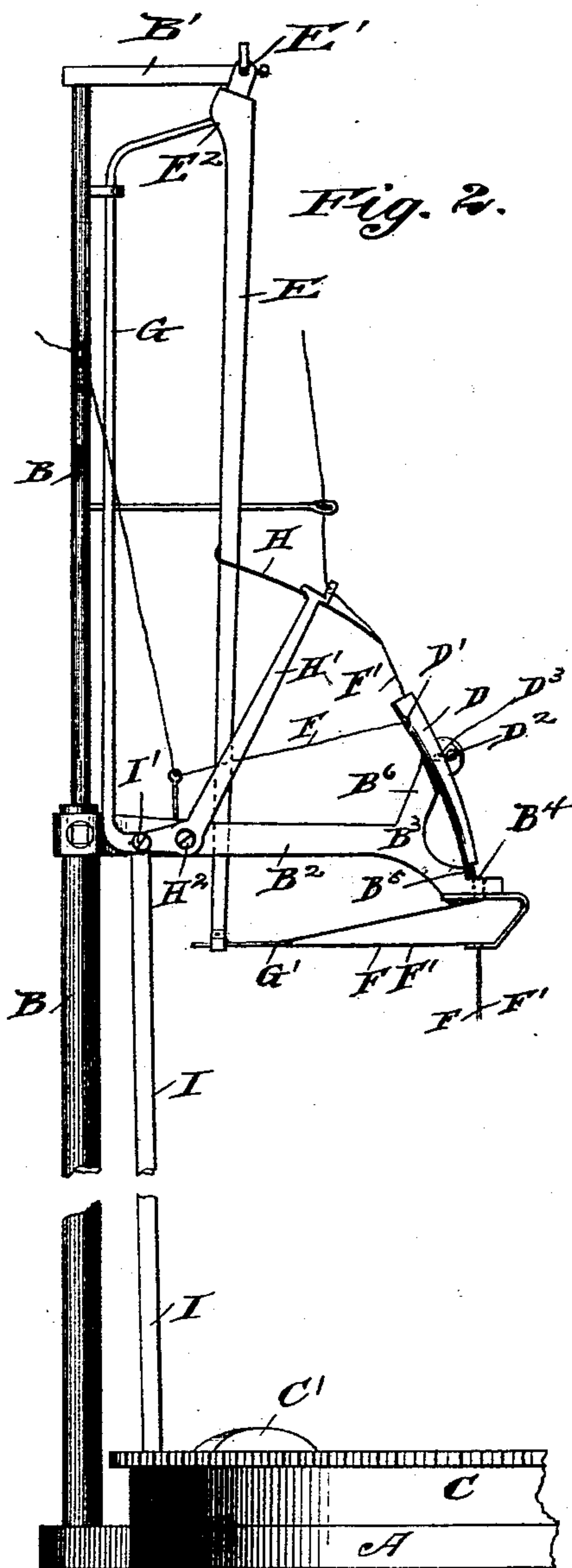
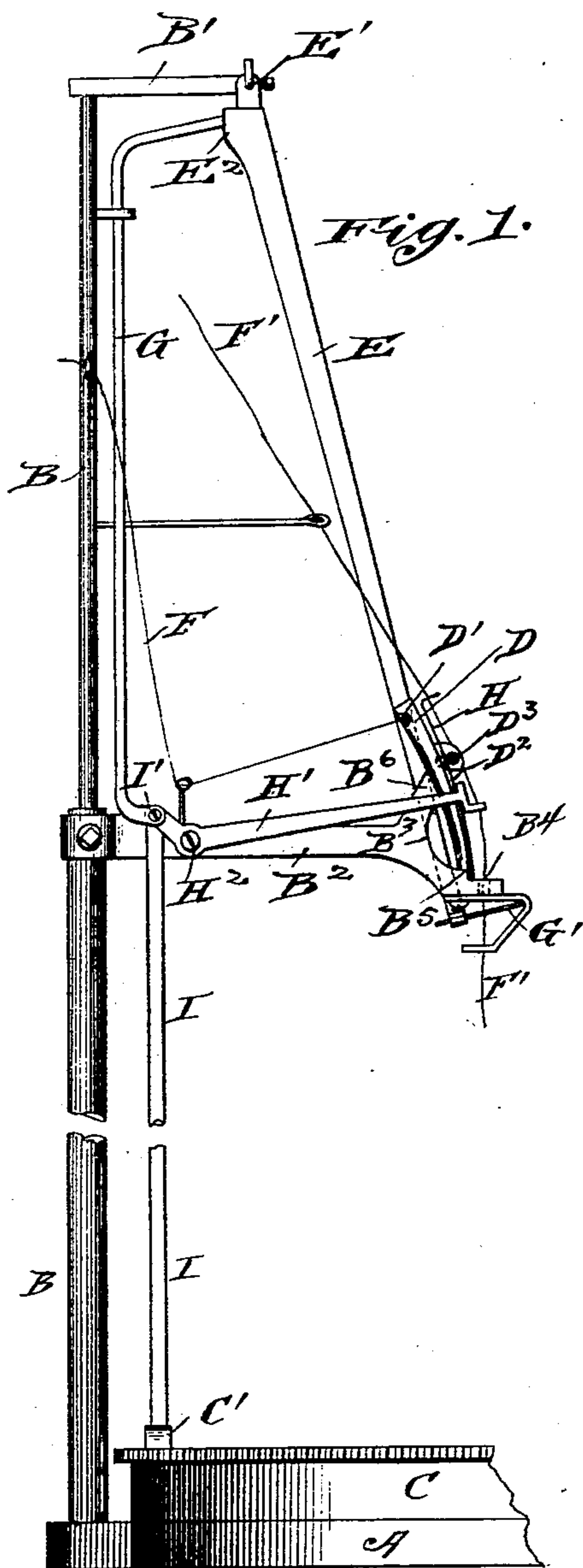
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REINFORCING THREAD MECHANISM FOR KNITTING MACHINES.

No. 563,230.

Patented June 30, 1896.



Witnesses,  
J. J. Mann,  
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Inventor,  
Howard E. Harbaugh,  
By L. L. Morrison,  
Att'y.

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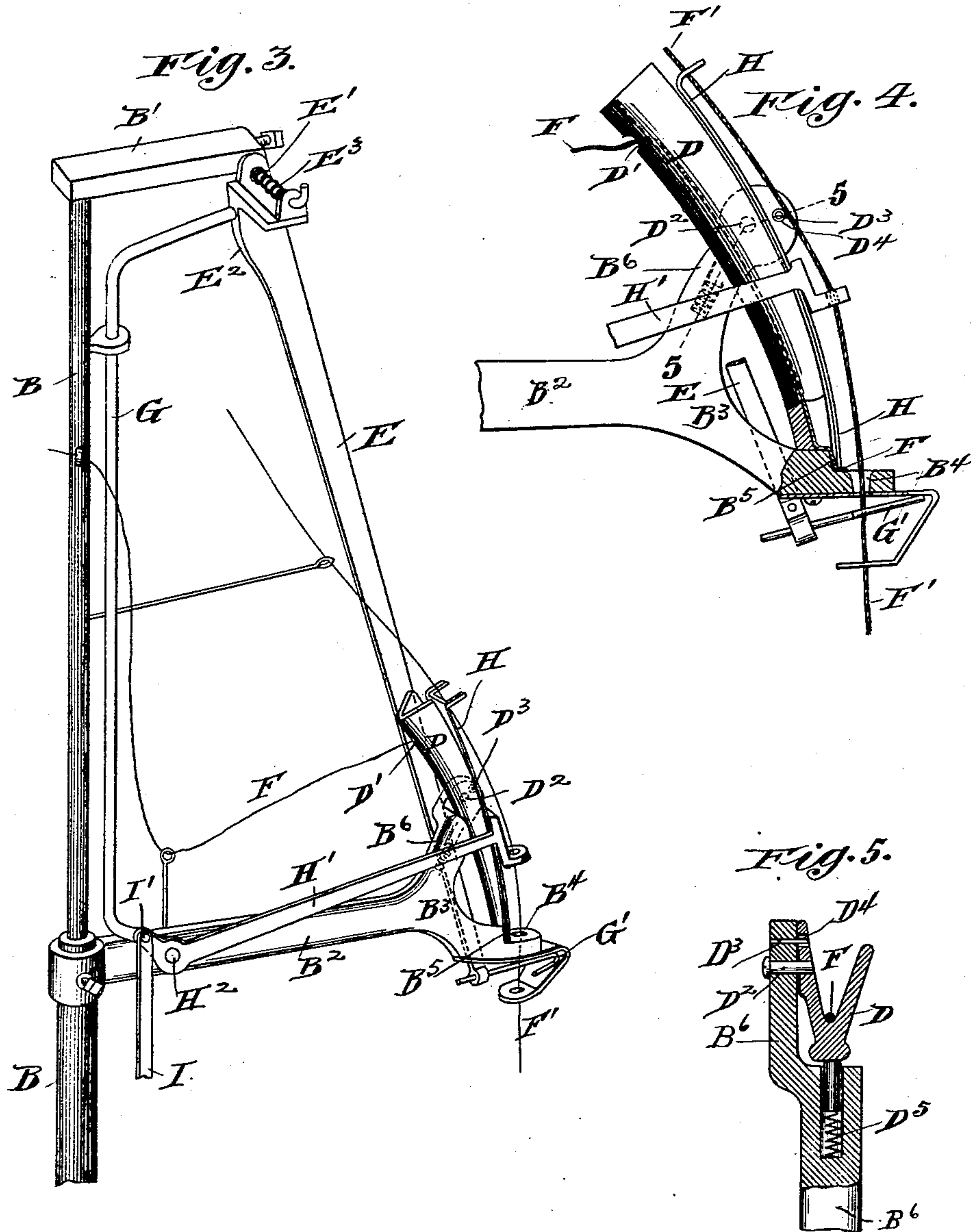
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# UNITED STATES PATENT OFFICE.

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## REINFORCING-THREAD MECHANISM FOR KNITTING-MACHINES.

SPECIFICATION forming part of Letters Patent No. 563,230, dated June 30, 1896.

Application filed September 15, 1894. Serial No. 523,166. (No model.)

*To all whom it may concern:*

Be it known that I, HOWARD E. HARBAUGH, a citizen of the United States, residing in the city and county of Kenosha, in the State of Wisconsin, have invented certain new and useful Improvements in Reinforcing-Thread Mechanism for Knitting-Machines, of which the following is a specification.

My invention relates specifically to mechanism for controlling the yarn that is customarily employed to reinforce the heels and toes of stockings by conducting it to and withdrawing it from the fashioning-needles of knitting-machines at predetermined intervals; and my invention consists of certain new and useful features of construction and combination of parts hereinafter fully described, and specifically pointed out in the claims.

Referring to the accompanying drawings, which form a part of this specification, Figure 1 is a side elevation of my invention, showing the parts thereof in the positions assumed by them while a knitting-machine (not shown) is knitting round and round to form the legs and feet of stockings. Fig. 2 is a like view of the same, showing the parts thereof in the positions assumed by them while the knitting-machine is knitting back and forth to form the heels and toes of stockings. Fig. 3 is an isometric enlarged detailed view of the upper portion of the mechanism shown in Fig. 1. Fig. 4 is an isometric enlarged detailed view of parts shown in Fig. 3. Fig. 5 is a section at the dotted line 5 in Fig. 4 of parts there shown.

Like letters of reference indicate corresponding parts throughout the several views.

A is the base of the machine, and is annular in form.

B is a vertical standard rigidly connected with the base A.

B' is a horizontal arm rigidly connected with the standard B.

B<sup>2</sup> is an arm rigidly connected with the standard B, terminating in a bracket B<sup>3</sup>, having a yarnway B<sup>4</sup> therein, and provided with an upwardly-projecting shoulder B<sup>5</sup>, the functions whereof will be fully explained hereinafter.

C is a pattern-wheel, rotatably mounted on

the base A, and provided with two cams C', only one of which is shown, the other being located on the portion of the wheel that is represented as broken away. One of the cams C' corresponds in extent to the leg, and the other to the foot, of the stocking to be knit. The pattern-wheel C makes a single revolution during the knitting of one stocking.

D is a yarn-chute V-shaped in cross-section, having a yarnway D' therein and mounted on a pivot D<sup>2</sup>, located on a projection B<sup>6</sup> on the bracket B<sup>3</sup>. The yarn-chute D is limited in its movements on the pivot-bearing D<sup>2</sup> by means of a stationary pin D<sup>3</sup>, which projects into a hole D<sup>4</sup> therein of greater diameter than the pin D<sup>3</sup>. The upper portion of the yarn-chute D is heavier than its lower portion. Its weight therefore causes it, when free to oscillate, to normally assume the position shown in Fig. 2, but the spring D<sup>5</sup> has been added, as a more positive force, in order to always assure its speedy assumption of such position.

E is a take-up lever suspended from the pivot-bearing E' and provided with an integral cam E<sup>2</sup>, whereto power may be applied to oscillate the same in one direction.

E<sup>3</sup> is a spring normally impelling the take-up lever E toward the standard B, and thereby acting to take up the slack of the yarn F F' being knit.

G is a rod for oscillating the take-up lever E, through the cam E<sup>2</sup> thereon, against the action of the spring E<sup>3</sup>, out of operative connection—through the hook G', projecting therefrom—with the yarn F F'.

H is a yarn-severer consisting of a thin strip of spring-steel chisel-edged at its lower end and mounted on the radial oscillatory arm H', which is provided with a bearing H<sup>2</sup> on the arm B<sup>2</sup>. The part H performs the triple function of training the yarn F out of alinement with the yarnway B<sup>4</sup> in the bracket B<sup>3</sup>, which it does by descending into contact with the lower portion of the yarn-chute D, and thereby tilting it from the position shown in Fig. 2 to that shown in Fig. 4, of severing the same, and of holding the free end thereof securely gripped against the shoulder B<sup>5</sup> on the bracket B<sup>3</sup> while the machine is knitting round and round.



I is a rod jointed at its upper end, by means of a pivot I', to the rod G and arm H', and in operative connection, at its lower end, with the face of the pattern-wheel C and the cam C' thereon.

The machine is operated as follows: Figs. 3, and 4 show the yarn F' passing to a knitting-machine to form the leg of a stocking, during the knitting whereof the lower end of the reinforcing-yarn F, Fig. 4, is tightly gripped between the shoulder B<sup>5</sup> and yarn-severer H. Upon the completion of the leg of the stocking, the pattern-wheel C will have rotated until the cam C' thereon will have passed completely under the rod I, when all the other parts of the machine will simultaneously assume the positions shown in Fig. 2. Immediately thereafter the yarn-chute D, having oscillated from the position it occupied in Figs. 1, 3, and 4, the yarn F, which travels continuously, engages the free end of the yarn F and carries it downward to the needles of the machine, which now knits back and forth with the yarn F F' to form the heel of the stocking, upon the completion of which the pattern-wheel C will have rotated until all the parts of the machine have again assumed the positions shown in Figs. 1, 3, and 4, and the yarn F will have been severed by the yarn-severer H, and the end thereof will remain firmly gripped between the yarn-severer H and the shoulder B<sup>5</sup> until the foot of the stocking is knit by the yarn F' and is ready to toe off, when the same movements of the parts of the machine and the yarn F F' will take place that took place preparatory to the knitting the heel of the stocking.

After the machine has completed knitting the leg of a stocking by knitting round and round, the cam-cylinder and yarn-carrier mounted thereon begin to oscillate to knit the heel of the stocking. The first oscillation of the cam-cylinder pays out yarn, around the outside of the needles, just below their latches, in length about one-fourth of the circumference of the series of needles. As the cam-cylinder makes its second oscillation, in the opposite direction, the yarn so paid out

slackens and tends to form a loop. The function of the lever E is to take up this loose yarn and to hold it taken up until the next oscillation of the cam-cylinder, when the needles of the machine knit the slack yarn just taken up by the take-up lever E. During the latter part of last-mentioned oscillation, after the needles have ceased knitting that course and just before the cam-cylinder reverses to perform its next oscillation, more yarn is paid out, which is taken up by the take-up lever E and knit at the next oscillation of the cam-cylinder. The take-up lever E travels from the position shown in Fig. 2 to that shown in Fig. 1, while the machine is knitting the taken up yarn, and returns from the position shown in Fig. 1 to that shown in Fig. 2 while it is taking up the next installment of slack yarn paid out by the machine.

This mechanism, when operatively connected with a knitting-machine, will cause it to automatically knit all the parts of a stocking, following the first with a second, and so on, in a continuous web.

I claim—

1. In a knitting-machine, in combination, a bracket having a yarnway therein, a pivoted yarn-chute—V-shaped in cross-section—the lower end whereof is adapted to be trained, by tilting into and out of alinement with the yarnway in the bracket, and a yarn-severer having provision to operate said yarn-chute, substantially as and for the purpose specified.

2. In a knitting-machine, in combination, a bracket having a yarnway therein and being provided with an upwardly-projecting shoulder B<sup>5</sup>, a pivoted yarn-chute and devices for tilting it so that the lower end thereof may be trained into and out of alinement with the yarnway in the bracket, a yarn-severer, adapted to coact with said shoulder to grip the free end of a severed yarn, and means for operating said yarn-severer, substantially as and for the purpose specified.

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