

No. 660,053.

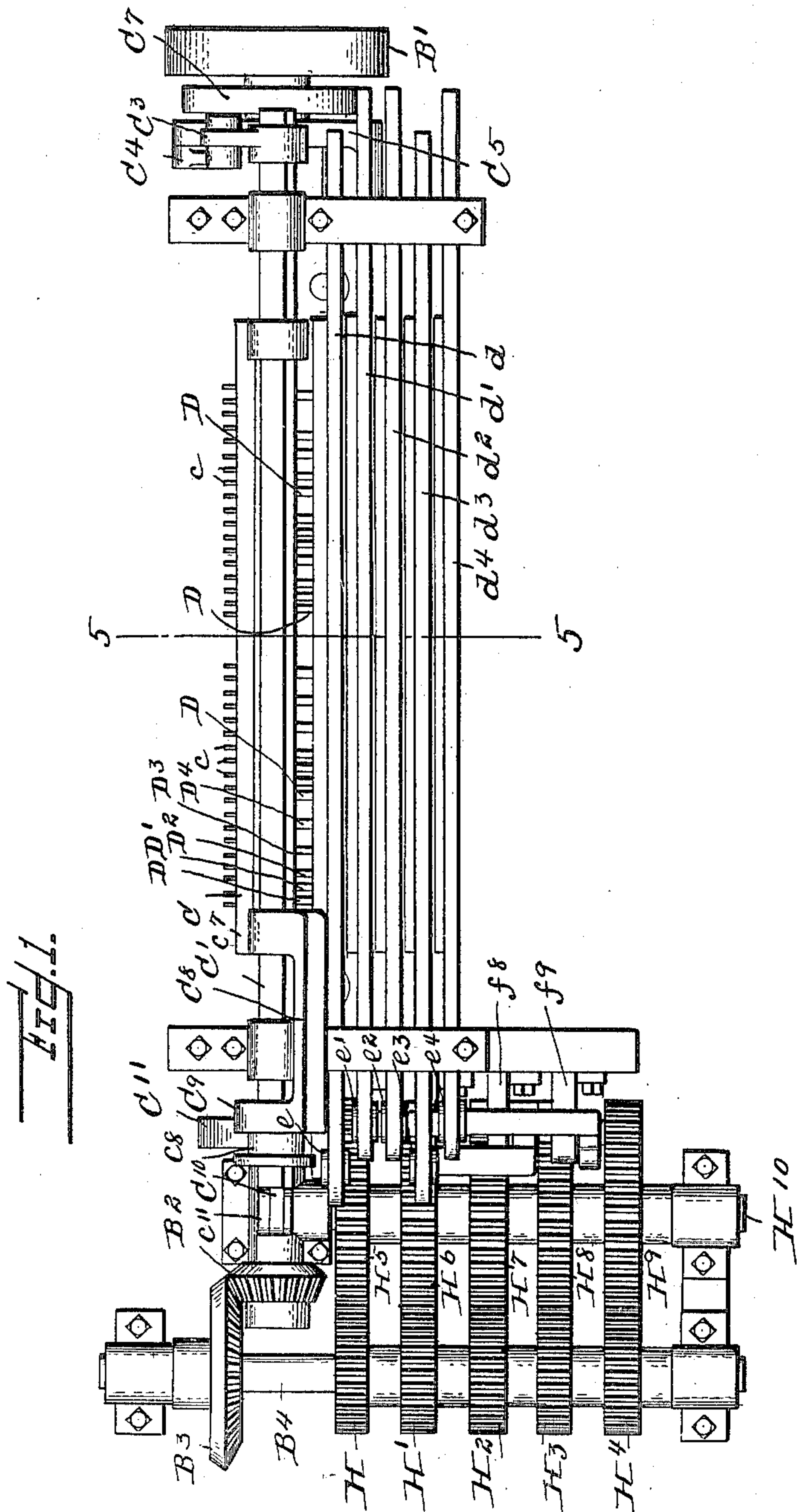
Patented Oct. 16, 1900.

C. E. DREW.
LACE KNITTING MACHINE.

(Application filed June 4, 1900.)

(No Model.)

5 Sheets—Sheet 1.



WITNESSES:

Jesse B. Heller,
J. M. Shumaker Jr.

INVENTOR

Charles E. Drew

BY

Handing & Harding
ATTORNEYS.

No. 660,053.

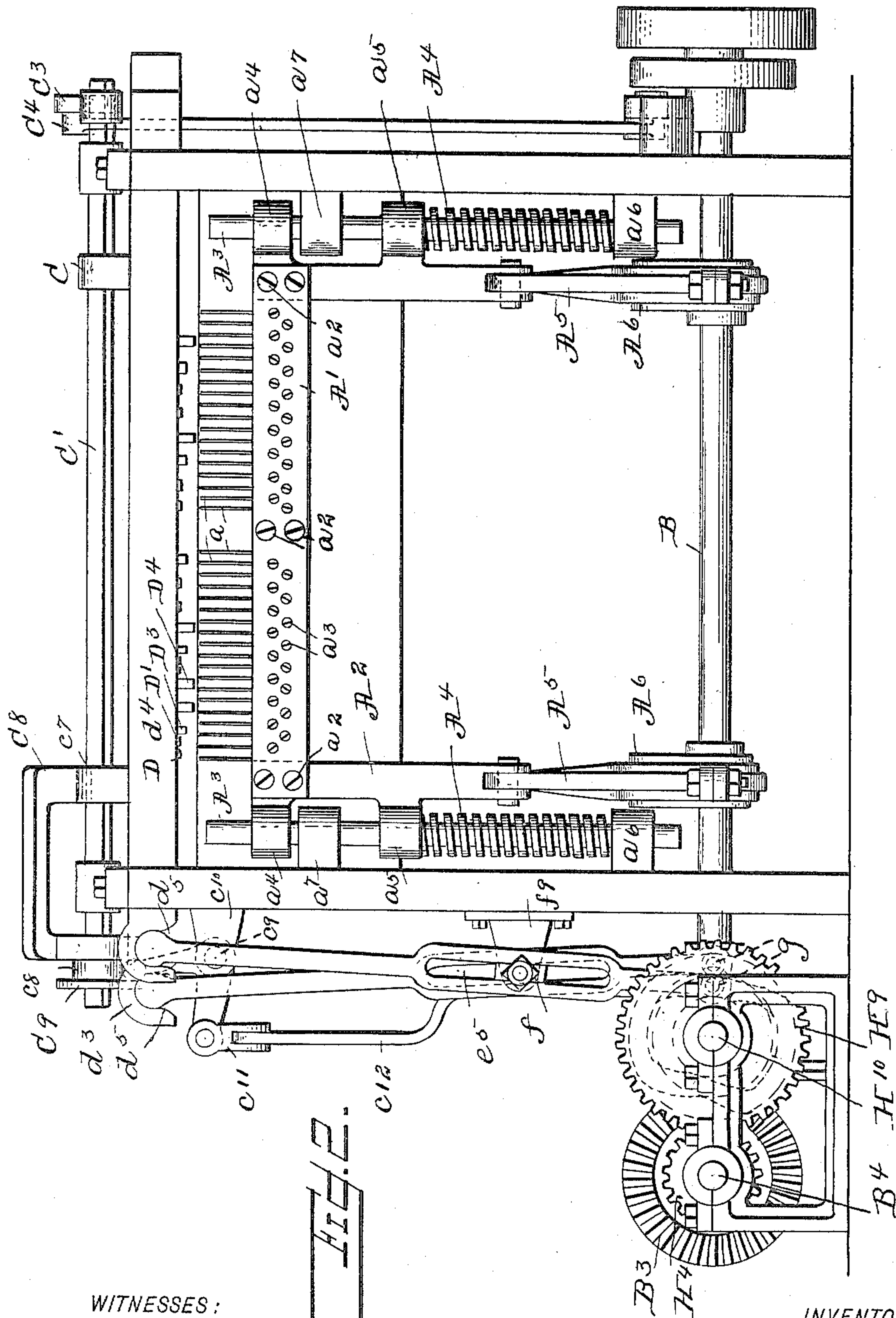
Patented Oct. 16, 1900.

C. E. DREW.
LACE KNITTING MACHINE.

(No Model.)

(Application filed June 4, 1900.)

5 Sheets—Sheet 2.



WITNESSES:

Jesse B. Heller,
J. M. Shindler Jr.

INVENTOR

Charles E. Drew

BY

Handing & Handing
ATTORNEYS

No. 660,053.

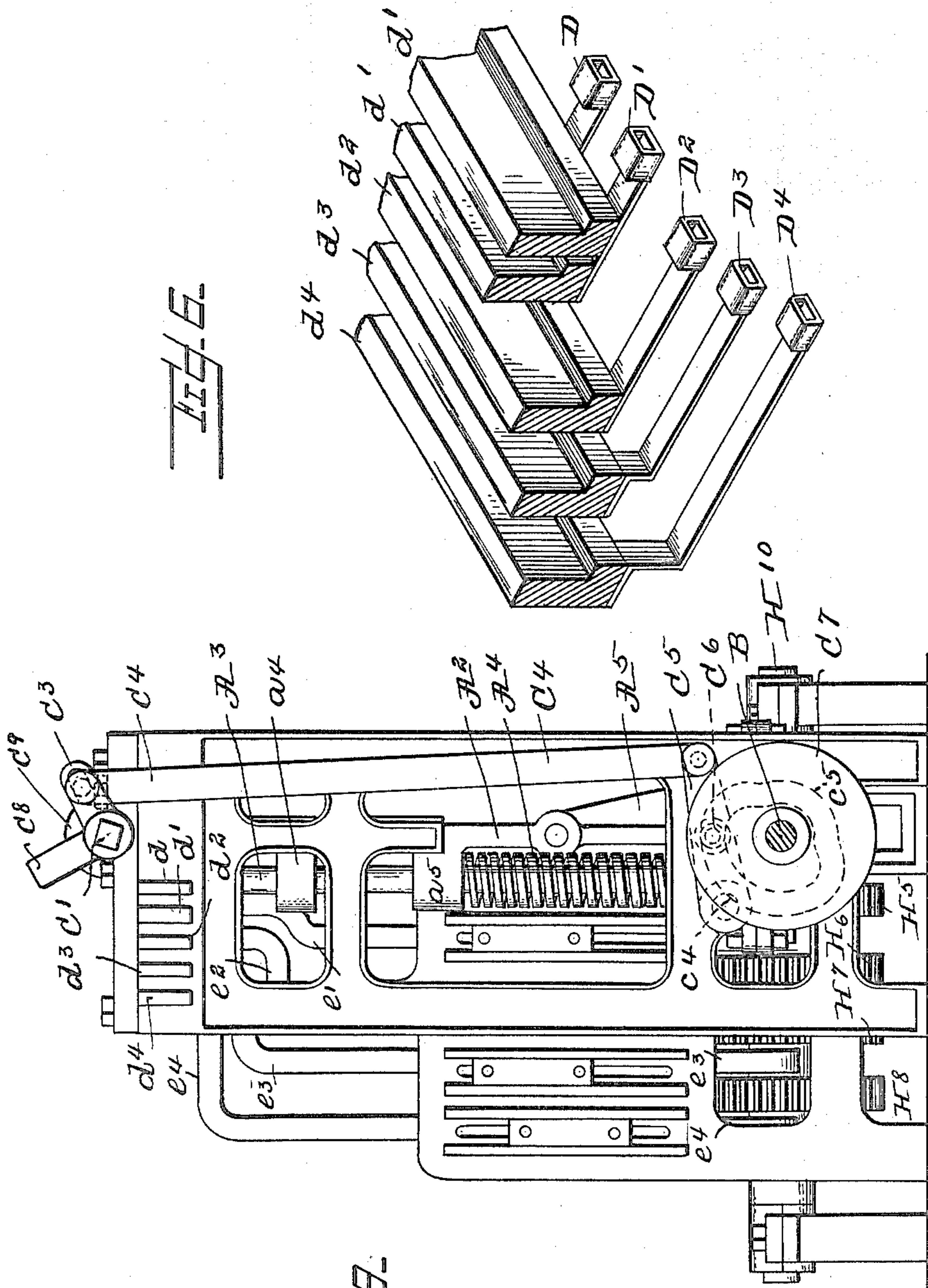
Patented Oct. 16, 1900.

C. E. DREW.
LACE KNITTING MACHINE.

(Application filed June 4, 1900.)

(No Model.)

5 Sheets—Sheet 3.



WITNESSES:

Jesse B. Neller,
J. M. Shindler Jr.

INVENTOR

Charles E. Drew

BY

Handing Handing
ATTORNEYS

No. 660,053.

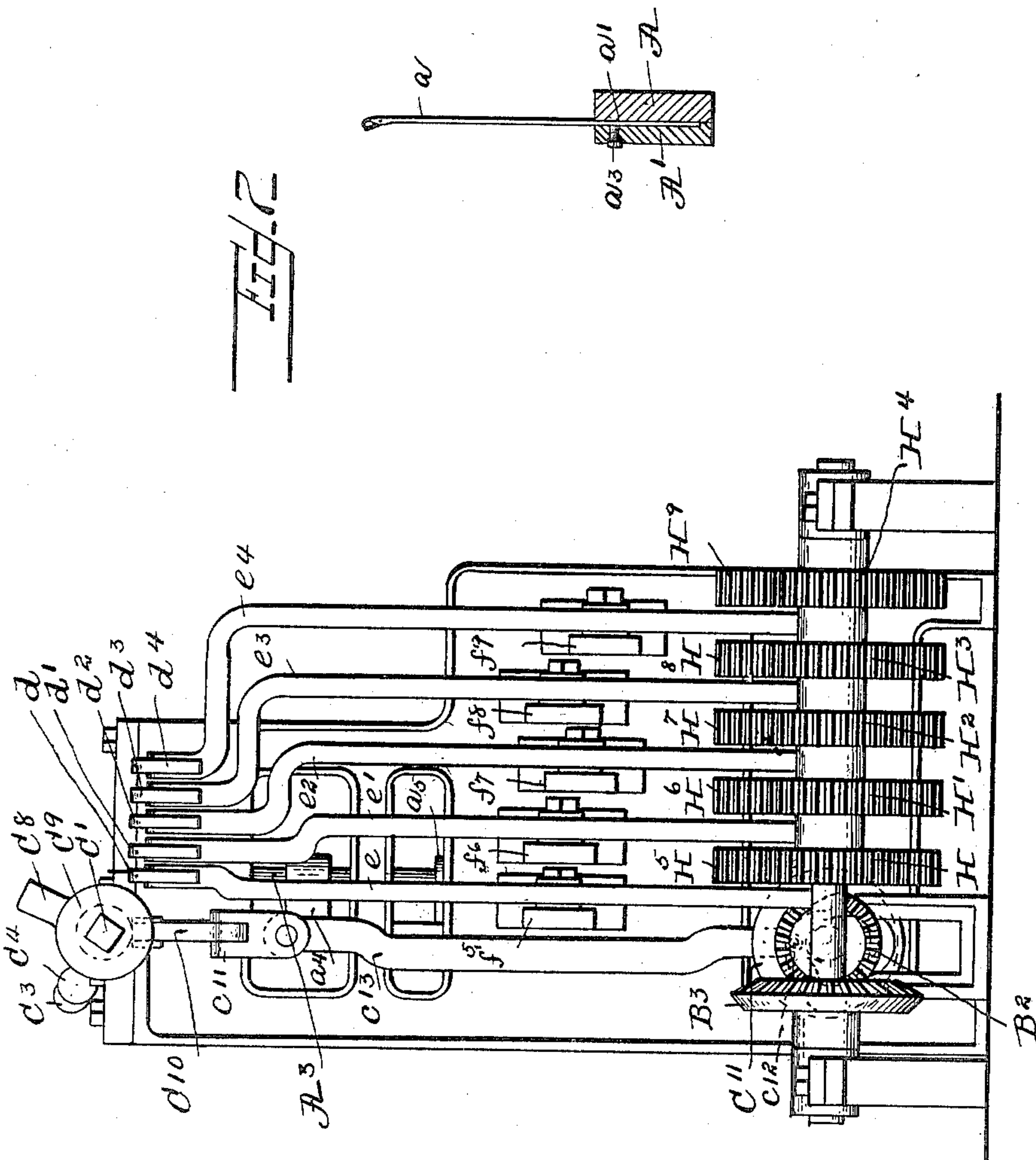
Patented Oct. 16, 1900.

C. E. DREW.
LACE KNITTING MACHINE.

(No Model.)

(Application filed June 4, 1900.)

5 Sheets—Sheet 4.



WITNESSES:

Jesse B. Heller,
J. M. Shindler.

INVENTOR

Charles E. Drew

BY

Handing & Handing
ATTORNEYS

No. 660,053.

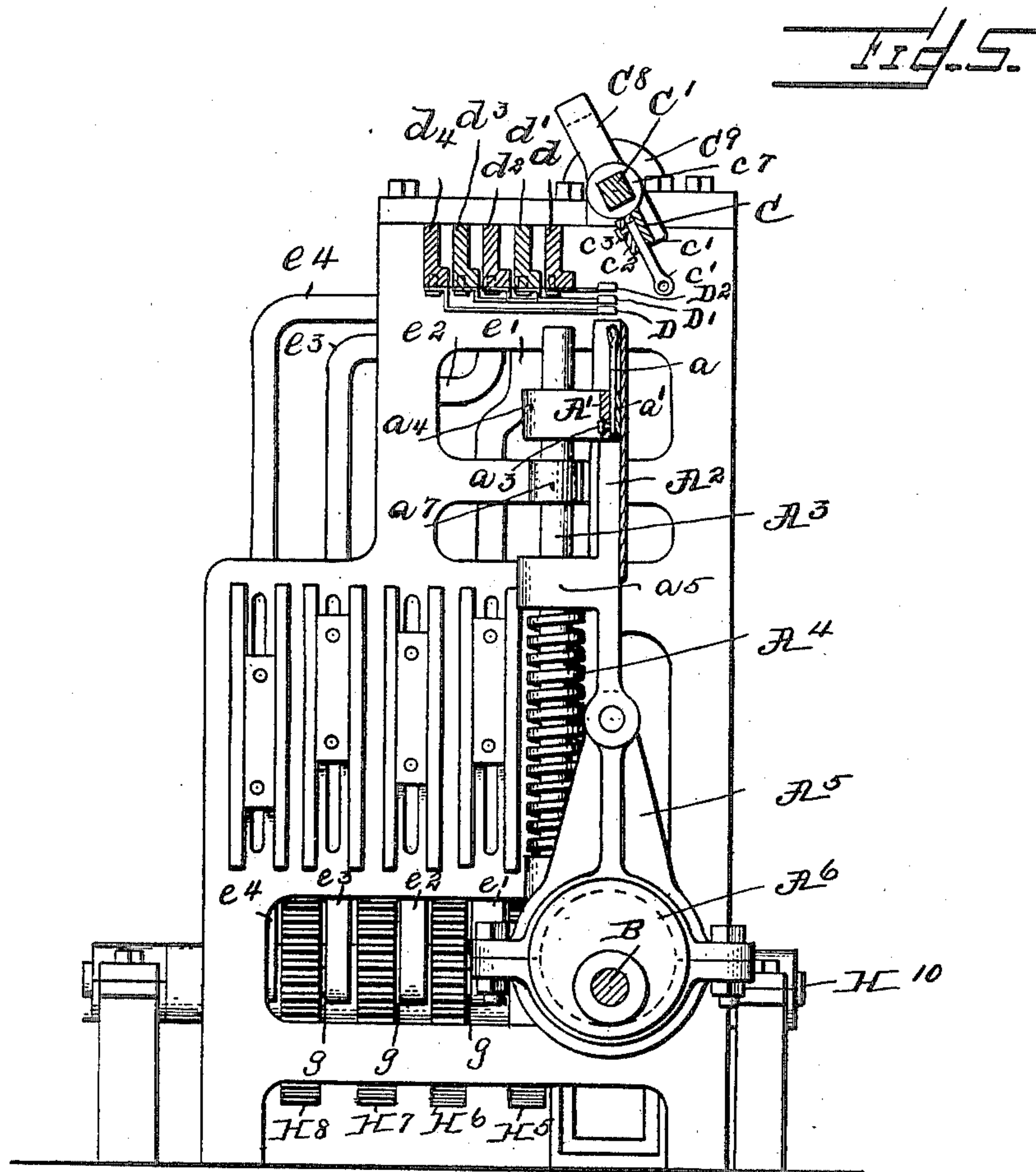
Patented Oct. 16, 1900.

C. E. DREW.
LACE KNITTING MACHINE.

(Application filed June 4, 1900.)

(No Model.)

5 Sheets—Sheet 5.



WITNESSES:

Jesse B. Heller,
J. M. Shindler Jr.

INVENTOR

Charles E. Drew

BY

Handley & Handley
ATTORNEYS

UNITED STATES PATENT OFFICE.

CHARLES E. DREW, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE
FRIEDBERGER MANUFACTURING COMPANY, OF PENNSYLVANIA.

LACE-KNITTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 660,053, dated October 16, 1900.

Application filed June 4, 1900. Serial No. 18,980. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. DREW, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Lace or Fancy-Trimming Knitting Machines, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention consists in certain improvements in the parts of lace or fancy-trimming machines, whereby the fabric may be more correctly and rapidly manufactured and the design readily varied. Machines of this class are provided with a plurality of needles adapted to make the desired stitch, and to each of which when operative an independent thread is fed. This forms a series of parallel stitches—say chain-stitches—which may be separated from each other any desired distance, dependent upon which needles are operated by having thread fed to them. There are also a series of independent threads fed to the needles, and so fed as to be interlocked by the needles with the rows of stitches. The carriers of these last-mentioned threads are given a movement to cause them to interlock with the desired chain-stitches, to pass from one chain to another, and to dwell the desired time at any one chain of stitches, thus forming the pattern. My invention, specifically considered, comprises certain improved mechanism for accomplishing this result and enabling the pattern to be readily varied.

I have illustrated in the drawings my invention as embodied in a machine adapted to make that class of trimmings which consists of a heading for attachment to the garment, a pillar-bar or ribbon-space, and an ornamental design beyond the ribbon-space or pillar-bar.

In the drawings, Figure 1 is a plan view of my improved machine. Fig. 2 is a front view of same. Figs. 3 and 4 are end views of same. Fig. 5 is a section on line 5 5, Fig. 1. Fig. 6 is a perspective view showing tubes for feeding pattern-threads. Fig. 7 is an enlarged view showing the manner in which the needles are fastened.

a a are the needles, some of which are used

to form the chain-stitch for the heading, others to form the chain-stitch for the pillar-bar, and others to form the chain-stitch for the design beyond the pillar-bar, all of which is well known, a plurality of trimmings being made upon one machine, about eight needles being used for each repeat. These needles are secured in the following manner: A is the needle-bar, provided with slots *a'* equal in number to the needles *a*. Each needle *a* is placed in a slot and the front plate *A'* secured to the needle-bar A by the screws *a''*. Through this plate *A'* and corresponding to each slot *a'* is an orifice through which passes a set-screw *a'''*. The needles may be properly adjusted in place, and if any needle becomes broken or defective, by operating its set-screw *a'''* the needle may be released. The bar A is secured to the needle-bar frame, which has the lugs *a⁴* *a⁵*. Secured to the lugs *a⁷* and *a⁶*, projecting from the frame of the machine, is the guide *A³*. Between the lugs *a⁵* and *a⁶*, surrounding the guide *A³*, is the spring *A⁴* to counterbalance the frame. Connected to the lower ends of the frame *A²* are the eccentric-rods *A⁵*, operated by the eccentric *A⁶* on the main driving-shaft B, rotated by the driving-pulley B'. By this mechanism the needles are moved up and down vertically to produce the chain-stitch and to interlock with the pattern-threads, as will hereinafter be described.

c represents the chain-stitch thread-guides, equal in number and corresponding to the needles used. This thread is fed to and around the needles *a* in the following manner: The chain-stitch thread-guides *c* are connected to a frame C in the same manner that the needles *a* are connected to their frame—that is, the frame has slots *c'*, in which the guides *c* are placed and in which they are secured by the plate *c²* and set-screws *c³*. The frame C is mounted on the shaft C', so as to oscillate with, but slide upon, said shaft. The well-known way of accomplishing this is by means of a rectangular shaft and a corresponding orifice in the frame. This frame C is given an oscillatory movement to carry the thread across the path of the needles a longitudinal movement to carry the thread around the needle, an oscillatory movement to carry the thread away from the path of the needles, and

a longitudinal movement to return the guide to its initial position. Secured to one end of the shaft is a lever C^3 , which is connected by link C^4 with a lever C^5 , pivoted to the frame of the machine. Secured intermediate of this lever C^5 is the roller C^6 , which is engaged by the cam C^7 on the main driving-shaft B. This cam C^7 has a concentric high portion c^4 and concentric low portion c^5 . In the rotation of this cam C^7 the shaft and guides are oscillated across and back from the path of the needles, and at each end of this oscillation there is a dwell in the movement of the shaft. Provision for the longitudinal movement of the guide is made in the following manner: Connected to the sleeving-lug c^7 of the frame C is the strap C^8 . The other end of strap C^8 is connected to a sleeve C^9 on the shaft C' . The sleeve C^9 has the groove c^8 . C^{10} is a bell-crank pivoted at c^9 to a projection c^{10} from the frame of the machine. One end of this bell-crank rests in the groove c^8 and the other end of the bell-crank is connected to the links c^{11} and c^{13} , the link c^{13} having at its lower end the roller c^{12} , which rests upon the cam C^{11} on the shaft B. This cam C^{11} has high and low concentric portions, so that in its rotation the frame C and guides c are reciprocated, and there is a dwell at each end of the reciprocation. The cams C^{11} and cam C^7 make the same number of revolutions; but the high and low concentric portions are oppositely placed, so that in one rotation of these cams the frame C is first moved across the path of the needles, then around the needles, then back from the path of the needles, and then longitudinally to its initial position.

The pattern-threads are carried in guides, five sets D D^4 being shown in the drawings. Each of these guides is secured to a corresponding bar d d^4 . Each of these bars d d^4 has a cut-away portion d^5 . In each of these cut-away portions rests one end of a lever e e^4 . Between the ends of each of these levers e e^4 is a slotted portion e^5 . In these slotted portions are pivot-blocks f , secured to lugs f^5 f^9 . The lower end of each of the levers e e^4 has a roller, (denoted by g). Upon the main driving-shaft B is the miter-gear B^2 , meshing with the miter-gear B^3 upon the shaft B^4 . Upon and so as to rotate with this shaft are the gears H H^4 . Each of these gears meshes with a gear H^5 H^9 on the shaft H^{10} . Each of these gears H^5 H^9 has a cam-groove, the roller g resting on the cam-groove of gear H^5 , roller of e' upon that of gear H^6 , roller of e^2 upon that of gear H^7 , roller of e^3 upon that of gear H^8 , and roller of e^4 upon that of gear H^9 . The arrangement of gears is such that shaft B^4 revolves one-half as fast as shaft B and gears H^5 H^9 one-half as fast as gears H H^4 . This arrangement would give one rotation of gears H^5 H^9 to four stitches of the needles. By arranging the cam-grooves the throw and dwell of the pattern-thread within the limit of four stitches may be dictated. By

changing the rotation of gears B^2 and B^3 the rotation of the shaft of the gears H^5 and H^9 may be varied. The relation of any individual gear H^5 H^9 may be changed by changing such gear and its corresponding gear of the set H' H^4 . The extent of throw of the pattern-thread may be varied by raising or lowering the pivot-block f , thereby varying the throw of the levers e e^4 .

From the foregoing the operation of the machine will be readily understood. The needles are given a reciprocating movement, and the thread is fed across their path, around the needles, and back, and each of the pattern-threads is given a movement along the needles and is given the desired dwell to form the pattern.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In a fancy-knitting machine, in combination with the thread-guides and frame for the same, of a shaft upon which said frame is sleeved so as to move with and upon said shaft, a sleeve connected with said frame, there being a groove in said sleeve a bell-crank pivoted lever, one end resting in said groove, a rotating cam having high and low points and connection between said bell-crank lever and said cam.

2. In a fancy-knitting machine, in combination with the thread-guides and frame for the same, of a shaft upon which said frame is sleeved so as to move with and upon said shaft a sleeve connected with said frame, there being a groove in said sleeve a bell-crank pivoted lever, one end resting in said groove, a link connected to the other end of said bell-crank, a rotating cam having high and low points, said link resting upon and being operated by said rotating crank.

3. In a fancy-knitting machine, in combination with the thread-guides and frame for the same, of a shaft upon which said frame is sleeved so as to move with and upon said shaft a sleeve connected with said frame, there being a groove in said sleeve a bell-crank pivoted lever, one end resting in said groove, a rotating cam having high and low points and connection between said bell-crank lever and said cam a lever connected with the guide-frame shaft, a rotating cam having high and low points, a pivoted lever operated by said cam, and a link connecting said last-mentioned lever and the lever connected with the shaft the high and low points on said two rotating cams being respectively oppositely placed.

4. In a fancy-knitting machine, in combination with the thread-guides and frame for the same, of a shaft upon which said frame is sleeved so as to move with and upon said shaft a sleeve connected with said frame, there being a groove in said sleeve a bell-crank pivoted lever, one end resting in said groove, a rotating cam having high and low points and connection between said bell-crank lever

and said cam a lever connected with the guide-frame shaft, a rotating cam having high and low points, a pivoted lever operated by said cam, and a link connecting said last-mentioned lever and the lever connected with the shaft the high and low points on said two rotating cams being respectively oppositely placed, and said two cams rotating in unison.

5. In a fancy-knitting machine, in combination with a pattern-thread guide and sliding bar for the same, of a lever pivotally connected with said bar, a rotating cam having high and low points operating said lever, a removable gear operating said cam, a second removable gear meshing with the first-mentioned gear, a main driving-shaft and connection between said main driving-shaft and the second removable gear.

6. In a fancy-knitting machine, in combination with a pattern-thread guide and sliding bar for the same, of a lever pivotally connected with said bar and adjustably fulcrumed, a rotating cam having high and low points operating said lever, a removable gear operating said cam, a second removable gear meshing with the first-mentioned gear, a main driving-shaft and connection between said main driving-shaft and the second removable gear.

7. In a fancy-knitting machine, in combination with a pattern-thread guide and sliding bar for the same, of a lever pivotally connected with said bar, a slot in said lever, a pivot-block adjustably secured in said slot, a cam having high and low points, a removable gear operating said cam, a second removable gear meshing with the first-mentioned gear, a main driving-shaft and connection between said main driving-shaft and the second removable gear.

8. In a fancy-knitting machine, in combination with a plurality of pattern-thread guides and sliding bars for the same, of a plurality of levers equal in number to said bars, one lever being pivotally connected to each bar, rotating cams equal in number to

said levers each bar having high and low points, each cam operating a lever, removable gears equal in number to said cams, each cam being operated by a gear, each first-mentioned gear having a corresponding second-mentioned gear, a main driving-shaft and connection between the main driving-shaft and the second set of gears.

9. In a fancy-knitting machine, in combination with a plurality of pattern-thread guides and sliding bars for the same, of a plurality of levers equal in number to said bars, one lever being pivotally connected to each bar, and each lever being adjustably fulcrumed, rotating cams equal in number to said levers each bar having high and low points, each cam operating a lever, removable gears equal in number to said cams, each cam being operated by a gear, each first-mentioned gear having a corresponding second-mentioned gear, a main driving-shaft and connection between the main driving-shaft and the second set of gears.

10. In a fancy-knitting machine, in combination with a plurality of pattern-thread guides and sliding bars for the same, of a plurality of levers equal in number to said bars, one lever being pivotally connected to each bar, there being a slot in each lever and a pivot-block adjustably secured in said slot, rotating cams equal in number to said levers each bar having high and low points, each cam operating a lever, removable gears equal in number to said cams, each cam being operated by a gear, each first-mentioned gear having a corresponding second-mentioned gear, a main driving-shaft and connection between the main driving-shaft and the second set of gears.

In testimony of which invention I have hereunto set my hand, at Philadelphia, Pennsylvania, on this 31st day of May, 1900.

CHARLES E. DREW.

Witnesses:

M. F. ELLIS,

J. M. SHINDLER, Jr.