

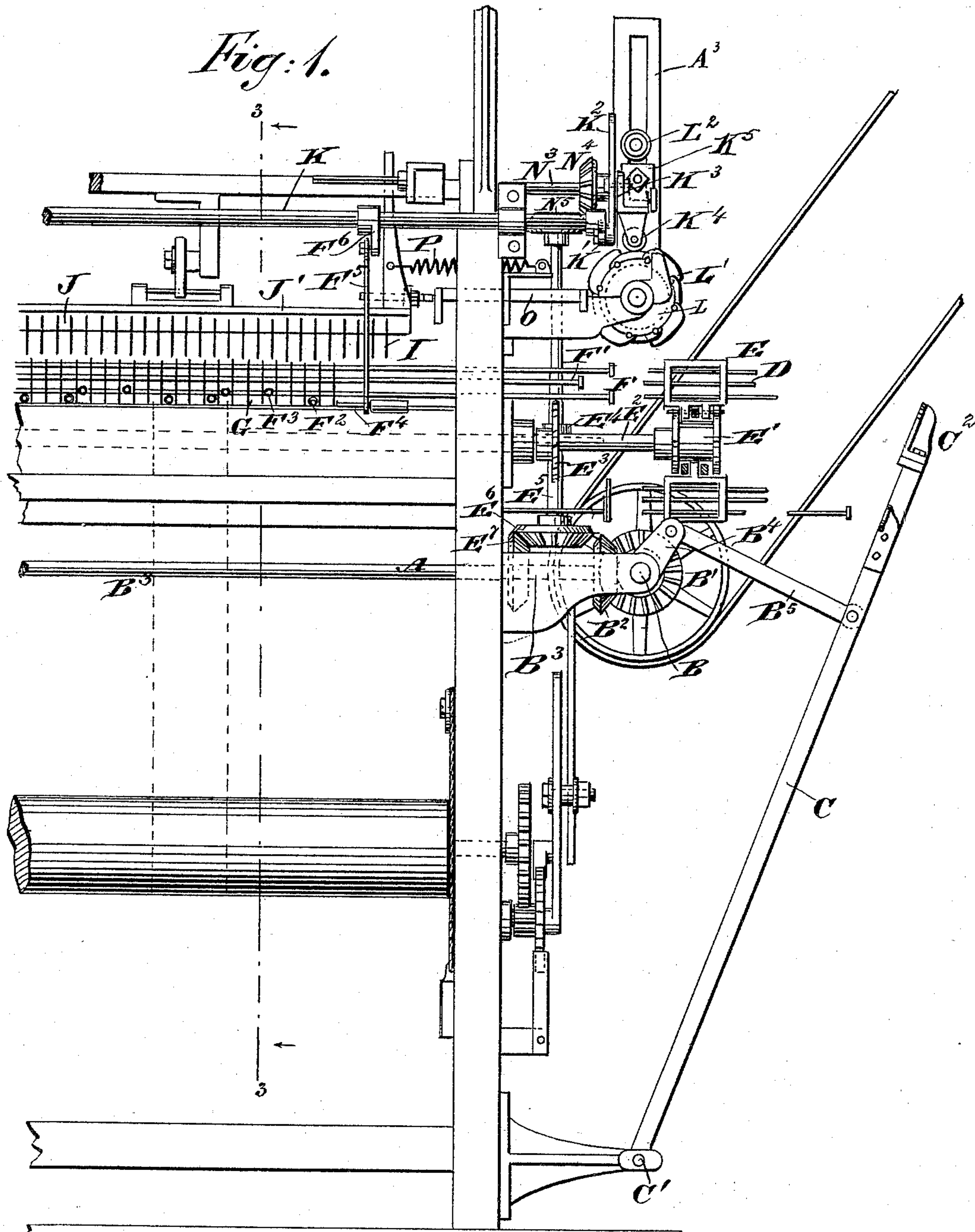
(No Model.)

4 Sheets—Sheet 1.

J. FRELLOEHR.
KNITTING MACHINE.

No. 489,801.

Patented Jan. 10, 1893.



WITNESSES:

Chas. Viola
W. Sedgwick

INVENTOR

J. Frelloehr
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ATTORNEYS.

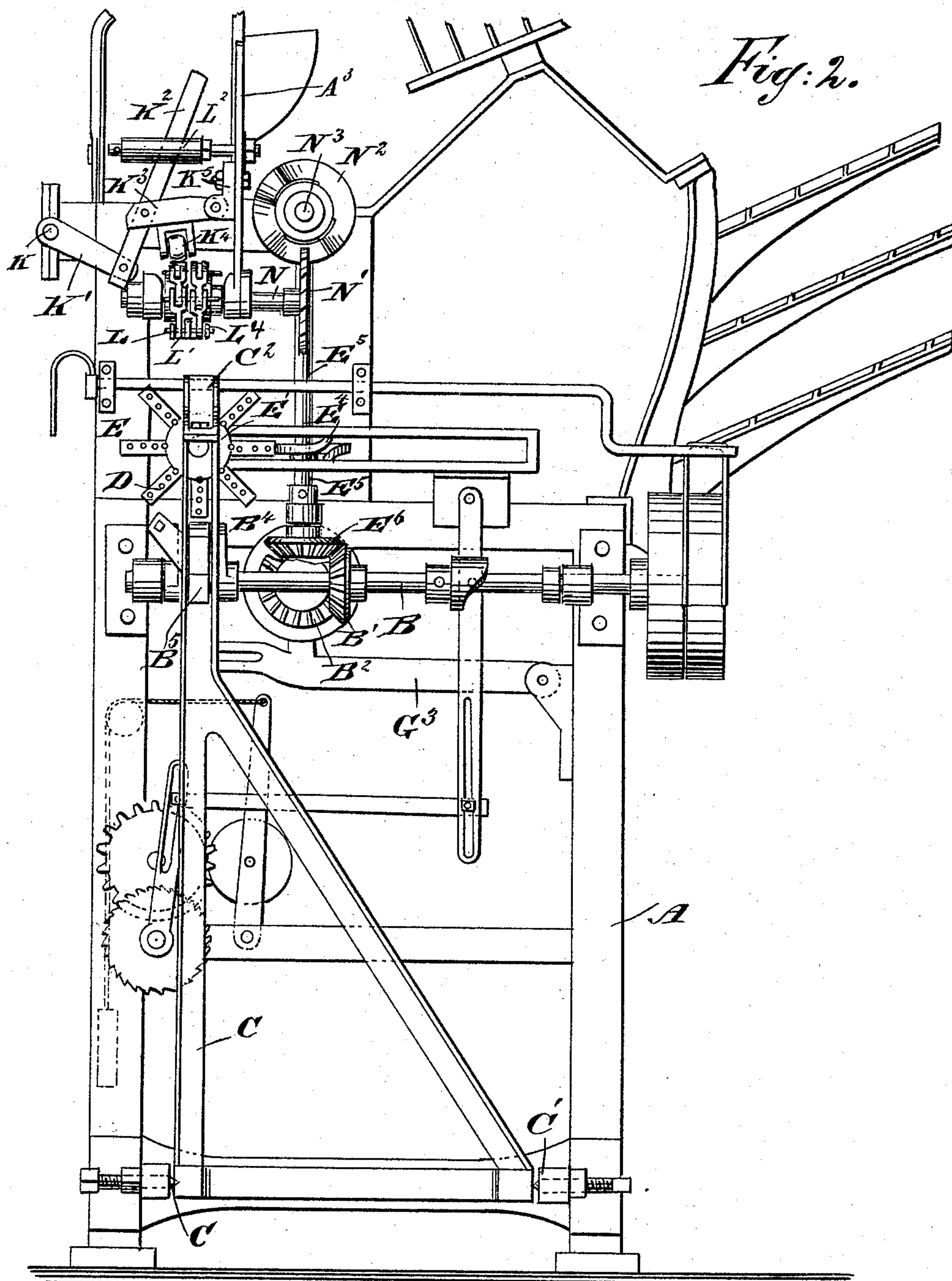
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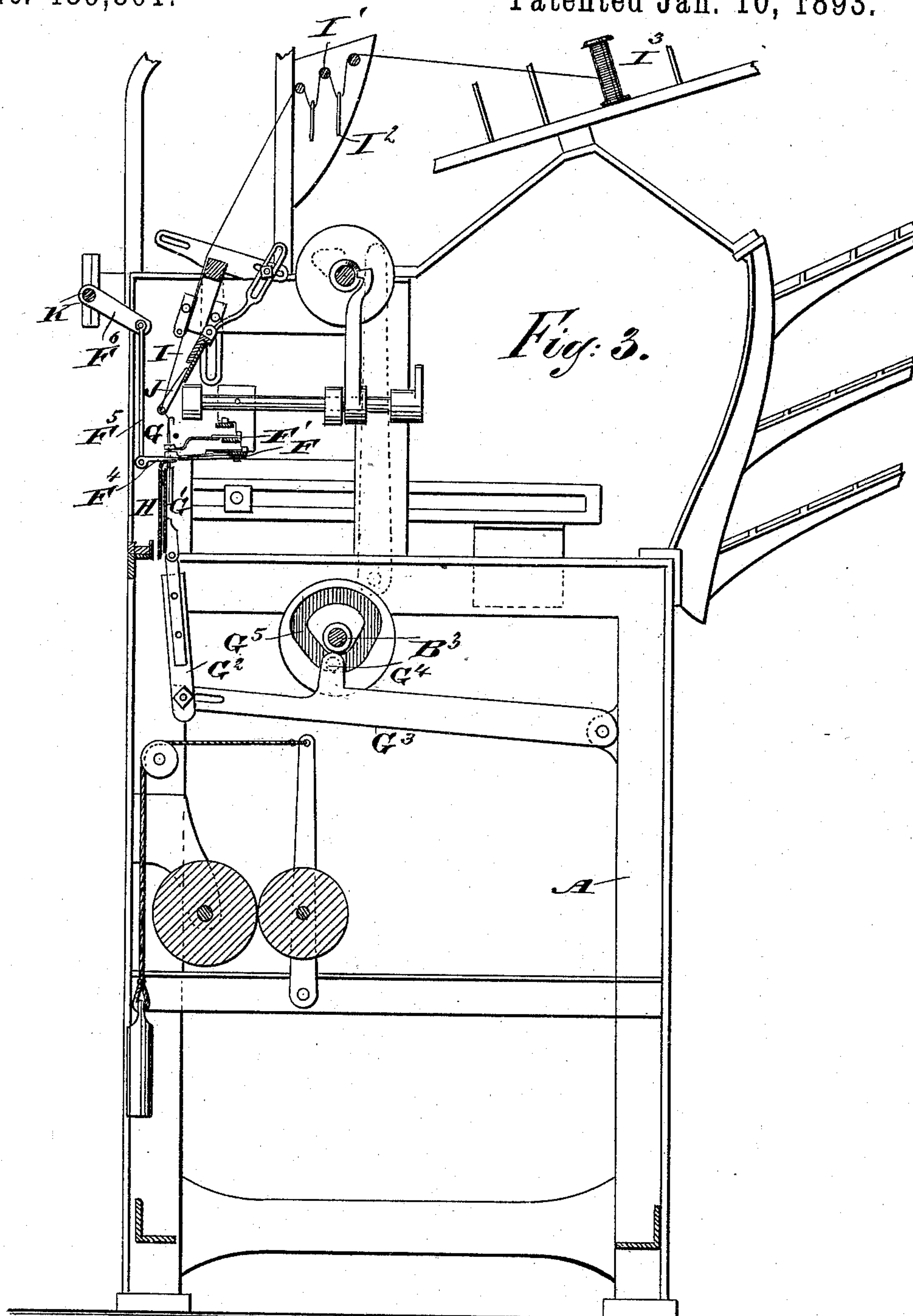
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Fig: 4

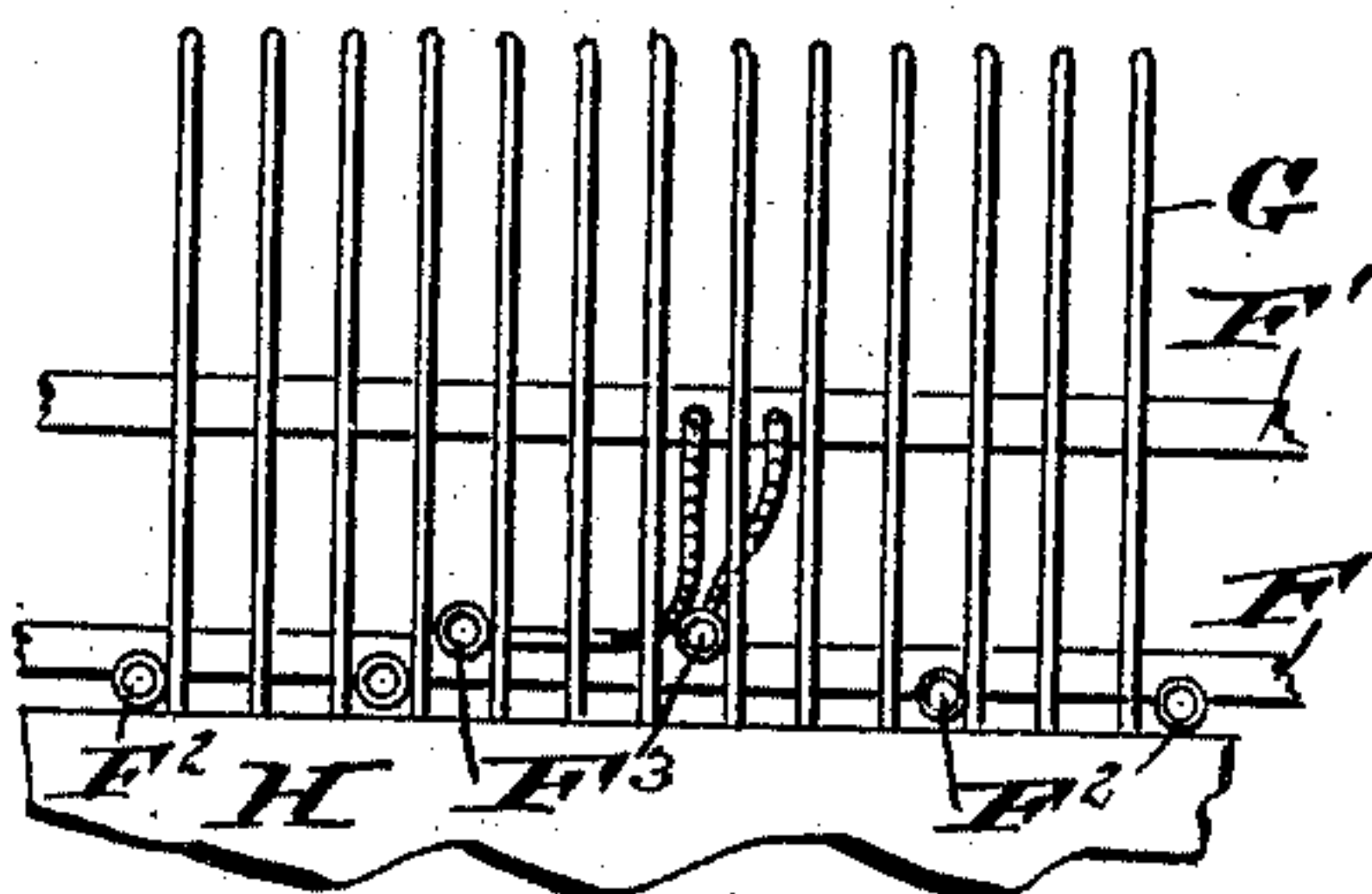


Fig. 5.

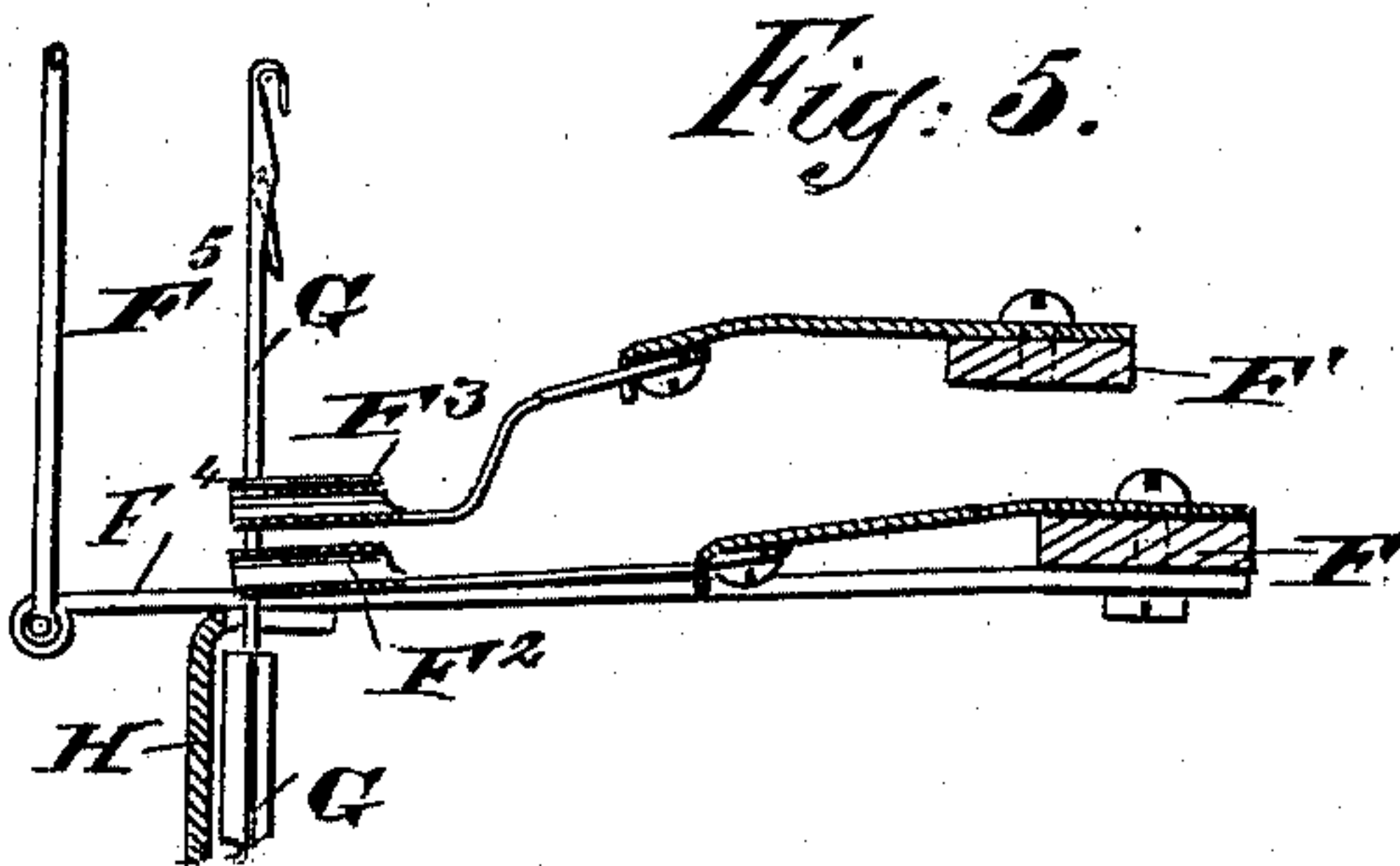


Fig: 7.

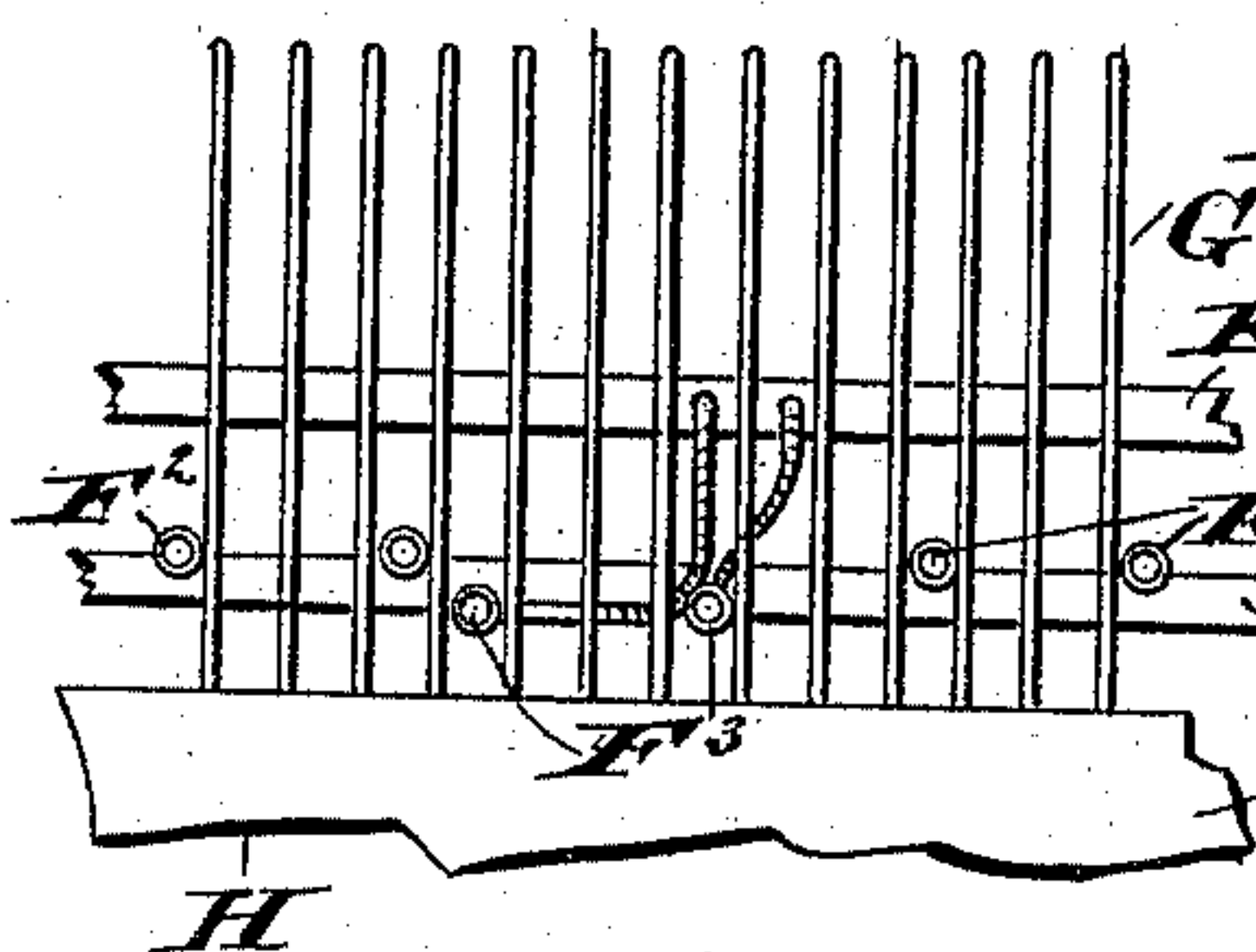


Fig: 8.

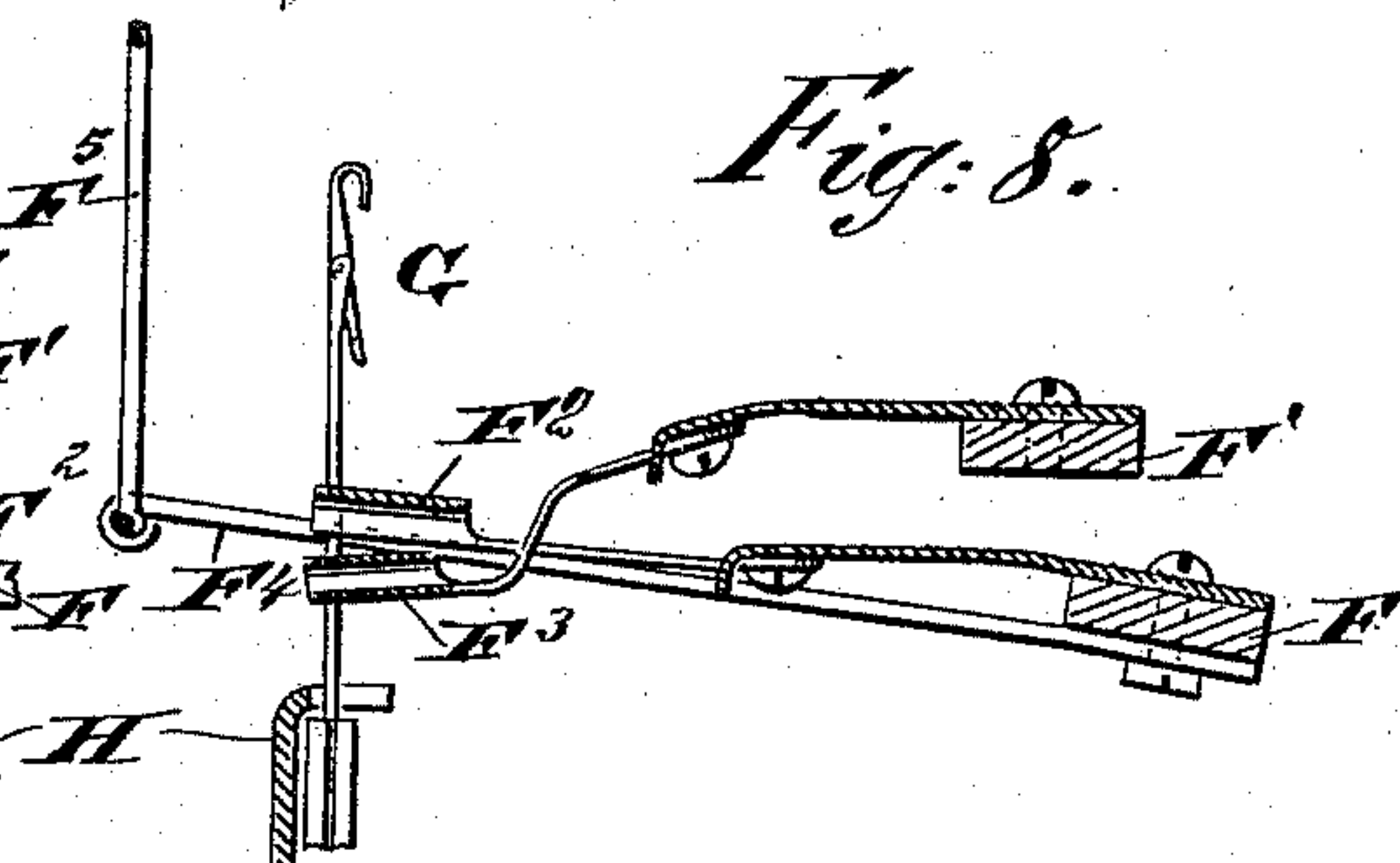


Fig: 9.

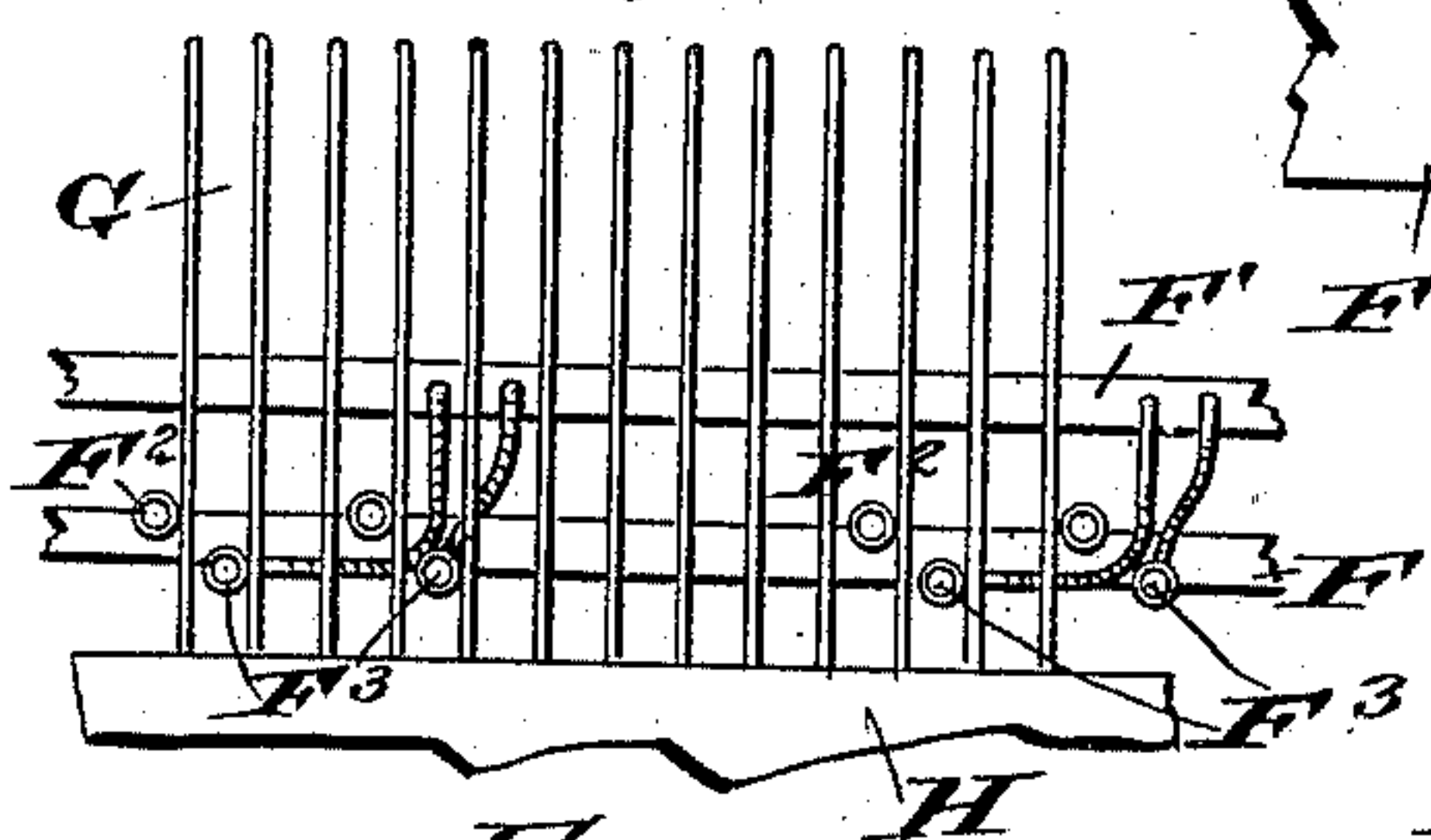


Fig: 6.

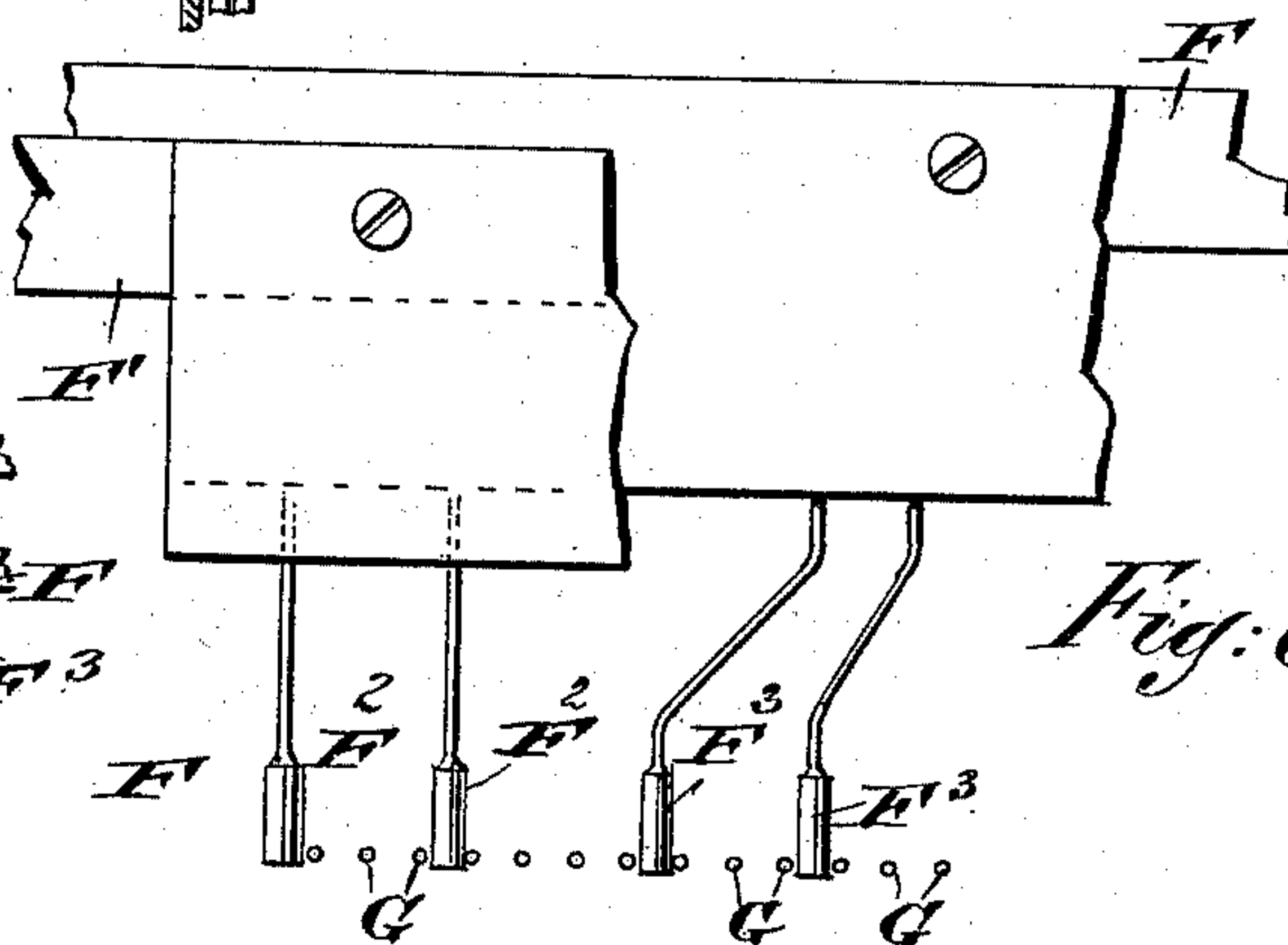


Fig: 10.

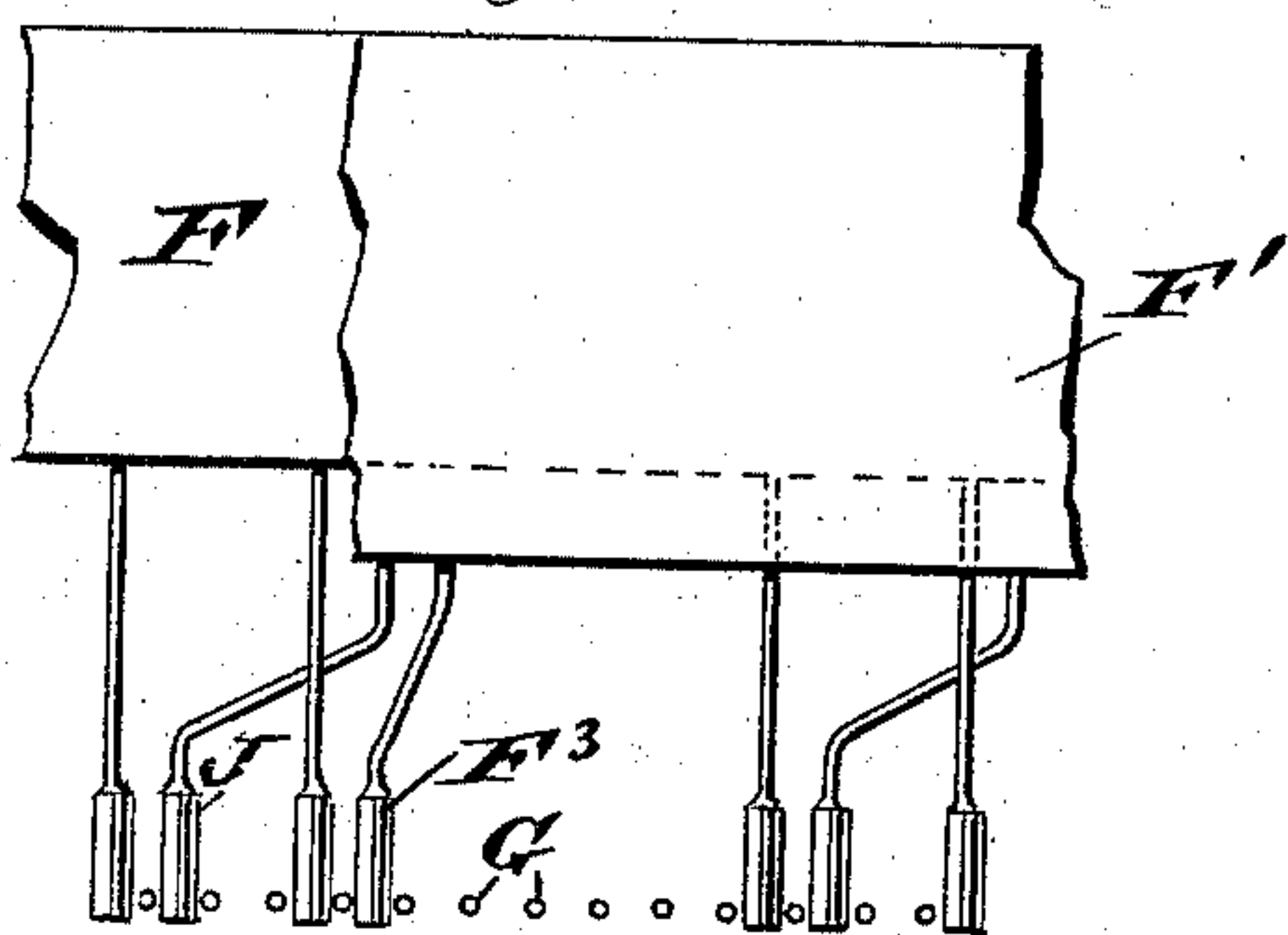


Fig: 11.

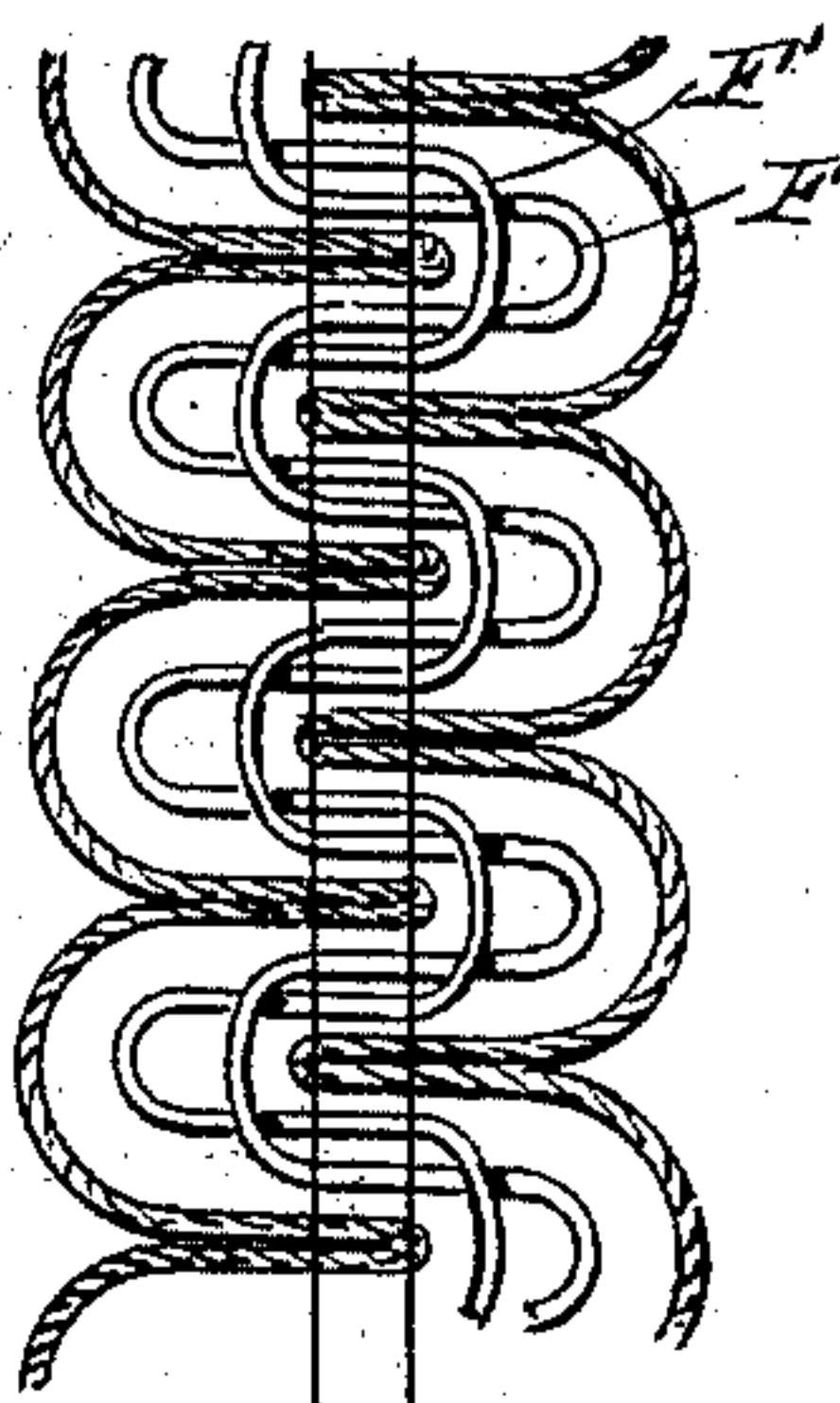
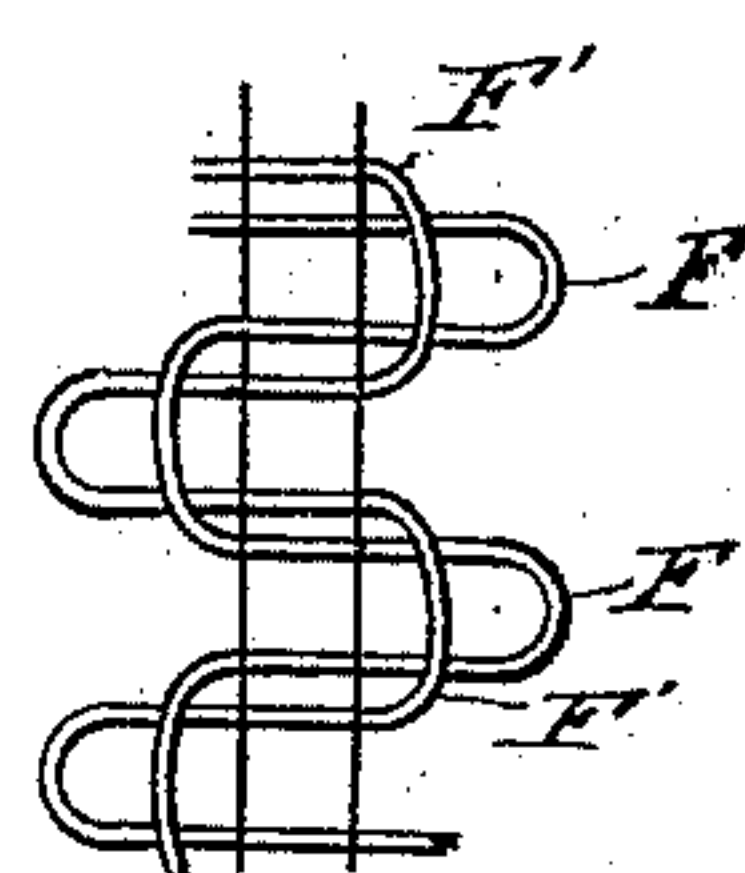


Fig: 12.



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UNITED STATES PATENT OFFICE.

JULIUS FRELLOEHR, OF NEW YORK, N. Y.

KNITTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 489,801, dated January 10, 1893.

Application filed August 6, 1892. Serial No. 442,298. (No model.)

To all whom it may concern:

Be it known that I, JULIUS FRELLOEHR, of the city, county, and State of New York, 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 such as that shown and described in the Letters Patent of the United States No. 457,265 granted August 4, 1891, to Julius Frelloehr and Louis Tisch.

The object of the invention is to provide a new and improved knitting machine, which is simple and durable in construction, very effective in operation, and designed for forming very fancy trimmings in a very simple and effective manner.

The invention consists of thread guide bars having a reciprocating motion, one of them at the same time having a swinging motion.

The invention also consists of certain parts and details and combinations of the same, as will be described hereinafter and then pointed out in the claims.

Reference is to be had to the accompanying drawings forming a part of this specification, in which similar letters of reference indicate corresponding parts in all the figures.

Figure 1 is a front elevation of one side of the improvement; Fig. 2 is an end elevation of the same; Fig. 3 is a transverse section of the same on the line 3—3 of Fig. 1; Fig. 4 is an enlarged front elevation of the needles and thread guide bars; Fig. 5 is a transverse section of the same; Fig. 6 is a plan view of the same; Fig. 7 is a front elevation of the same in a different position; Fig. 8 is a transverse section of the same; Fig. 9 is a front view of the same in still another position; Fig. 10 is a plan view of the same; and Fig. 11 is a plan view of the fabric produced by the machine; and Fig. 12 is a view showing the mode of forming the loops, two pattern threads and two binding threads being employed.

The improved knitting machine is provided with a suitably constructed frame A, on one end of which is mounted to turn in suitable bearings, the transversely extending main driving shaft B, provided with fast and loose pulleys connected by belt with suitable machinery for imparting a rotary motion to the said shaft B. On the latter is secured a bevel

gear wheel B' in mesh with a like gear wheel B² secured on a shaft B³ extending longitudinally from one end of the machine to the other and serving to actuate the mechanism on the other end of the frame A in unison with the mechanism shown on the side of the frame carrying the main driving shaft. It is understood that the mechanism on the other end of the machine is an exact counterpart of the one shown in the drawings, so that further description of the same is not deemed necessary.

On the main driving shaft B, and on a like shaft on the opposite end of the machine is secured a crank arm B⁴ connected by a link B⁵ with an arm C hung on centers C' at the end of the frame A, as will be readily understood by reference to Figs. 1 and 2. On the upper end of the arm C is secured a plate C² adapted to actuate sets of pins D, mounted to slide longitudinally in links or arms E, of a wheel E' secured on a shaft E² extending from one side of the frame to the other. The shaft E² receives an intermittent rotary motion and is, for this purpose, provided with a toothed wheel E³ engaged by a cam wheel E⁴ secured on a vertically disposed shaft E⁵ mounted to turn in suitable bearings on the frame A. On the lower end of this shaft E⁵ is secured a bevel gear wheel E⁶ in mesh with a bevel gear wheel E⁷ fastened on the longitudinal shaft B³ so that the rotary motion of the latter is transmitted by the bevel gear wheels E⁷ and E⁶ to the vertical shaft E⁵, so that the cam wheel E⁴ of the latter acting on the toothed wheel E³ imparts an intermittent rotary motion to the shaft E². Thus, for every full stroke of the arm C a new link E, with its set of pins D, is brought in alignment with the plate C², to be acted on by the latter at the time the said link, its wheel E', and shaft E² are at a standstill.

The sets of pins D acted on by the plate C impart a reciprocating motion to the thread guide bars F, F',—for shifting the pattern threads in a manner hereinafter more fully described.

The mechanism for shifting the thread guide bars F and F' is fully shown and explained in the patent above referred to, so that further description of the operation of this device is not deemed necessary.

In Figs. 1 and 3, three thread guide bars are shown, but only two, F, F', are used for forming the fabric illustrated in Fig. 11, it being, however, understood that any desired
 5 number of such thread guide bars may be employed for forming various styles of fabrics. The thread guide bars F, F' operate in conjunction with the knitting needles G mounted to reciprocate vertically in the rear
 10 of the longitudinally extending fixed beam H, down which passes the fabric as it is knitted by the needles, to be wound on the cloth beam in the usual manner.

To the needles G pass the binding threads
 15 I, led to the needles from above, through eyed thread guide bars J secured on a frame mounted to turn and to slide longitudinally, and arranged and actuated in the manner described in the patent above referred to, so that further description of the same is not deemed
 20 necessary. The binding threads I pass over bars I' before reaching the eyed thread guide bars J, and the said binding threads are weighted by weights I² hung on the said
 25 threads between the bars I', as is plainly shown in Fig. 3. The binding threads unwind from spools I³ arranged in suitable racks in the rear of the machine as will be understood by reference to Fig. 3. The pattern
 30 threads also unwind from spools on racks in the rear of the machine, and one set of pattern threads passes through tubes F² projecting forward from the thread guide bar F, while another set of pattern threads passes
 35 through tubes F³ arranged on the second thread guide bar F', it being understood that the said tubes extend transversely and pass between the needles G to bring their threads in proper position to be bound by the binding
 40 threads I on the up and down movement of the vertically-reciprocating needles G.

The needles G are secured on a needle bar G' mounted to slide in the rear of the beam H, and pivotally connected by a link G² with
 45 a lever G³ extending transversely and fulcrumed on the main frame A. This lever G³ carries a friction roller G⁴ engaged by a cam groove in a cam wheel G⁵ attached to the shaft B³ as shown in Fig. 3, the said cam groove being formed to impart an up and down sliding
 50 motion for every revolution of the shaft B, the needles remaining at a standstill when in a lowermost position, to permit of shifting the thread guide bars F, F' with their tubes F² F³
 55 respectively.

As illustrated in the drawings, especially with reference to Figs. 4 to 10, the lower thread guide bar F, besides having a longitudinal sliding motion, is also mounted to
 60 swing so as to bring its tubes F² above and below the tubes F³, to change the position of the pattern threads for the purpose of forming the fancy trimming shown in Figs. 11 and 12.

65 The mechanism for imparting the turning motion to the thread guide bar F, is arranged as follows:—From the thread guide bar F

extends forward an arm F⁴ pivotally connected by a link F⁵ with a crank arm F⁶ secured on a shaft K mounted to turn in suitable bearings on the frame A, arranged longitudinally thereon, as illustrated in Fig. 1.
 70 On the shaft K, and at one end of the same is secured a second crank arm K', extending rearward and downward, (see Fig. 2,) and
 75 pivotally connected with a link K² pivoted on an arm K³, pivoted on a plate held vertically adjustable by a bolt on a slotted bracket A³ projecting from the main frame A. On this arm K³ is journaled a friction roller K⁴
 80 traveling on the peripheral surface of a cam chain L' held on a wheel L secured on a shaft N extending transversely and provided with a toothed wheel N' engaged by a cam
 85 wheel N² attached to a shaft N³ mounted to turn in suitable bearings on the main frame A and provided with a bevel gear wheel N⁴ in mesh with a bevel gear wheel N⁵ secured
 90 on the vertically disposed shaft E⁵, previously described. The rotary motion of the shaft E⁵ is transmitted by the bevel gear wheels N⁵ and N⁴ to the shaft N³, which, by its cam wheel N² and the toothed wheel N', imparts an intermittent rotary motion to the
 95 shaft N carrying the chain cam wheel L. The links of the chain L' for the wheel L are arranged in such a manner that the friction roller K⁴ travels up and down, as every alternate link has a raised back or cam surface, as is plainly shown in Fig. 1. The
 100 height of the links for raising the roller K⁴ depends on the distance the thread guide bar F is to swing according to the design of the fabric to be produced. In case a very large number of links are necessary to form
 105 the chain L' to produce the desired variations of the pattern, then the chain L' is larger than the wheel L and is consequently passed over a roller L² held vertically adjustable above the wheel L on the bracket A³.
 110 The plate K⁵ forming the fulcrum for the link K² is likewise adjustable on the bracket A³, so that the friction roller always travels on top of the chain L'. The latter then passes around the lower half of wheel L and derives
 115 its traveling motion from the latter.

The up and down traveling motion of the friction roller K⁴ imparts a swinging motion to the arm K³ which, by its connection with the link K² and the crank arm K', imparts a
 120 rocking motion to the shaft K and the latter by its crank arm F⁶ and the link F⁵ engaging the arm F⁴ of the thread guide bar F, imparts an up and down swinging motion to the latter. Now, this up and down swinging motion
 125 takes place as often as is necessary to change the position of the pattern threads carried by the tubes F² and F³, it being understood that the pattern threads carried by the tubes F², are passed over those carried by the tubes
 130 F³ whenever an upward swinging motion has been given to the thread guide bar F, and the pattern threads carried by the tubes F² pass under those carried by the tubes F³ whenever

the thread guide bar F is swung downward into a lowermost position, as will be readily understood by reference to Figs. 8 and 5. Now this up and down swinging motion given to the thread guide bar F is varied according to the pattern to be formed in the fabric, and in order to easily accomplish this the links of the chain cam wheel L are changed accordingly; that is, more or less links are employed so that each full revolution of the shaft N controls a certain number of up and down movements of the friction roller K⁴, and consequently a like number of up and down swinging motions of the thread guide bar F relative to the lateral shifting of the thread guide bars which takes place at every revolution of the shaft B. It will be seen that by this arrangement a positive longitudinal shifting of the thread guide bars F and F' takes place, and a like positive swinging movement is given to the thread guide bar F from the chain cam wheel L having a positive rotary motion derived from the main driving shaft. It is understood that the longitudinal shifting of the thread guide bars F, F', takes place at the time the needle bar G is in a lowermost position, and at the same time the swinging motion of the thread guide bar F takes place, so that the pattern threads are in a proper position at the time the needles rise and again descend with the proper binding threads to bind the pattern threads in place.

As illustrated in Figs. 1 and 2, the eyed thread guide bars J for the binding threads are mounted on a frame J' receiving a longitudinal motion in one direction by means of a slide O acted on by a cam chain L⁴ arranged alongside the cam chain L' on the wheel L and of similar construction. A spring P connects with the frame J' so as to hold the latter in contact with the slide O, thus insuring a return movement of the said frame and slide O to hold the latter in contact with the peripheral surface of the cam chain L⁴. The links of the latter impart a sliding motion in one direction to the slide O, thus shifting the thread guide bar frame J' and the bars J, thereon, while the spring P insures a return movement of the latter and of the slide O.

In Figs. 1, 2 and 3, of the drawings, is shown the mechanism for actuating the cloth beam from the main driving shaft B, but as I do not claim the device shown, further description of the same is not deemed necessary, it being understood that any desired mechanism may be employed to actuate the cloth beam for winding up the fabric after it is formed in the manner described.

Having thus described my invention, what

I claim as new and desire to secure by Letters Patent, is—

1. In a knitting machine, the combination with thread guide bars mounted to slide, one of the said bars being mounted to turn, and the other having sliding movement only, of means for imparting a sliding motion to the said guide bars, and means for imparting a swinging motion to the guide bar mounted to turn, to move its guides into planes above and below that of the guides on the other bar substantially as shown and described.

2. In a knitting machine, the combination with reciprocating needles and binding thread guide bar to guide the binding threads to the said knitting needles, of pattern thread guide bars mounted to slide longitudinally to carry the pattern threads across the binding threads, one of the said pattern thread guide bars being also mounted to swing or turn, so as to move its pattern threads above or below the threads carried by the other pattern thread guide bar, substantially as shown and described.

3. In a knitting machine, the combination with a sliding pattern thread guide bar mounted to swing, of a mechanism for imparting a swinging motion to the said thread guide bar and comprising a chain cam wheel, a cam chain thereon, an arm mounted to swing vertically and provided with a friction roller traveling on the peripheral surface of the said chain cam wheel, a rocking shaft parallel with said thread guide bar and connected with the said pivoted arm, a crank arm and link for connecting the said rocking shaft with the said pattern thread guide-bar, and a binding thread guide bar, substantially as shown and described.

4. The combination with the vertically reciprocating needles, of the horizontally reciprocating pattern thread guide bars, one of which is adapted to swing to raise and lower its guides above and below the plane of the guides on the other bar, the sliding binding thread guide bar, a pair of parallel wheels provided with cam chains, a lever mechanism operated by one cam chain and connected with the swinging pattern thread guide bar to swing the same, a slide between the binding thread guide bar and the other pattern chain, and a spring throwing the said thread guide bar and pressing its operating slide in contact with its cam chain, substantially as set forth.

JULIUS FRELLOEHR.

Witnesses:

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C. SEDGWICK.