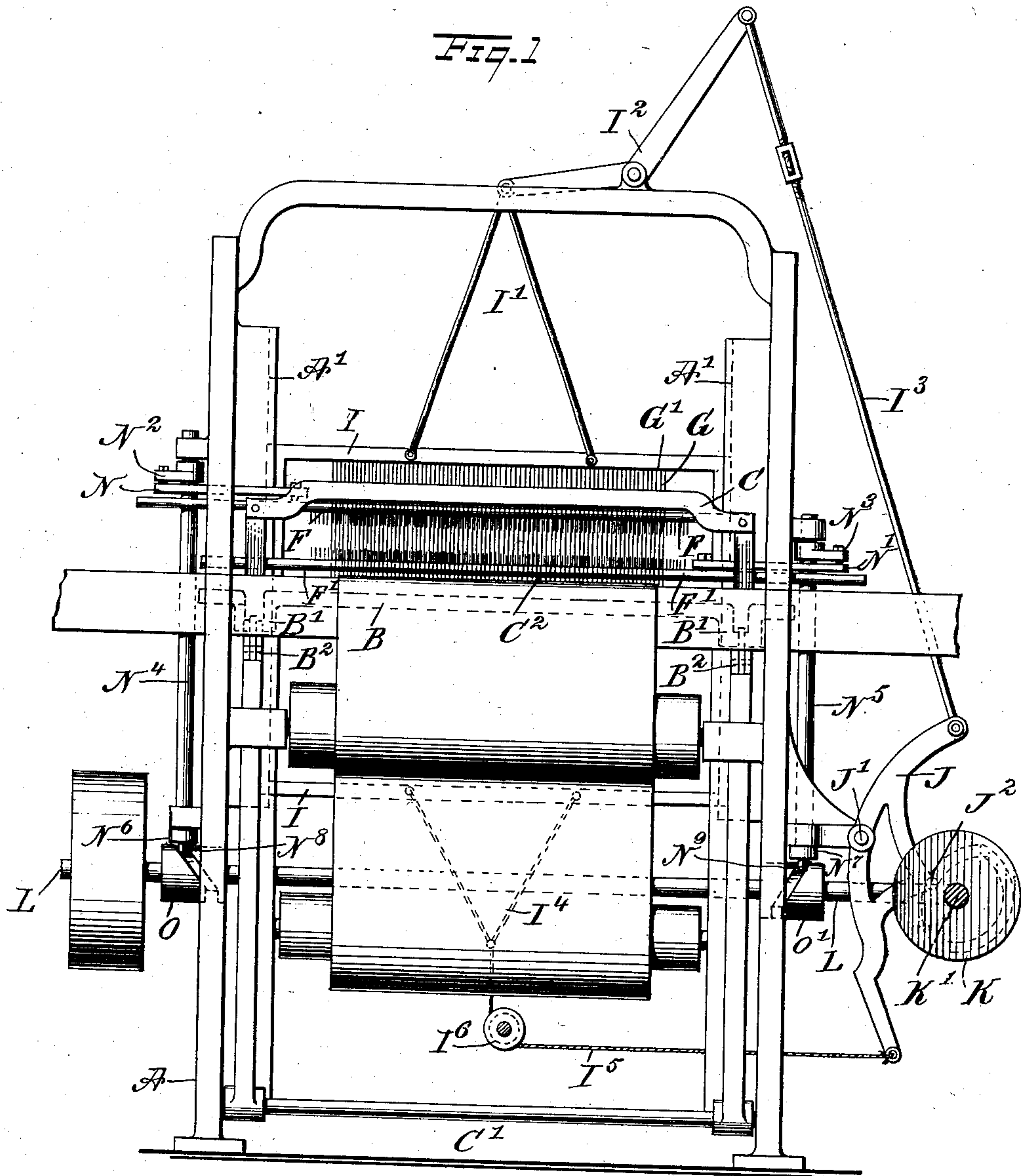


No. 840,257.

PATENTED JAN. 1, 1907.

H. SARAFIAN.
PILE FABRIC LOOM.
APPLICATION FILED JULY 26, 1904.

5 SHEETS—SHEET 1.



WITNESSES:

John A. Bergstrom
Reed G. Koster

INVENTOR

Horace Sarafian

BY *Munn & Co.*

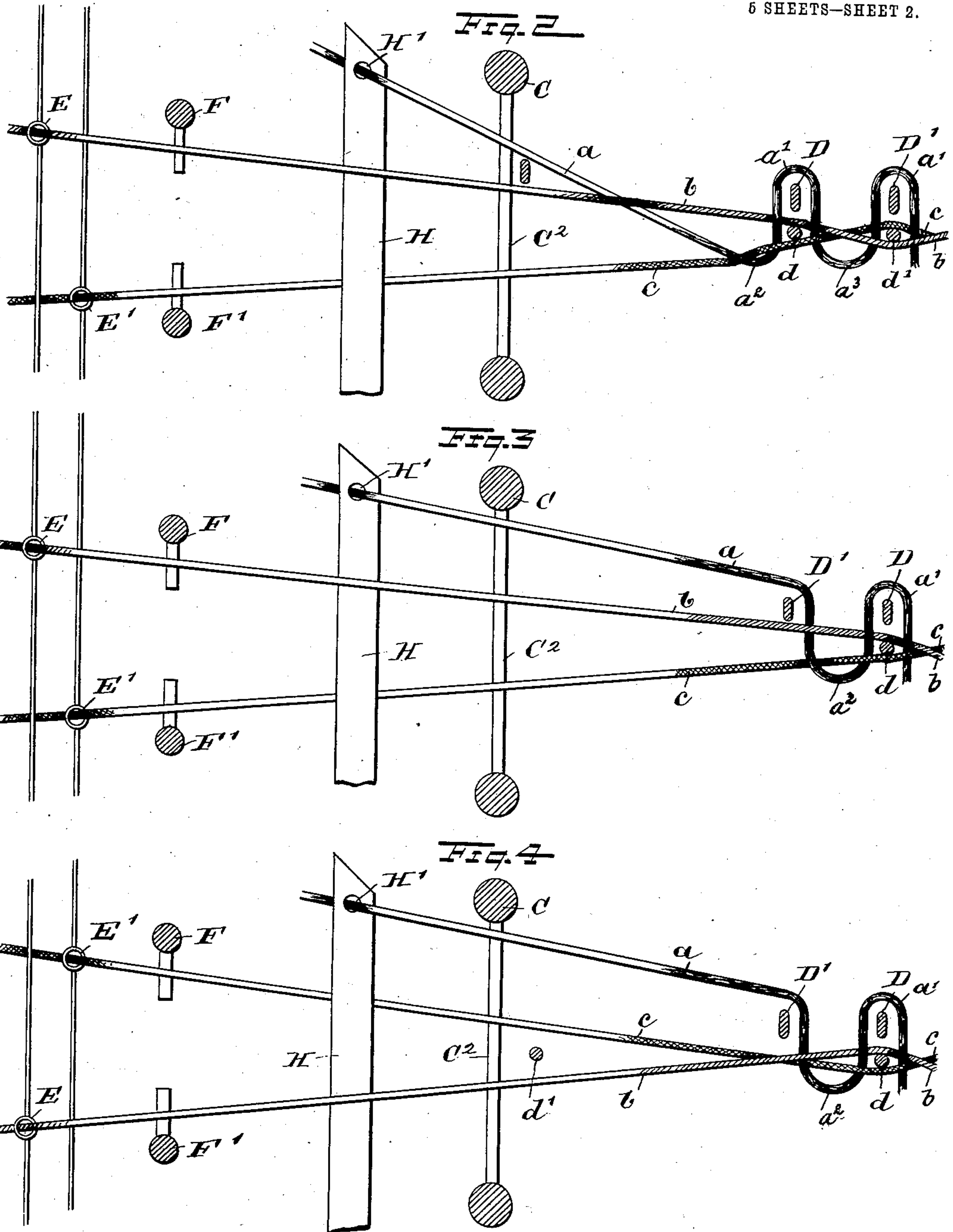
ATTORNEYS

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PILE FABRIC LOOM.
APPLICATION FILED JULY 26, 1904.

6 SHEETS—SHEET 2.



WITNESSES:

John A. Sutherland
Rev. H. H. Hester

INVENTOR

Hovsep Sarafian

BY *Munn & Co.*

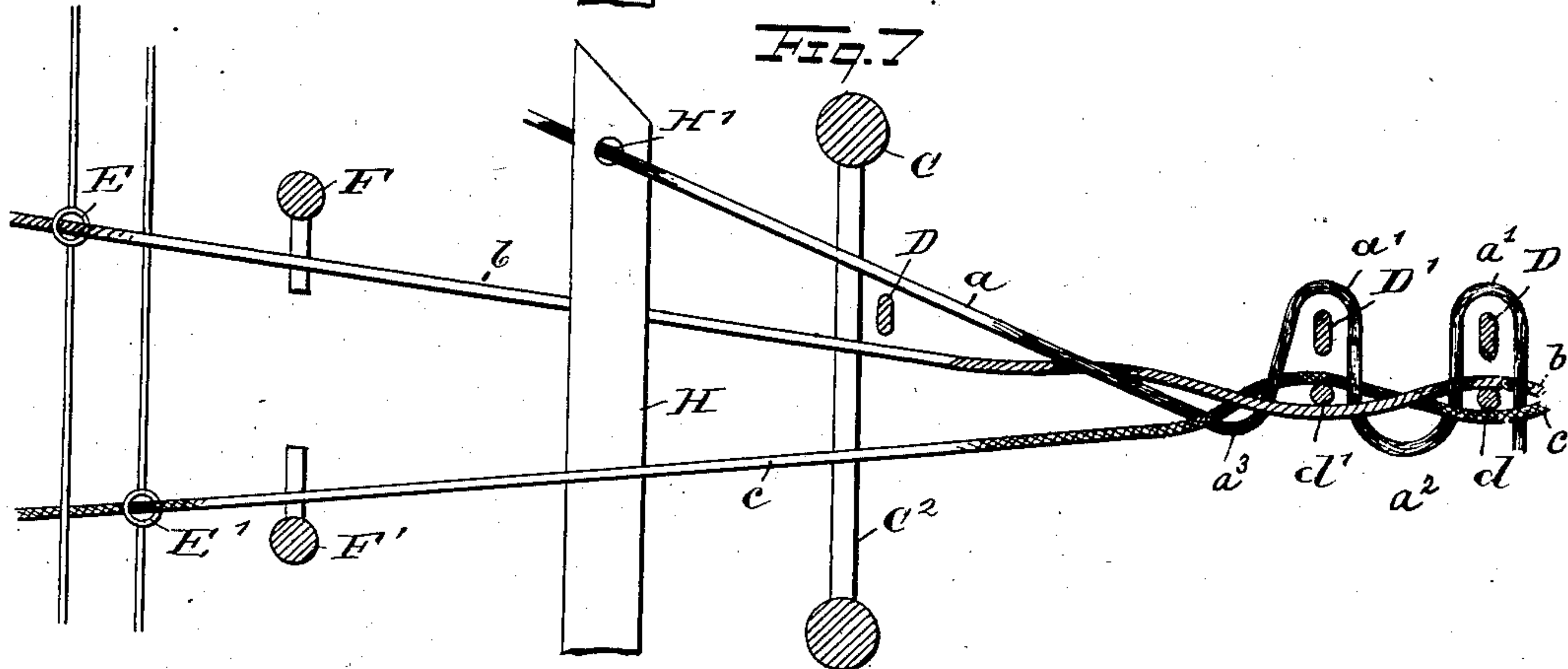
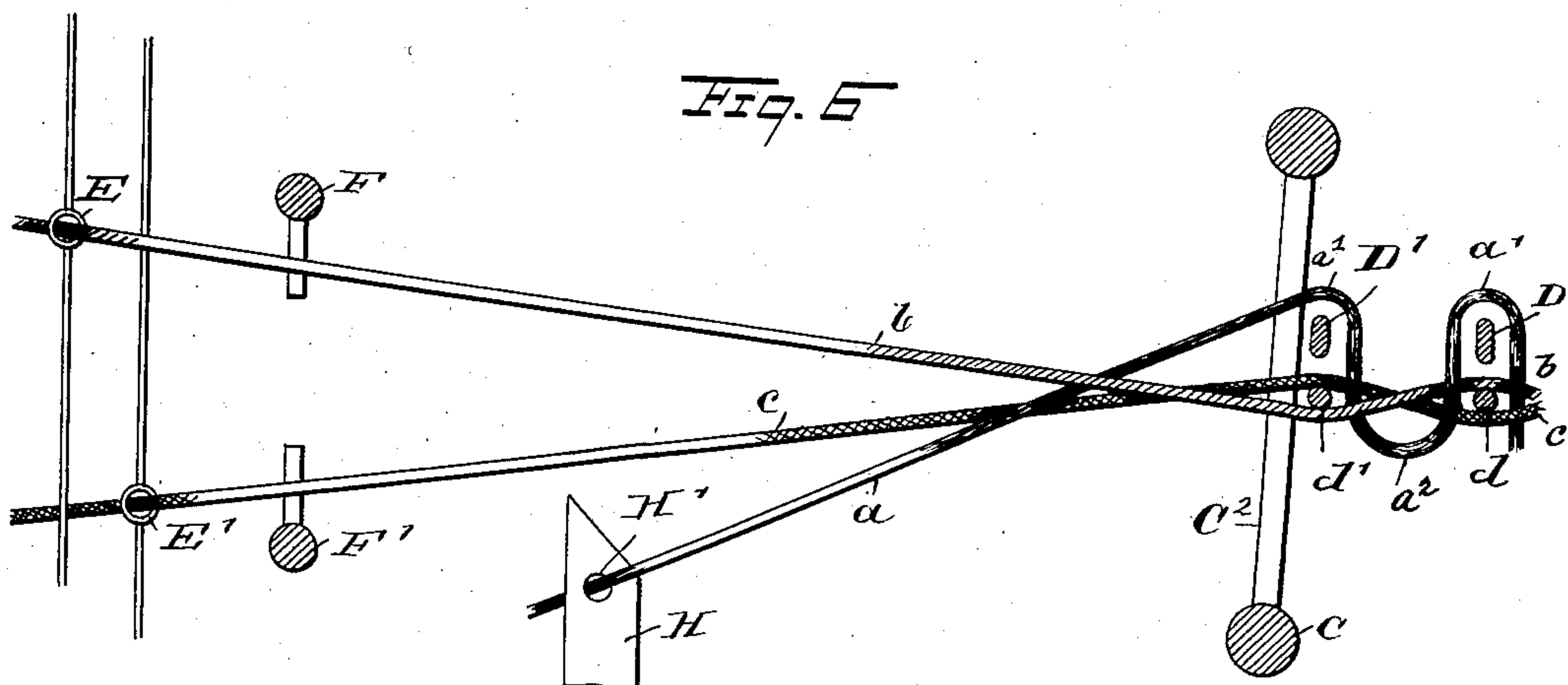
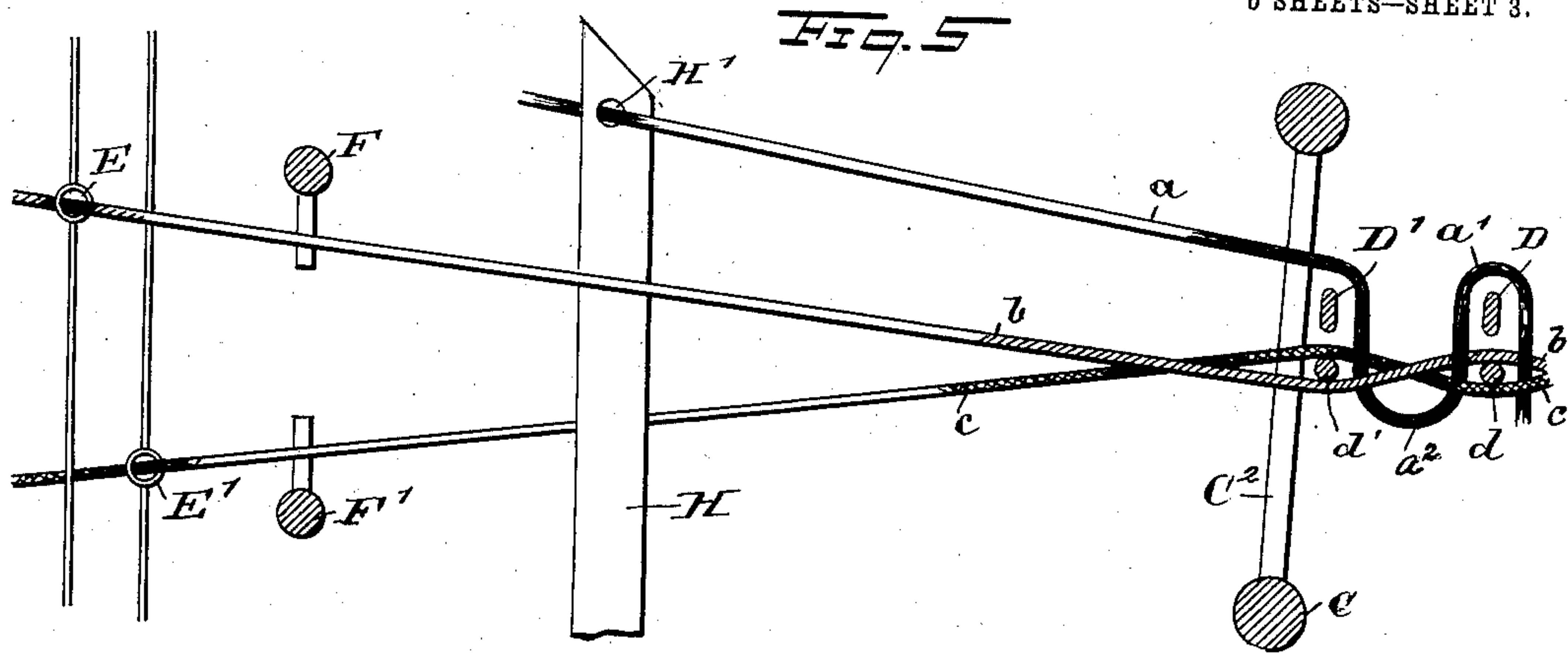
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6 SHEETS—SHEET 3.



WITNESSES:

John A. Broughton
Rev. J. H. Foster

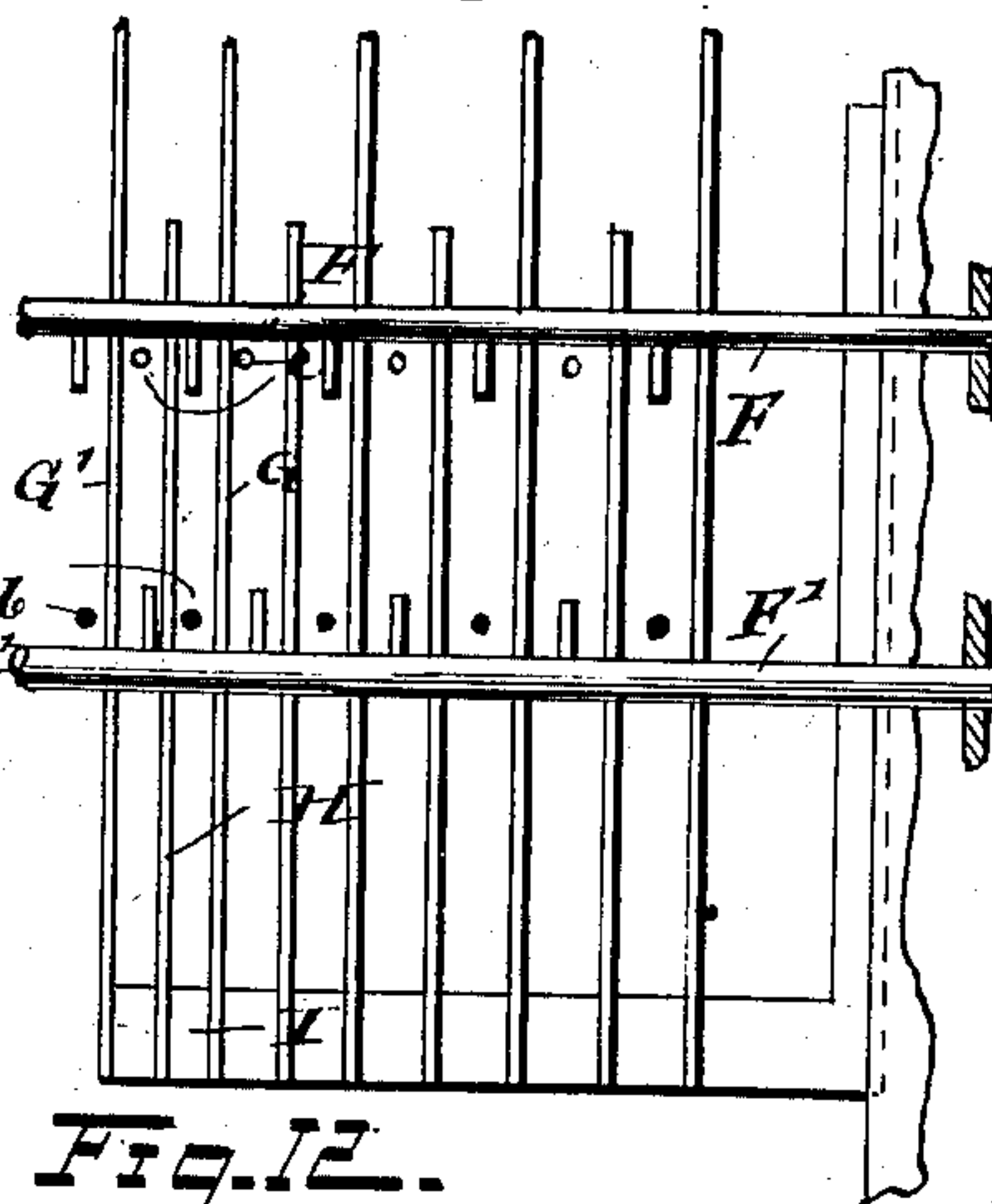
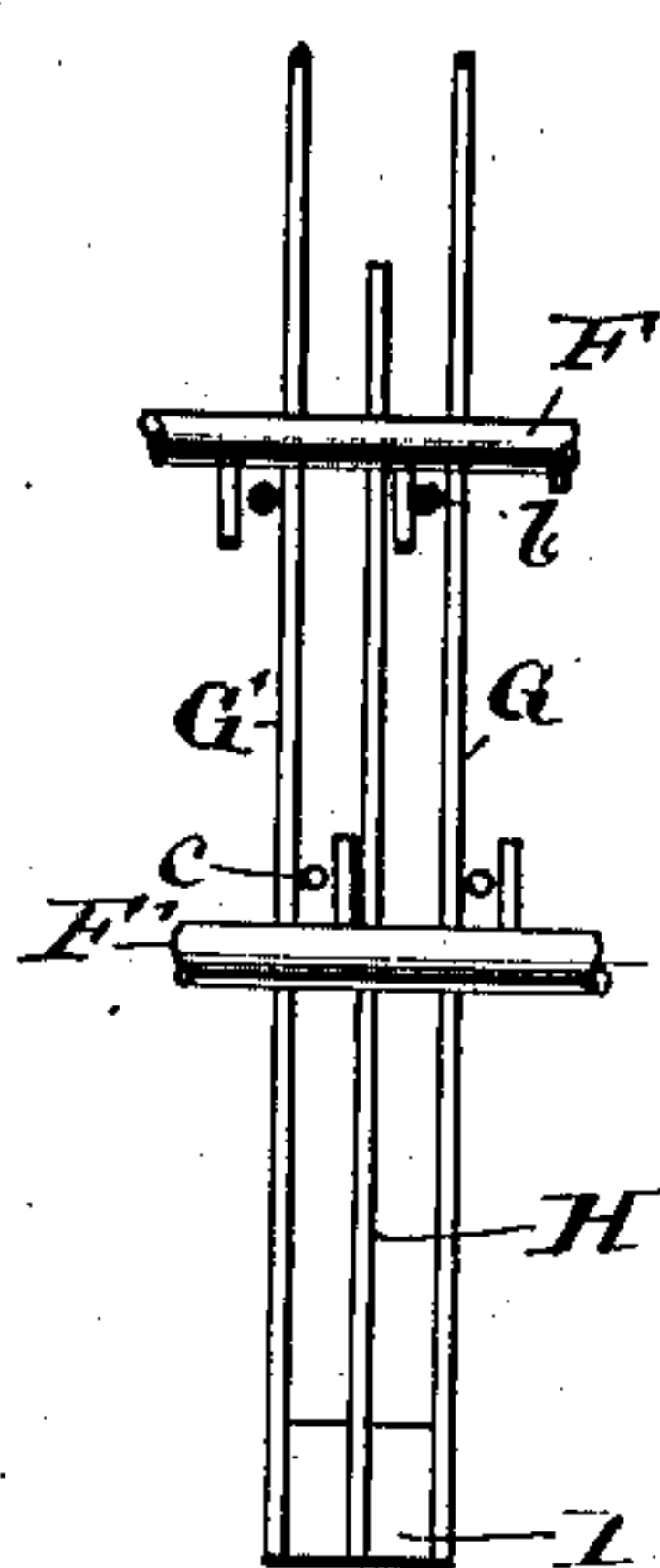
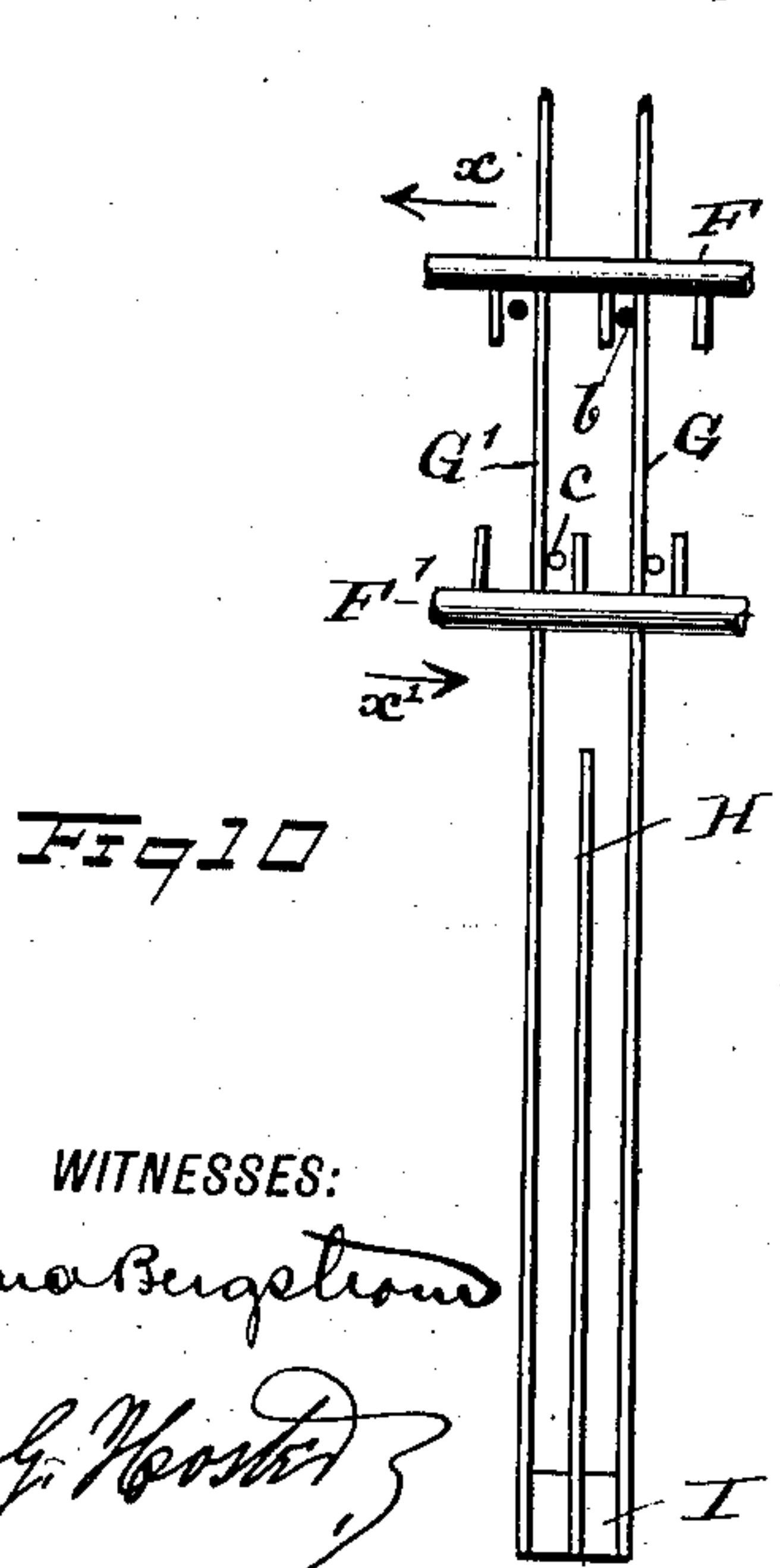
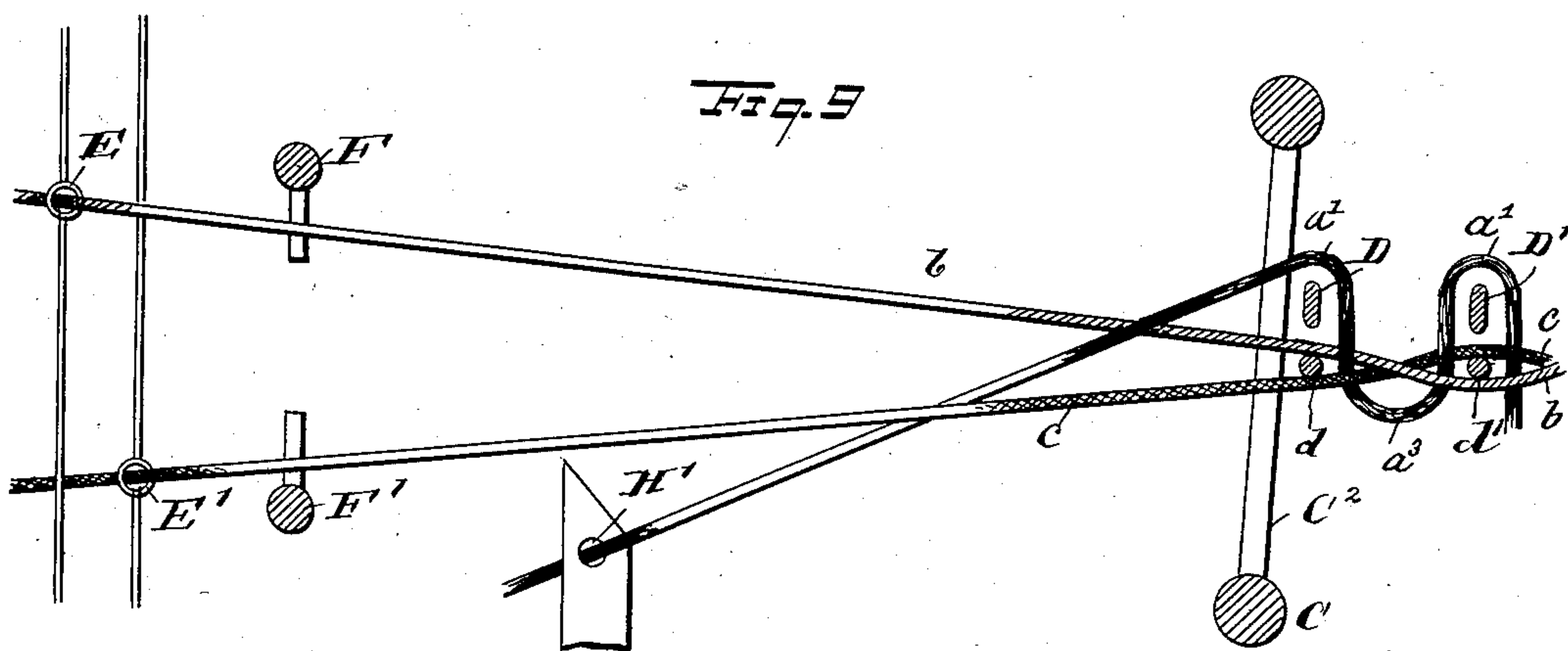
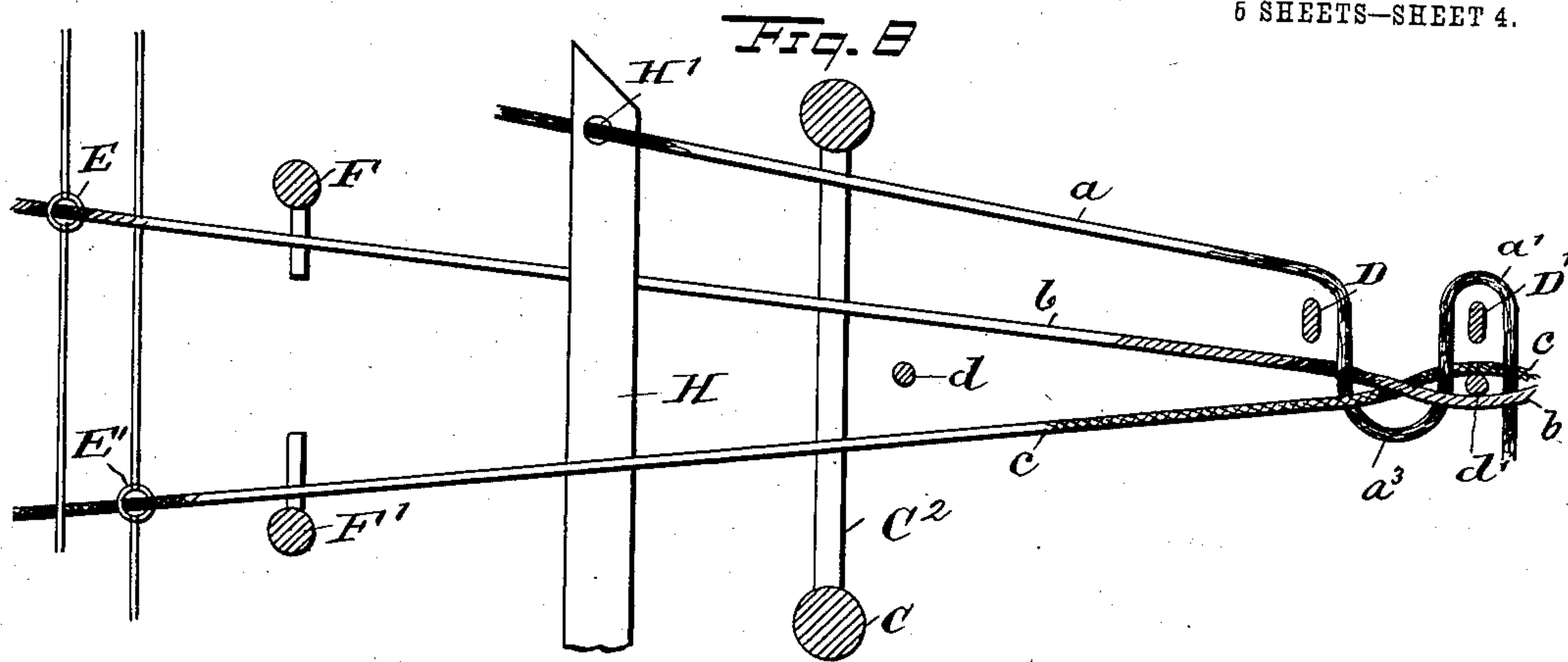
INVENTOR
Hovsep Sarafian
BY *Munn & Co*
ATTORNEYS

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5 SHEETS—SHEET 4.



WITNESSES:

John Bergstrom
Ned. Hooper

Fig. 11

Fig. 12.

INVENTOR

Hovsep Sarafian

BY Munn & Co

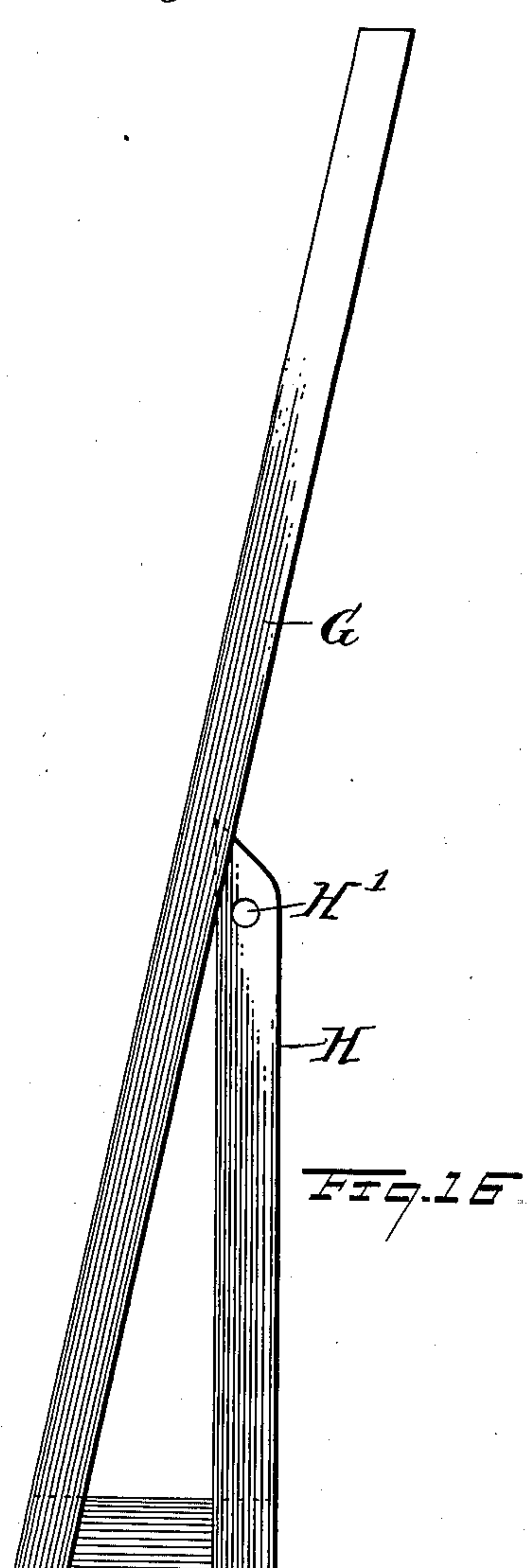
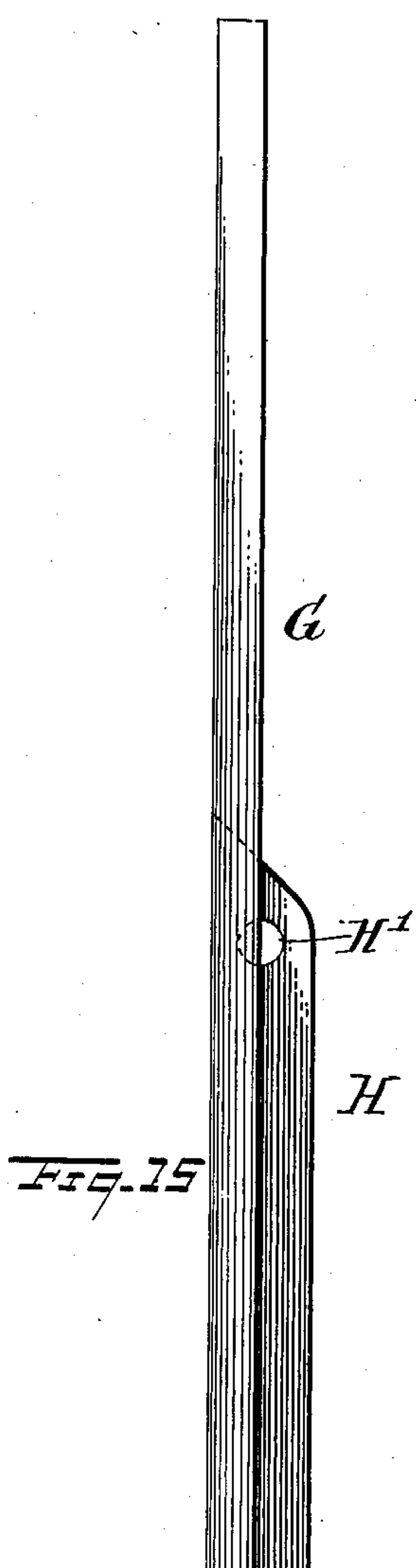
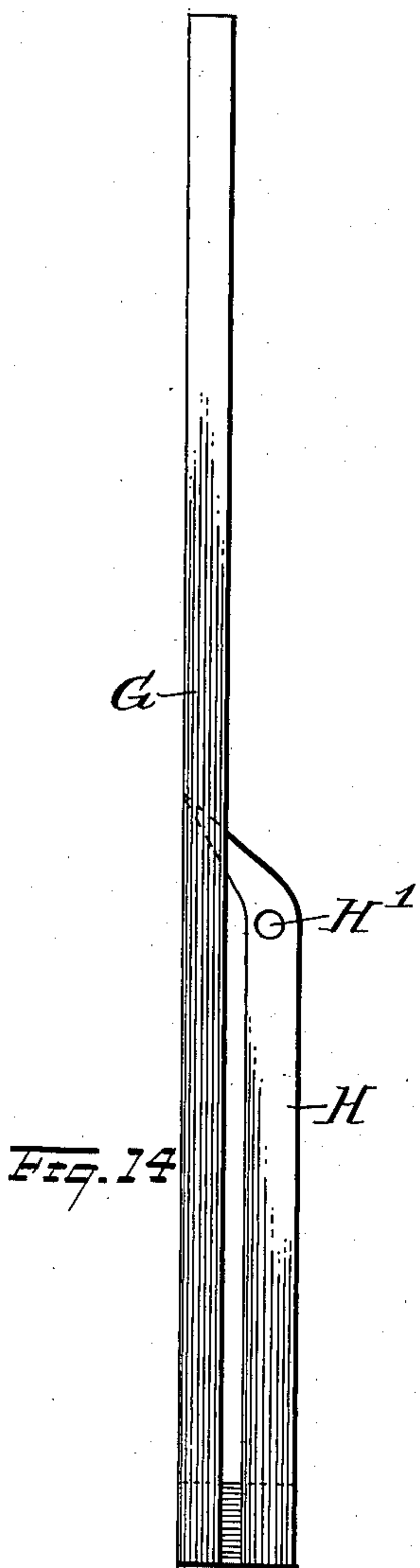
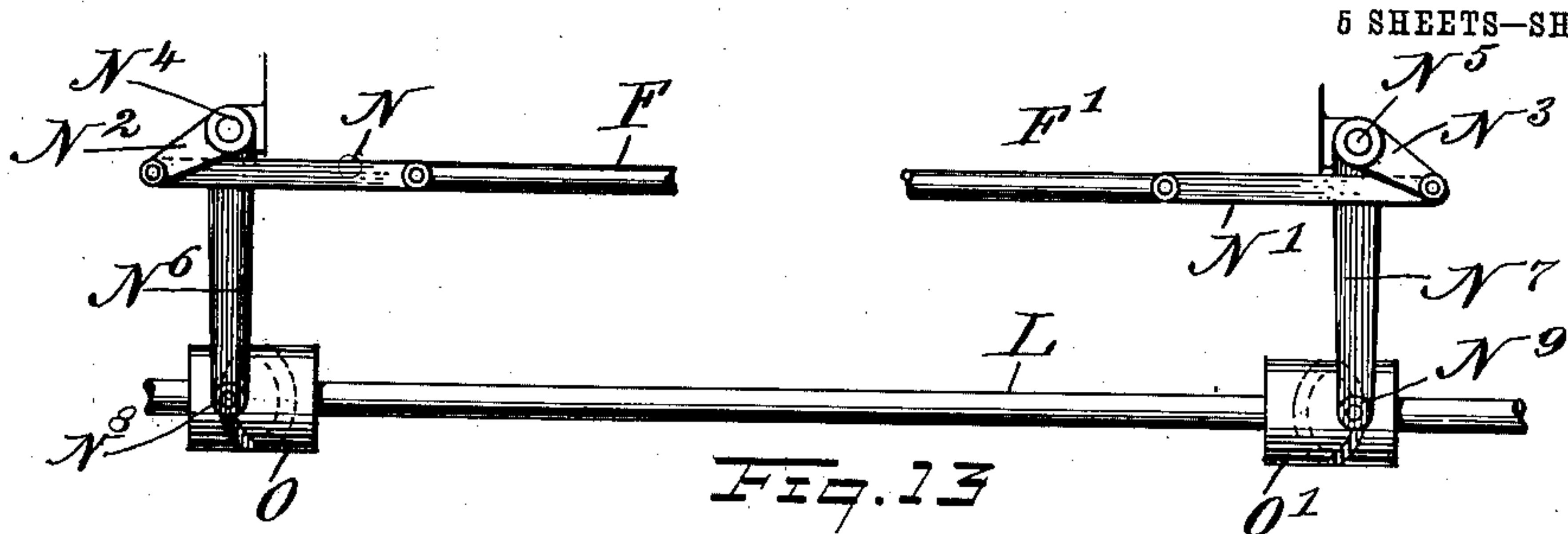
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No. 840,257.

PATENTED JAN. 1, 1907.

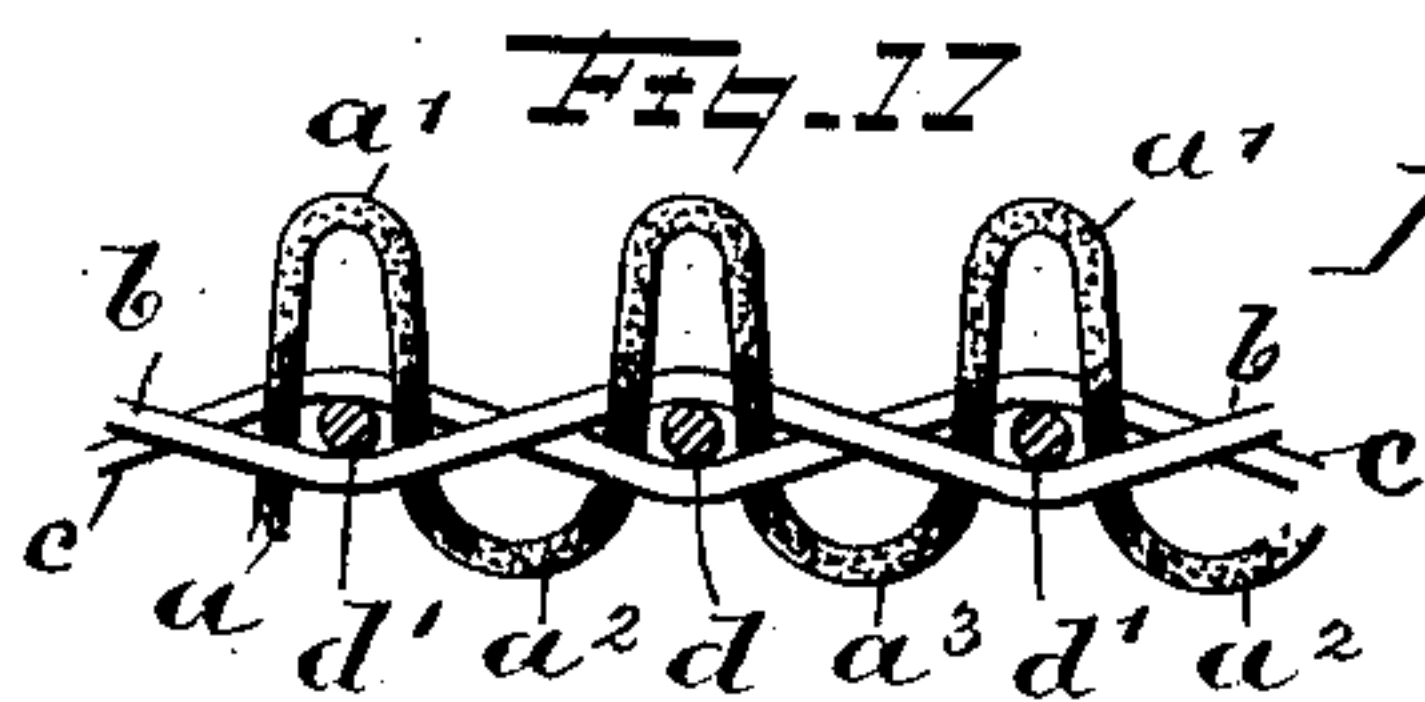
H. SARAFIAN.
PILE FABRIC LOOM.
APPLICATION FILED JULY 26, 1904.

5 SHEETS—SHEET 5.



WITNESSES:

John Bergstrom
Rev. H. H. H.



INVENTOR

Hovcep Sarafian

BY *Munn & Co.*

ATTORNEYS

UNITED STATES PATENT OFFICE.

HOVCEP SARAFIAN, OF YONKERS, NEW YORK, ASSIGNOR, BY MESNE ASSIGNMENTS, TO UNITED STATES PERSIAN CARPET COMPANY, OF NEW YORK, N. Y., A CORPORATION OF NEW YORK.

PILE-FABRIC LOOM.

No. 840,257.

Specification of Letters Patent.

Patented Jan. 1, 1907.

Application filed July 26, 1904. Serial No. 218,193.

To all whom it may concern:

Be it known that I, HOVCEP SARAFIAN, a citizen of the United States, and a resident of Yonkers, in the county of Westchester and State of New York, have invented a new and Improved Pile-Fabric Loom, of which the following is a full, clear, and exact description.

The object of the invention is to provide a new and improved loom for weaving pile fabrics—such, for instance, as are shown and described in the Letters Patent of the United States, No. 752,712, granted to me February 23, 1904, and in the Letters Patent of the United States, No. 782,178, granted to me February 7, 1905.

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 front elevation of a loom embodying my improvements, parts non-essential for the understanding of the invention being omitted. Fig. 2 is an enlarged longitudinal sectional elevation of the improvement. Figs. 3 to 9, inclusive, are like views of the same, showing the parts in different positions. Fig. 10 is an end elevation of the shogging-combs, the guideways, and needle. Figs. 11 and 12 are like views of the same, showing the parts in different positions. Fig. 13 is a plan view of the mechanism for shifting the combs transversely. Figs. 14, 15, and 16 are side elevations of modified forms of the needle and its bars; and Fig. 17 is an enlarged sectional side elevation of the fabric woven by the loom.

The pile fabric to be woven by the loom and illustrated in Fig. 17 consists, essentially, of sets of warp-threads $a\ b\ c$, the sets being bound together by alternating weft-threads $d\ d'$, and each set of warp-threads comprises a pile warp-thread a and what I prefer to call an "upper" ground warp-thread b and a "lower" ground warp-thread c , the said pile warp-thread a being looped around the lower ground warp-thread c and extending between the ground warp-threads c and b to

form a pile-loop a' above the upper ground warp-thread b . The successive bottom loops a^2 and a^3 of the pile warp-thread a around the lower ground warp-thread c extend alternately in opposite directions, and the ground warp-thread b passes under the weft-thread d' in front of the pile warp-thread a and over the weft-thread d in the rear of the pile warp-thread a , and the ground warp-thread c passes over the weft-thread d' in the rear of the pile warp-thread a and under the weft-thread d in front of the pile warp-thread a , as plainly shown in Fig. 17.

In order to produce the weave described, it is necessary to manipulate the warp-threads a , b , and c of each set in a peculiar manner and relative to each other, and for this purpose a special device, presently to be described in detail, is used.

The warp-beams for the warp-threads a , b , and c and the breast-beam for the woven fabric are suitably arranged on the main frame A of the loom, and in this frame is journaled a crank-shaft B, having its crank-arms B' connected by pitman B² with the lay C, fulcrumed at C' in the main frame A and provided with the usual reed C² for beating in the weft-threads $d\ d'$ and the pile-wires D D'. In practice the ground warp-threads b and c are preferably on a single warp-beam, and the said ground warp-threads b and c after leaving their warp-beam are engaged by the usual heddles E E', respectively, as plainly shown in Fig. 2, and the said ground warp-threads $b\ c$ then pass between the shogging-combs F F', extending transversely and having their teeth in vertical alinement and arranged toward each other, as plainly indicated in Figs. 10-12. The ground warp-threads $b\ c$ after leaving the combs F F' pass between spaced dents or bars G G', which, with the needle H for the pile warp-thread, are preferably mounted in a frame I, having an up-and-downsliding movement. The said ground warp-threads $b\ c$ after leaving the bars G G' pass through the reed C² of the lay C. The pile warp-thread a after leaving its warp-beam passes through the eye H' of the needle H, extending between adjacent bars G G' in such a manner that the needle H is approximately spaced midway between the bars and extends upwardly from the bottom of the frame I to approximately about half

the height of the bars, so that the upper portion of the bars is free for both the ground warp-threads *b* and *c* to pass into simultaneously, as indicated in Fig. 10. The pile warp-thread *a* after leaving the eye *H'* passes through the reed *C*² with the ground warp-threads *b* and *c*, as plainly shown in Figs. 2 to 9.

It is understood that a pair of bars *G G'* form a guideway for the passage of the ground warp-threads *b* and *c*, and the needle *H*, carrying the pile warp-thread *a*, is arranged in such a manner that it lies in a vertical plane extending longitudinally through the guideway at the middle thereof to allow either ground warp-thread to pass into the space between the needle and a bar *G G'*. By terminating the needle-point approximately at or near the middle of the guideway in the direction of the height thereof the upper portion of the guideway is completely unobstructed by the needle *H*, and hence the ground warp-threads *b c* can be readily shifted in the guideway in a transverse direction by the action of the combs *F F'* and at the time the said guideway is in its lowermost position and the ground warp-threads *b* and *c* range in the upper unobstructed portion of the guideway, as shown in Figs. 6 and 9.

The needle *H* when in an uppermost position extends with its eye *H'* above the then uppermost ground warp-thread *b* or *c*, and when the needle *H* is in a lowermost position its eye *H'* is below the ground warp-thread *c*, as will be readily understood by comparing Figs. 2 and 9, for instance. The guideways may be stationary and only the needles moved up and down to bring the ground warp-threads alternately to opposite sides of the needle by shogging the ground warp-threads *b* and *c*, as will hereinafter be more fully described, and hence I do not limit myself to the exact construction shown, it being understood that for practical reasons I prefer to attach the bars *G G'* and the needles *H* to the same frame and move the latter up and down instead of holding the bars *G G'* stationary and moving only the needles *H* up and down.

The frame *I*, carrying the needle *H* and the bars *G G'*, is mounted to slide up and down in suitable guideways *A' A'*, arranged on the main frame *A*, and the said frame *I* is pivotally connected at its upper end by links *I'* with a bell-crank lever *I*², fulcrumed at or near its middle on the main frame *A*, and the said bell-crank lever *I*² is pivotally connected by a link *I*³ with the upper end of a cam-lever *J*, fulcrumed at or near its middle at *J'* on the main frame *A*. The cam-lever *J* is provided with a friction-roller *J*², engaging a cam *K*, secured on the cam-shaft *K'*, driven by suitable gearing from the main driven shaft *L*, which by the usual gearing (not shown) also rotates the crank-shaft *B*. The lower end of the

frame *I* is connected by links *I*⁴ with a rope *I*⁵, extending under a pulley *I*⁶ and connected with the lower end of the cam-lever *J*, so that when the loom is in operation and the shaft *K'* is rotated then the cam *K* imparts an intermittent swinging motion to the cam-lever *J*, which by its connection with the frame *I* moves the latter intermittently up and down. The cam *K* is so arranged that the frame *I* is moved whenever the lay *C* is in a forward position.

The combs *F F'* are shogged or caused to move intermittently in a transverse direction, and for this purpose a mechanism is provided connected with the main shaft *L*. The combs *F F'* are mounted to slide transversely in suitable bearings arranged in the main frame *A*, and the said combs *F F'* are pivotally connected by links *N* and *N'* (see Figs. 1 and 13) with arms *N*² and *N*³, secured on the upper ends of vertically-disposed shafts *N*⁴ *N*⁵, journaled in suitable bearings on the sides of the main frame *A*, as plainly indicated in Fig. 1. On the lower ends of the shafts *N*⁴ *N*⁵ are secured arms *N*⁶ *N*⁷, carrying friction-rollers *N*⁸ *N*⁹, of which the friction-roller *N*⁸ engages a cam-groove on the cam *O*, secured on the main shaft *L*, and the friction-roller *N*⁹ engages a similar cam-groove on the cam *O'*, also secured on the main shaft *L*. The cam-grooves on the cams *O O'* are arranged in opposite directions, as plainly indicated in Fig. 1, so that when the loom is in operation and the main shaft *L* is rotated then the cams *O O'* impart simultaneously a swinging motion to the arms *N*⁶ *N*⁷, so that the shafts *N*⁴ *N*⁵ are turned and their arms *N*² *N*³ impart a transverse sliding motion to the combs *F F'* by the links *N N'*. The cams *O* and *O'* are so arranged relative to the cam *K* and the lay *C* that the combs *F F'* are shifted periodically relative to the guideway formed by the bars *G G'*.

From the foregoing it will be seen that the combs *F F'* are adapted to be shifted transversely in opposite directions—that is, when the comb *F* moves in the direction of the arrow *x* (see Fig. 10) then the comb *F'* moves in the direction of the arrow *x'*, and when the comb *F* moves in the reverse direction of the arrow *x* then the comb *F'* moves in the reverse direction of the arrow *x'*.

When the combs *F F'* are in the position shown in Fig. 10, the ground warp-thread *b* lies adjacent to the inner face of the bar *G* and the ground-warp *c* lies adjacent to the inner face of the other bar *G'*, and when the needle *H* and its pile warp-thread *a* now pass upward between the ground warp-threads *c* and *b* then the ground warp-thread *b* is on the left side of the needle *H* and the ground warp-thread *c* is on the right side of the needle *H* when viewed from the front of the loom at the breast-beam. When the combs *F F'* have shifted the ground warp-threads *b* and

c at the time the needle *H* is in a lowermost position, then the ground warp-thread *c* lies adjacent to the inner face of the bar *G* and the ground warp-thread *b* lies adjacent to the other bar *G'*, and hence when the needle *H* and its pile-warp rise they pass between the ground warp-threads *b* and *c*, and the ground warp-thread *b* is now on the right side of the needle *H* and the ground warp-thread *c* is on the left side thereof, as shown in Figs. 7 and 8.

When the loom is in operation and the several parts are in the position shown in Fig. 2, then the frame *I* is in an uppermost position and the ground warp-threads *b* and *c* are on opposite sides of the needle *H* and are engaged by the shogging-combs *F F'*, respectively. The pile warp-thread *a* is looped around the ground warp-thread *c* to form the bottom loop *a²*, and the pile warp-thread *a* extends up between the ground warp-threads *c* and *b*, the ground warp-thread *b* being to the left of the pile warp-thread *a* and needle *H* and the ground warp-thread *c* being to the right of the pile warp-thread *a* and needle *H*. The lay *C* is in an uppermost position, and a pile-wire *D'* is now inserted between the ground warp-thread *b* and the pile warp-thread *a* in front of the lay *C*, and then the latter moves forward to beat in the said pile-wire *D'*. (See Fig. 3.) The lay *C* then immediately returns to a rearward position, (see Figs. 3 and 4,) and the heddles *E E'* now shift to move the ground warp-thread *b* downward and the ground warp-thread *c* up (see Figs. 4 and 12) for the ground warp-threads *b* and *c* to cross and open the shed in front of the lay *C*. The weft-thread *d'* is now passed through the open shed, (see Fig. 4,) and then this weft-thread *d'* is beaten in by the lay *C*. The heddles *E E'* now again change to bring the ground warp-thread *b* into an upward position and the ground warp-thread *c* into a lower position. (See Fig. 5.) The frame *I* is now lowered for the needle *H* to draw the pile warp-thread firmly over the pile-wire *D* to form the face-loop *a'* and to draw the pile warp-thread down between the ground warp-threads *b* and *c* and to the left of the ground warp-thread *c*. (See Fig. 6.) The combs *F* and *F'* are now shifted in the direction of the arrows *x x'*, and the lay *C* is moved rearward, and then the frame *I* is raised for the needle *H* to pass up between the ground warp-threads *c* and *b*, the ground warp-thread *c* now being on the left side of the needle *H* and the pile warp-thread *a* being looped around the said ground warp-thread *c* to form the loop *a³* and passed up to the left of the ground warp-thread *b*, as plainly shown in Fig. 7. A pile-wire *D* is now inserted between the ground warp-thread *b* and the pile warp-thread *a*, and then the lay *C* is moved forward to beat in the pile-wire. The lay *C* immediately returns, and the weft-thread *d* is now passed through the open shed, (see

Fig. 8,) and then the lay is moved forward to beat in the said weft-thread *d*. The frame *I* now descends for the needle *H* to draw the pile warp-thread *a* over the last pile-wire *D* to form the next face-loop *a'* and to pass the pile-warp thread between the ground warp-threads *b* and *c*, the ground warp-thread *b* being to the left and the ground warp-thread *c* being to the right of the pile warp-thread *a*. The combs *F F'* are now shifted in the inverse direction of the arrows *x x'* to reverse the positions of the ground warp-threads relative to the needle *H*, and then the frame *I* rises and the lay *C* moves rearward to bring the several parts back to the position shown in Fig. 2.

In the practical operation of the loom the thread on the bobbin of the shuttle unwinds to form the weft-thread *d* at the time the shuttle goes through the open shed from one side of the loom to the other, and when the shuttle returns the same thread on the shuttle-bobbin forms the weft-thread *d'*.

From the foregoing it will be seen that the pile-wires and the weft-threads are beaten in alternately, and the shogging of the ground warp-threads *b* and *c* only takes place when the needle *H* is in a lowermost position. It will also be seen that after the pile-wire *D'* is beaten in the heddles change while the needle *H* is up to cross the ground warp-threads *b* and *c* and open the shed for the weft-thread *d'*. After the pile-wire *D* is beaten in and the lay returns the heddles do not change, as the ground warp-thread *c* is at this time to the left of the needle *H*. (See Fig. 8.)

When the several parts are in the position shown in Fig. 7, both the pile-wire *D* and the weft-thread *d* could be simultaneously passed to position, as the warp-threads *a*, *b*, and *c* do not change position during the beating in of the pile-wire *D* and the weft-thread *d*, it being understood that only between the time the pile-wire *D'* and the weft-thread *d'* are beaten in (see Figs. 2, 3, and 4) the ground warp-threads change position, as above described and shown in Figs. 3 and 4. In the practical construction of the loom it is, however, desirable to give uniform movement to the lay for the latter to beat in the pile-wire *D* first and then the weft-thread *d*, the same as the lay beats in the pile-wire *D'* and the weft-thread *d'*. It will further be seen that the heddles *E E'* operate in conjunction with the combs *F F'* to bring the ground warp-threads *b* and *c* alternately in engagement with the said combs as the teeth of the combs stand directly opposite each other. The combs *F F'* operate in conjunction with the unobstructed space in the guideway to shift the ground warp-threads *b* and *c* transversely to opposite sides of the guideway, and the heddles operate in conjunction with the guideway and needle *H* to move the ground warp-threads up and down

on opposite sides of the needle to cross the ground warp-threads *b* and *c* at the time the needle is in one of its raised positions.

Although I have shown and described two combs *F F'* for shifting the ground warp-threads transversely in opposite directions, this particular construction is not essential, as only a single comb, may be used for shifting the ground warp-threads *c*, for instance; but in this case it is necessary to give more movement to the comb, and hence for practical reasons I prefer to use two combs, so as to divide the shifting movement equally to the two ground warp-threads *b* and *c*. It is also not essential that the combs *F* and *F'* be located between the heddles *E* and *E'* and the lay *C*, as the combs *F* and *F'* may be arranged in the rear of the heddles. In the drawings the heddle *E'* for the ground warp-thread *c* is shown as the front heddle; but this arrangement is not of particular moment as the heddle *E* may be made the front heddle.

Various forms may be given to the needle *H* and the bars *G G'*, as indicated in Figs. 14, 15, and 16. Hence I do not limit myself to the particular construction shown, it being understood, however, that the needle *H* extends between two bars *G G'*, so that the ground warp-threads *b c* can pass alternately on opposite sides of the needle while between the bars *G G'*, as previously explained, it being expressly understood that the main object is to loop the pile warp-thread *a* around the ground warp-thread *c* alternately in opposite directions to form the bottom loops *a²* and *a³* and to pass the pile warp-thread *a* up between the two ground warp-threads *b c* to form the face-loops *a'*, as above set forth.

The shuttle mechanism, the pile-wire inserting and withdrawing device, and the mechanism for moving the heddles *E E'* periodically up and down are all actuated from the main shaft *L* and are of the ordinary construction, so that further detailed description of the same is not necessary. As the several devices are all driven from the main shaft *L*, they move synchronously to accomplish the desired result; but I do not limit myself to any particular actuating mechanism described and shown, as the same may be varied to produce the same result. For producing a desired pattern by the face-loops *a'* it is only necessary to employ a correspondingly-colored pile-warp.

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

1. A pile-fabric loom for interweaving ground warp-threads, a pile warp-thread and weft-threads provided with cooperating devices for looping the pile warp-thread around one of the ground warp-threads, for passing the pile warp-thread between the ground

warp-threads, for forming face-loops above the ground warp-threads and for crossing the ground warp-threads.

2. A pile-fabric loom for interweaving ground warp-threads, a pile warp-thread and weft-threads comprising cooperating devices arranged for looping the pile warp-thread around one of the ground warp-threads for forming bottom loops for passing the pile warp-threads between the ground warp-threads, for forming face-loops alternately above the ground warp-threads, for crossing the ground warp-threads above each bottom loop, and for passing weft-threads between the ground warp-threads below each face-loop.

3. A pile-fabric loom for interweaving sets of warp-threads and weft-threads comprising a lay, a pair of heddles for the ground warp-threads, a shogging device for the ground warp-threads, a guideway for the passage of the ground warp-threads and a needle for the pile warp-thread and having up-and-down movement, the needle lying approximately in a plane extending midway between the sides of the guideway to allow the ground warp-threads to pass to opposite sides of the needle.

4. A pile-fabric loom for interweaving a pair of ground warp-threads, a pile warp-thread and weft-threads, comprising a lay, a pair of heddles for the ground warp-threads, a shogging device for the ground warp-threads, a guideway for the passage of the ground warp-threads, a needle having an eye for the passage of the pile warp-thread and extending in a plane lying approximately midway of the guideway, and means for moving the said lay, the said heddles, the said shogging device and the said needle in unison.

5. A pile-fabric loom for interweaving a pair of ground warp-threads, a pile warp-thread and weft-threads, comprising a lay, a pair of heddles for the ground warp-threads, a shogging device for the ground warp-threads, a guideway for the passage of the ground warp-threads, a needle having an eye for the passage of the pile warp-thread and extending in a plane lying approximately midway of the guideway, and means for moving the said lay, the said heddles, the said shogging device and the said needle in unison, to loop the pile warp-thread around one of the ground warp-threads, to pass the pile warp-thread between the ground warp-threads, to form face-loops above the ground warp-threads, and to cross the ground warp-threads.

6. A loom for interweaving ground warp-threads and a pile warp-thread, comprising a guideway for the passage of the ground warp-threads, a needle having an eye for the passage of the pile warp-thread, shifting means for shifting the ground warp-threads transversely to bring the same to opposite

sides of the needle, and heddles for shifting the ground warp-threads up and down.

7. A loom for interweaving ground warp-threads and a pile warp-thread, comprising
5 a guideway for the passage of the ground warp-threads, a needle having an eye for the passage of the pile warp-thread, shifting means for shifting the ground warp-threads transversely to bring the same to opposite
10 sides of the needle, and heddles for shifting the ground warp-threads up and down, the said shifting means being arranged between the said heddles and the said guideway and its needle.

15 8. A loom for interweaving ground warp-threads and a pile warp-thread, comprising a guideway for the passage of the ground warp-threads, a needle having a point for the passage of the pile warp-thread and located
20 about midway of the length of the guideway and spaced from the inner faces of the guideway, a shogging device mounted to reciprocate intermittently in a transverse direction, to shift the ground warp-threads transversely
25 from one side of the guideway to the other to bring the ground warp-threads alternately on opposite sides of the needle, and heddles for moving the ground warp-threads up and down above and below the point of the needle.

30 9. A loom for interweaving ground warp-threads and a pile warp-thread, comprising a guideway for the passage of the ground warp-threads, a needle having a point for the passage of the pile warp-thread and located
35 about midway of the length of the guideway and spaced from the inner faces of the guideway, the said guideway and its needle reciprocating intermittently in an up-and-down direction, a shogging device mounted to reciprocate intermittently in a transverse direction, to shift the ground warp-threads transversely from one side of the guideway to the other to bring the ground warp-threads alternately on opposite sides of the
45 needle, heddles for moving the ground warp-threads up and down above and below the point of the needle and means for reciprocating and intermittently moving the needle, the guideway and the shogging device.

50 10. A loom for interweaving ground warp-threads and a pile warp-thread, comprising a guideway for the passage of the ground warp-threads, a needle having a point for the passage of the pile warp-thread and located
55 about midway of the length of the guideway and spaced from the inner faces of the guideway, the said guideway and its needle reciprocating in unison and intermittently in an up-and-down direction, a shogging device mounted to reciprocate intermittently in a transverse direction, to shift the ground warp-threads transversely from one side of the guideway to the other to bring the ground warp-threads alternately on opposite
65 sides of the needle, heddles for moving the

ground warp-threads up and down above and below the point of the needle and means for reciprocating and intermittently moving the needle, the guideway and the shogging device.

70 11. A loom for interweaving ground warp-threads and a pile warp-thread, comprising a guideway for the passage of the ground warp-threads, a needle having a point for the passage of the pile warp-thread and located
75 about midway of the length of the guideway and spaced from the inner faces of the guideway, the said guideway and its needle reciprocating in unison and intermittently in an up-and-down direction, a shogging device
80 mounted to reciprocate intermittently in a transverse direction, to shift the ground warp-threads transversely from one side of the guideway to the other to bring the ground warp-threads alternately on opposite
85 sides of the needle, heddles for moving the ground warp-threads up and down above and below the point of the needle, the said shogging device being located between the heddles and the guideway and its needle and
90 means for reciprocating and intermittently moving the needle, the guideway and the shogging device.

12. A loom for interweaving ground warp-threads and a pile warp-thread, provided
95 with a guideway for the passage of the ground warp-threads, and a needle having an eye for the passage of the pile warp-thread, the said needle being arranged in a plane extending longitudinally through the guideway
100 and the eye of the needle being located approximately half-way of the height of the guideway, to leave a portion of the guideway wholly unobstructed, means for shifting the ground warp-threads transversely in the said
105 guideway, and means for raising and lowering the ground warp-threads in the said guideway.

13. A loom for interweaving ground warp-threads and a pile warp-thread, provided
110 with a device for moving the ground warp-threads alternately to opposite sides of the pile warp-thread, and means for moving the pile warp-thread to loop the same around one of the ground warp-threads and to pass the
115 pile warp-thread between the ground warp-threads.

14. A loom for interweaving ground warp-threads and a pile warp-thread, provided
120 with heddles for moving the ground warp-threads alternately up and down, means for moving the ground warp-threads laterally, for bringing the same alternately to opposite sides of the pile warp-thread, and means for moving the pile warp-thread up and down,
125 for looping the pile warp-thread around one of the ground warp-threads and then passing the pile warp-thread up between the ground warp-threads.

15. A loom for interweaving ground warp- 130

threads and a pile warp-thread, provided with a guideway for the passage of a pair of ground warp-threads, a needle having an eye for the passage of the pile warp-thread, means for shifting the said pair of ground warp-threads laterally while the needle is down and to hold the ground warp-threads spaced apart in the guideway, and means for raising and lowering the said needle, for the latter to pass the said pile warp-thread between the said ground warp-threads.

16. A loom for interweaving ground warp-threads and a pile warp-thread, provided with a guideway for the passage of a pair of ground warp-threads, a needle having an eye for the passage of the pile warp-thread, means for shifting the said pair of ground warp-threads laterally while the needle is down and to hold the ground warp-threads spaced apart in the guideway, means for raising and lowering the said needle, for the latter to pass the said pile warp-thread between the said ground warp-threads, and means for moving the said ground warp-threads up and down while the needle is up between the said ground warp-threads.

17. A pile-fabric loom provided with a guideway for the passage of the ground warp-threads, a guideway-needle having an eye for the passage of the pile warp-thread and movable up and down, shogging-combs for engaging the ground warp-threads and shifting the same transversely in the guideway, to alternately bring the ground warp-threads to opposite sides of the needle, and heddles for moving the ground warp-threads up and down.

18. A pile-fabric loom provided with a guideway for the passage of the ground warp-threads, a guideway-needle having an eye for the passage of the pile warp-thread and movable up and down, shogging-combs for engaging the ground warp-threads and shifting the same transversely in the guideway, to alternately bring the ground warp-threads to opposite sides of the needle, and heddles for moving the ground warp-threads up and down, the said shogging-combs being located intermediate the heddles and the said guideway and its needle.

19. A pile-fabric loom provided with a guideway for the passage of the ground warp-threads, a guideway-needle having an eye for the passage of the pile warp-thread and movable up and down, shogging-combs for engaging the ground warp-threads and shifting the same transversely in the guideway, to alternately bring the ground warp-threads to opposite sides of the needle, and heddles for moving the ground warp-threads up and down, the said shogging-combs being spaced apart one above the other and having their teeth standing toward each other.

20. A pile-fabric loom provided with a pair of heddles for the ground warp-threads,

a guideway for the passage of the ground warp-threads, a pair of shogging-combs spaced apart and having their teeth standing opposite each other, and a needle for carrying the pile warp-thread between the said ground warp-threads in the guideway.

21. A pile-fabric loom provided with a pair of heddles for the ground warp-threads, a guideway for the passage of the ground warp-threads, a pair of shogging-combs spaced apart and having their teeth standing opposite each other, a needle for carrying the pile warp-thread between the said ground warp-threads in the guideway, means for raising and lowering the said needle, and means for shogging the said combs when the needle is down.

22. A pile-fabric loom provided with heddles for the ground warp-threads, a guideway for the passage of the ground warp-threads, and a pair of shogging-combs spaced apart and having their teeth standing opposite each other.

23. A pile-fabric loom provided with heddles for the ground warp-threads, a guideway for the passage of the ground warp-threads, and a pair of shogging-combs spaced apart and having their teeth standing opposite each other, the shogging-combs being located intermediate the heddles and the guideway.

24. A pile-fabric loom provided with a pair of heddles for a pair of ground warp-threads, a single guideway for the passage of the said pair of ground warp-threads, a needle having an up-and-down movement, the needle being provided with an eye for the passage of a pile warp-thread, the needle being arranged approximately midway between the sides of the guideway, for the heddles to move the ground warp-threads up and down on opposite sides of the said needle, the needle leaving a wholly unobstructed space in the said guideway, above the eye of the needle, and means for shifting the ground warp-threads from one side to the other in the said unobstructed space.

25. A pile-fabric loom provided with a guideway for the passage of the ground warp-threads, a needle having an eye for the passage of the pile warp-thread, the needle standing approximately midway between the sides of the guideway and distance from the top thereof to leave a portion of the guideway unobstructed and a pair of shogging-combs spaced apart and having their teeth standing toward each other.

26. A pile-fabric loom having a guideway for the passage of the ground warp-threads, a shogging device for shifting the ground warp-threads transversely in the said guideway, and a reciprocating needle provided with an eye for the passage of the pile warp-thread, the needle standing approximately midway between the sides of the guideway and the

needle-eye terminating a distance below the top of the guideway to leave an unobstructed space in the guideway.

27. A loom for interweaving ground warp-
5 threads and a pile warp-thread, provided with an intermittently-reciprocating frame having spaced bars, and needles extending in planes passing between adjacent bars, a portion of the space between adjacent bars being
10 unobstructed for the passage of the ground warp-threads to opposite sides of the needle, the pile warp-thread passing through the eye

of the needle, means for shifting the ground warp-thread transversely in the said unobstructed space portion and means for inter- 15 mittently reciprocating the said frame.

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

HOVCEP SARAFIAN.

Witnesses:

THEO. G. HOSTER,
F. W. HANAFORD