

No. 858,963.

PATENTED JULY 2, 1907.

J. K. DALKRANIAN.
PILE FABRIC LOOM.

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APPLICATION FILED JUNE 19, 1905.

8 SHEETS—SHEET 2.

FIG. 2

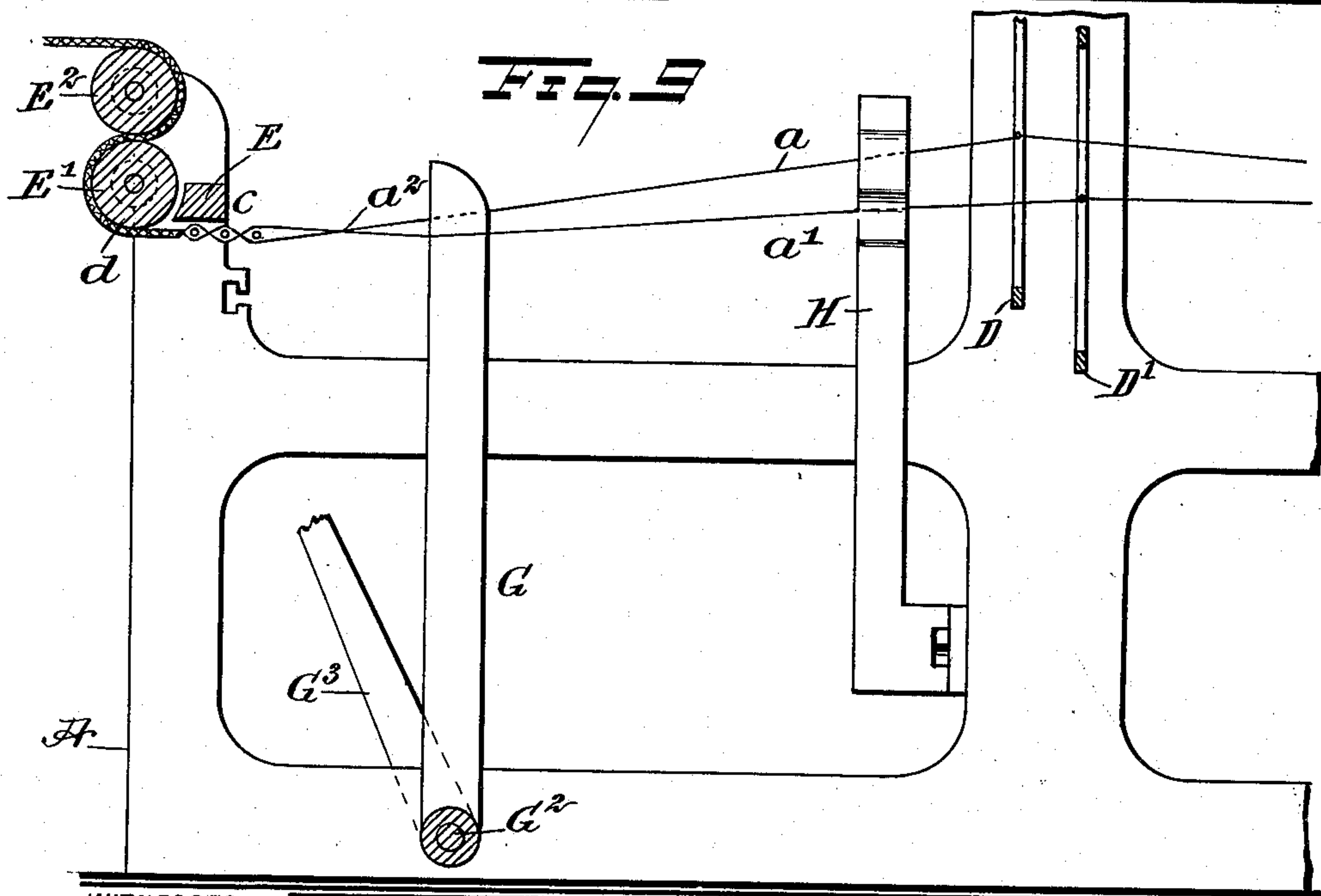
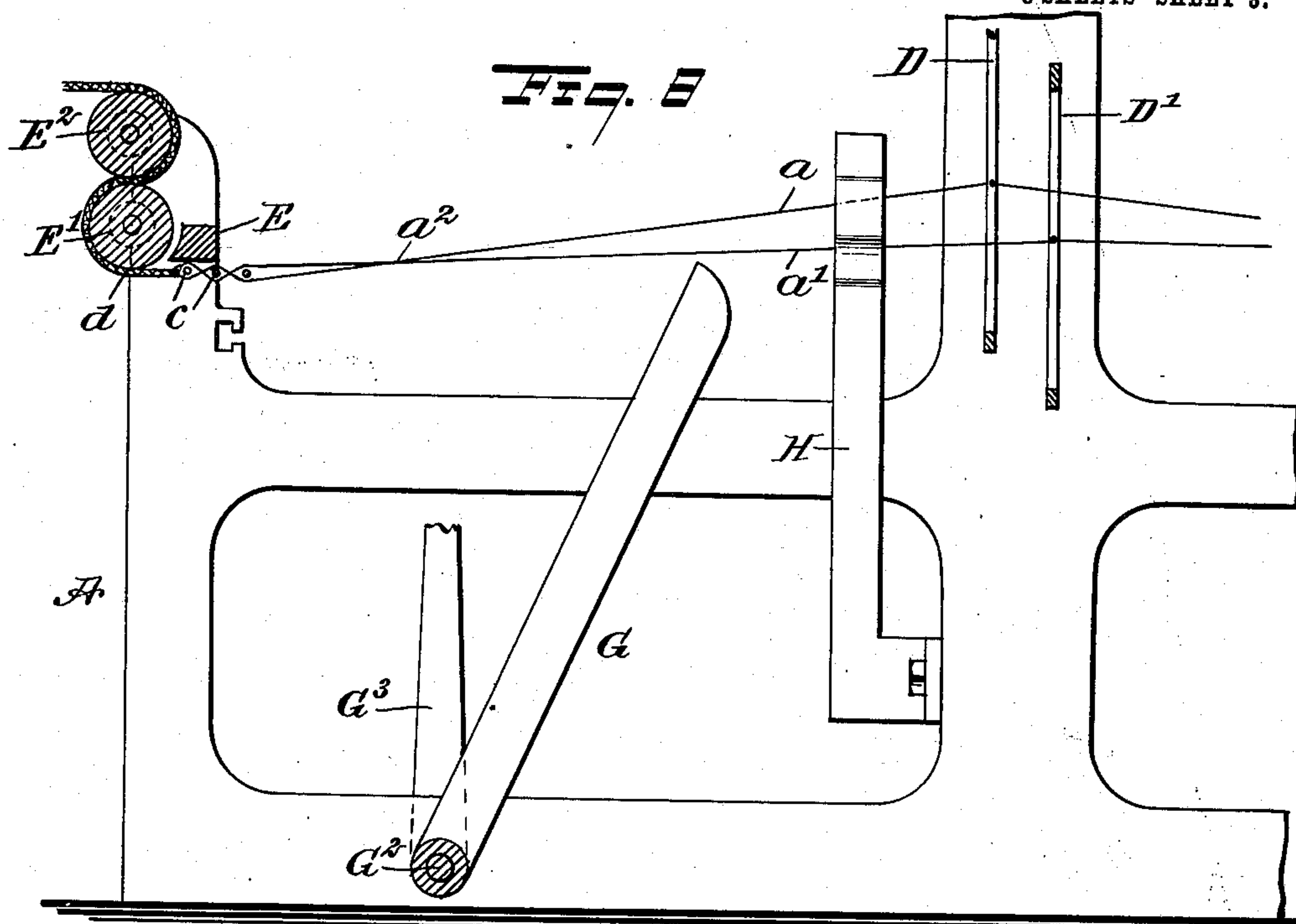
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8 SHEETS—SHEET 3.



WITNESSES:

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ATTORNEYS

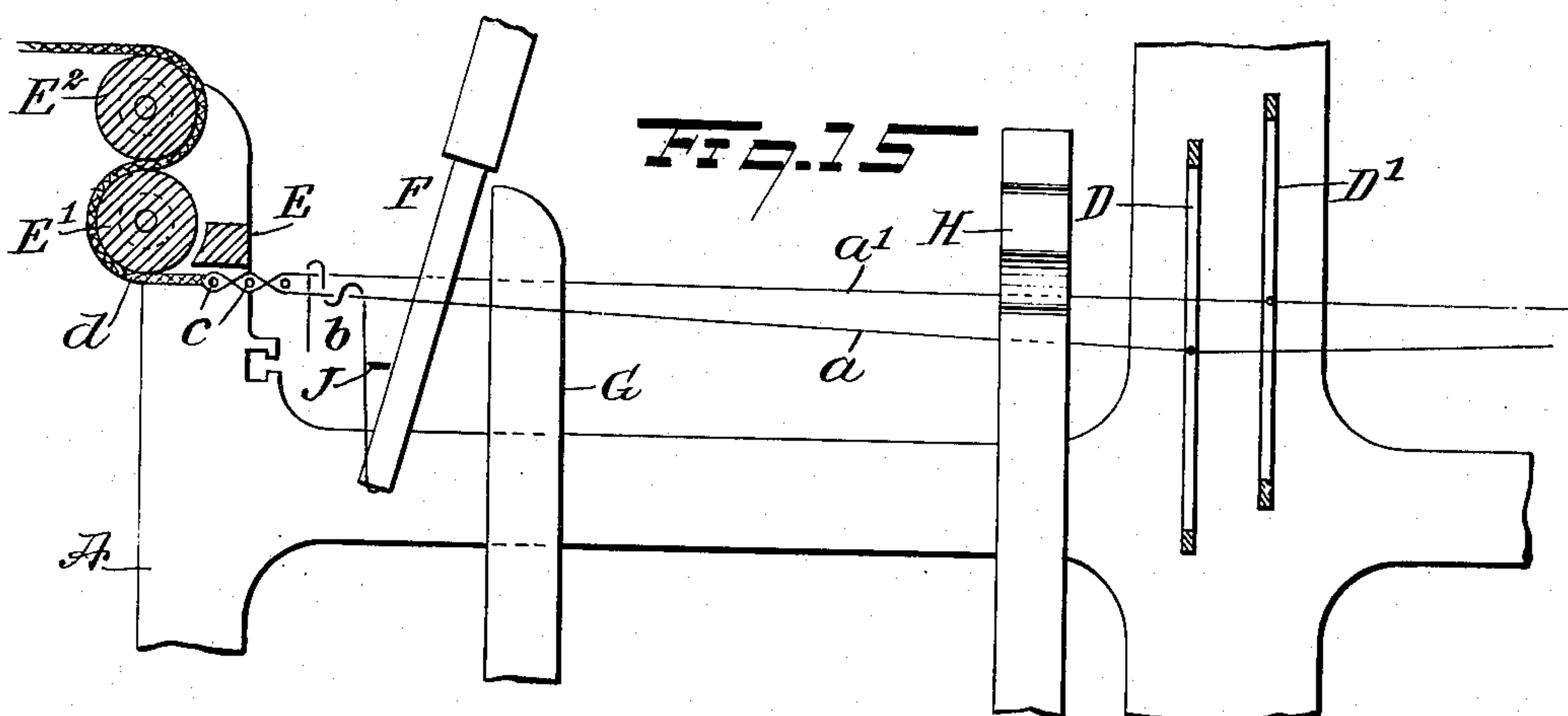
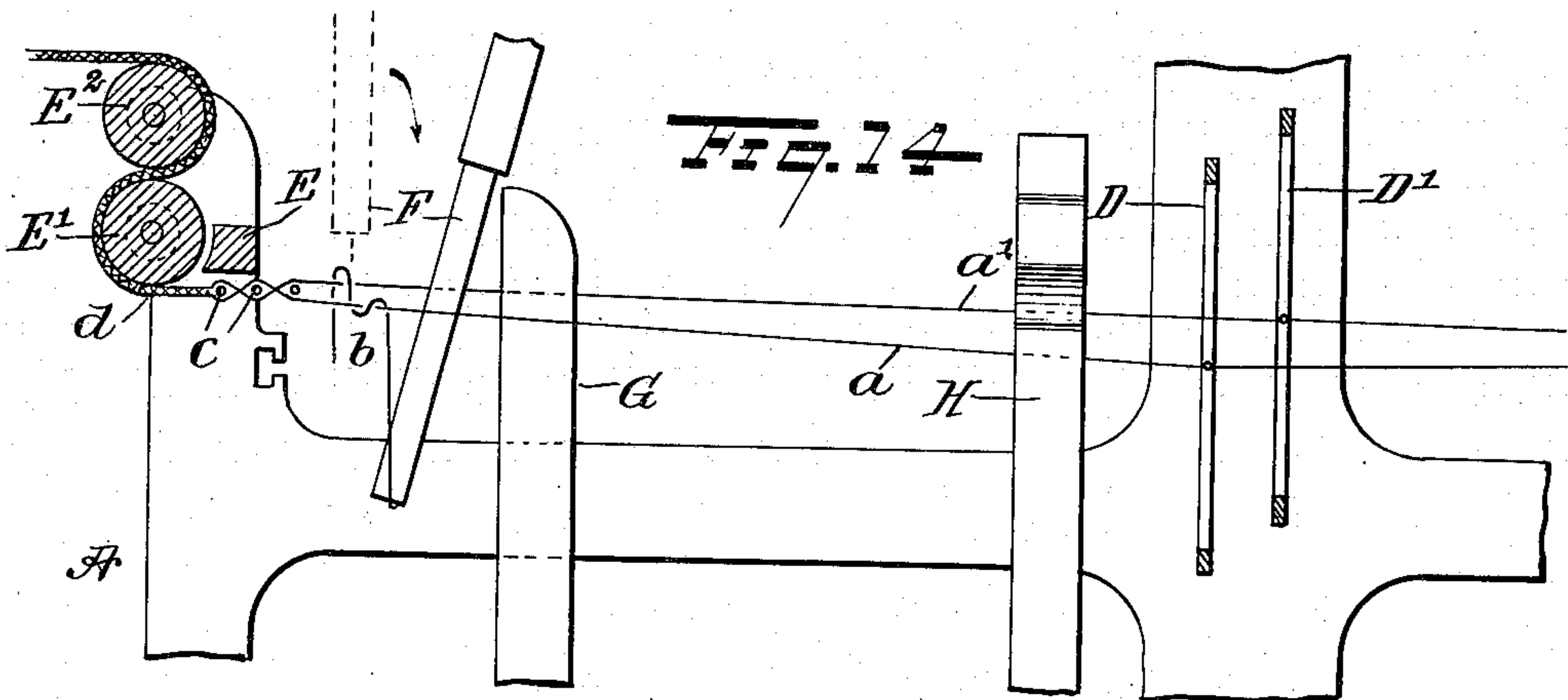
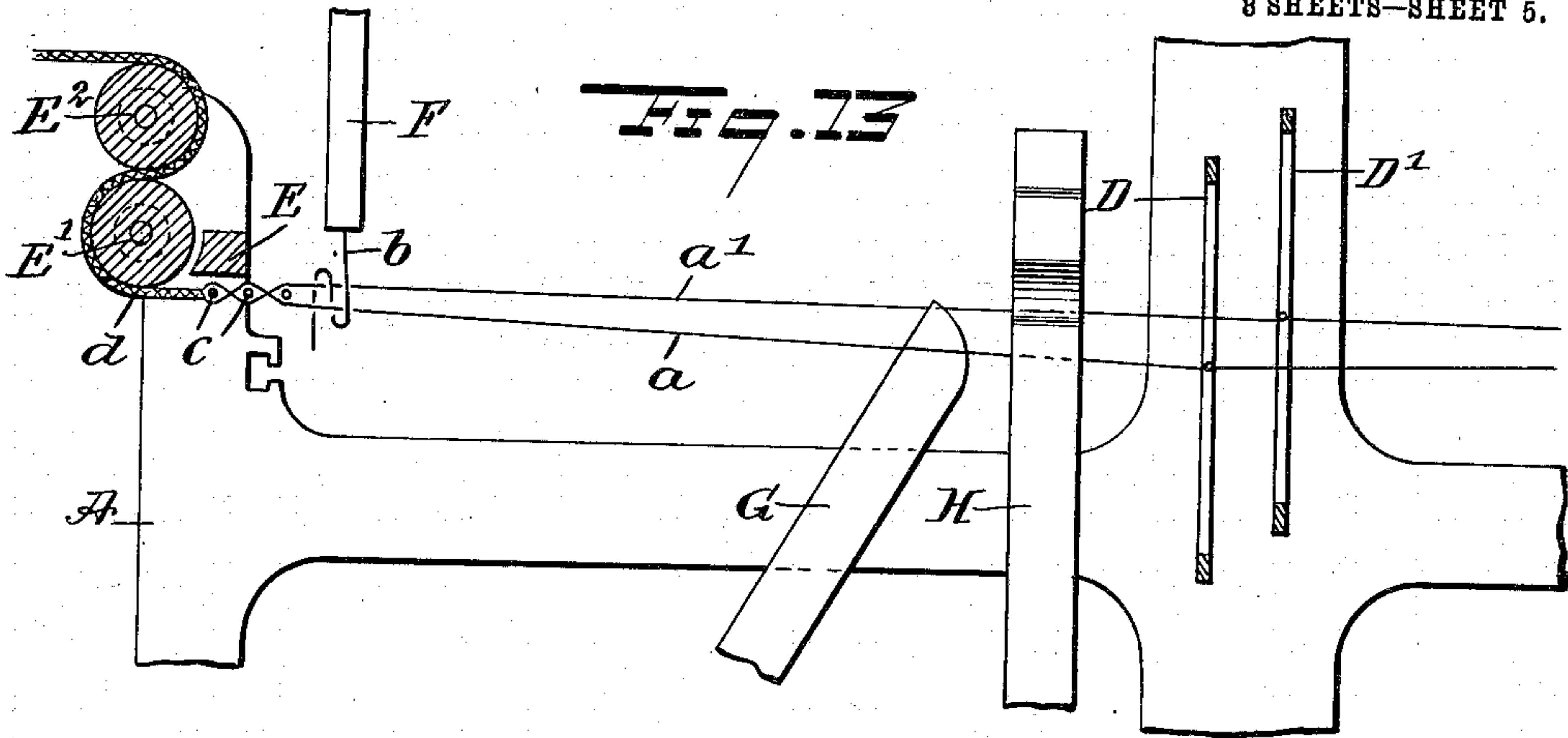
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8 SHEETS—SHEET 5.



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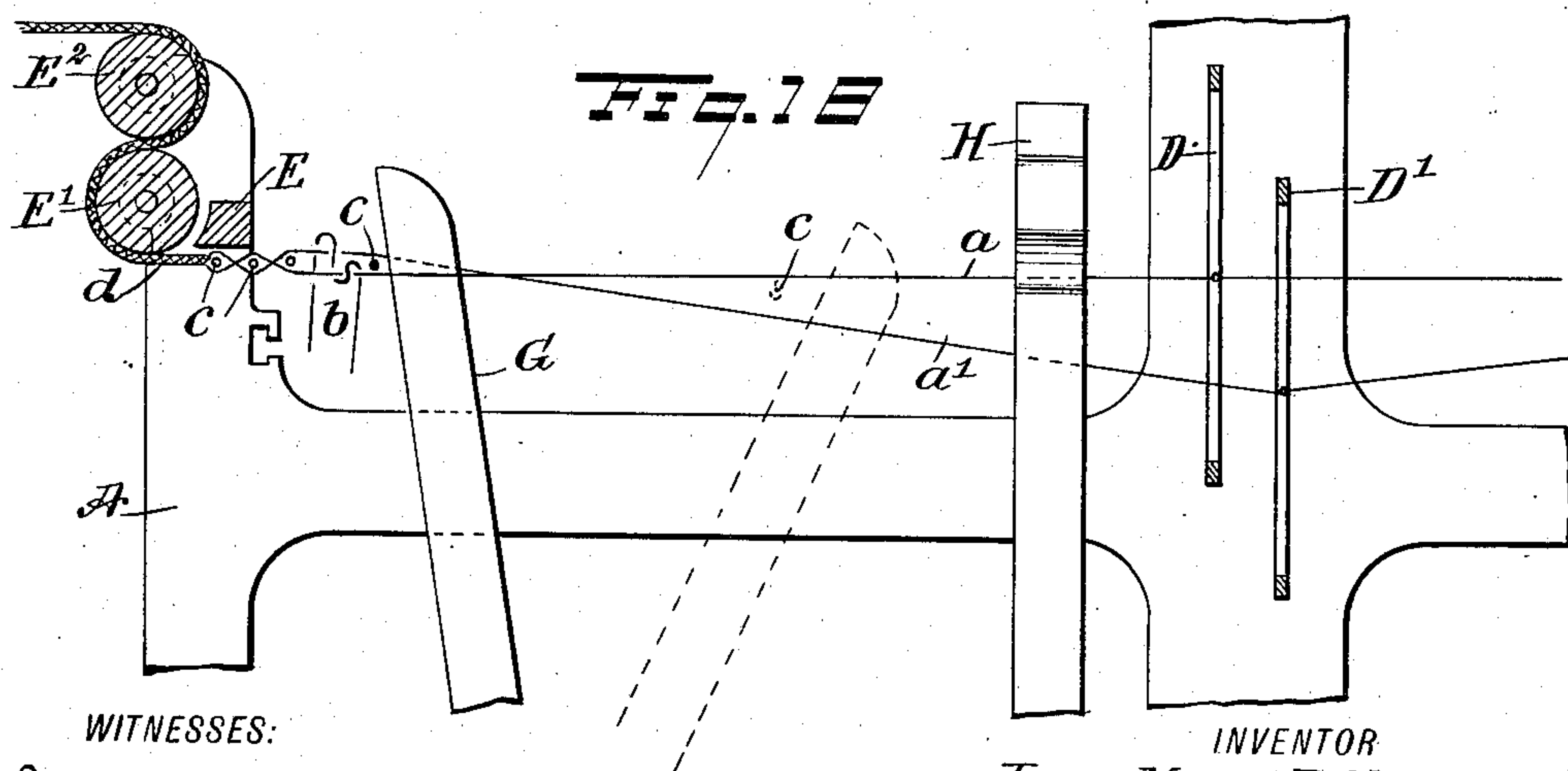
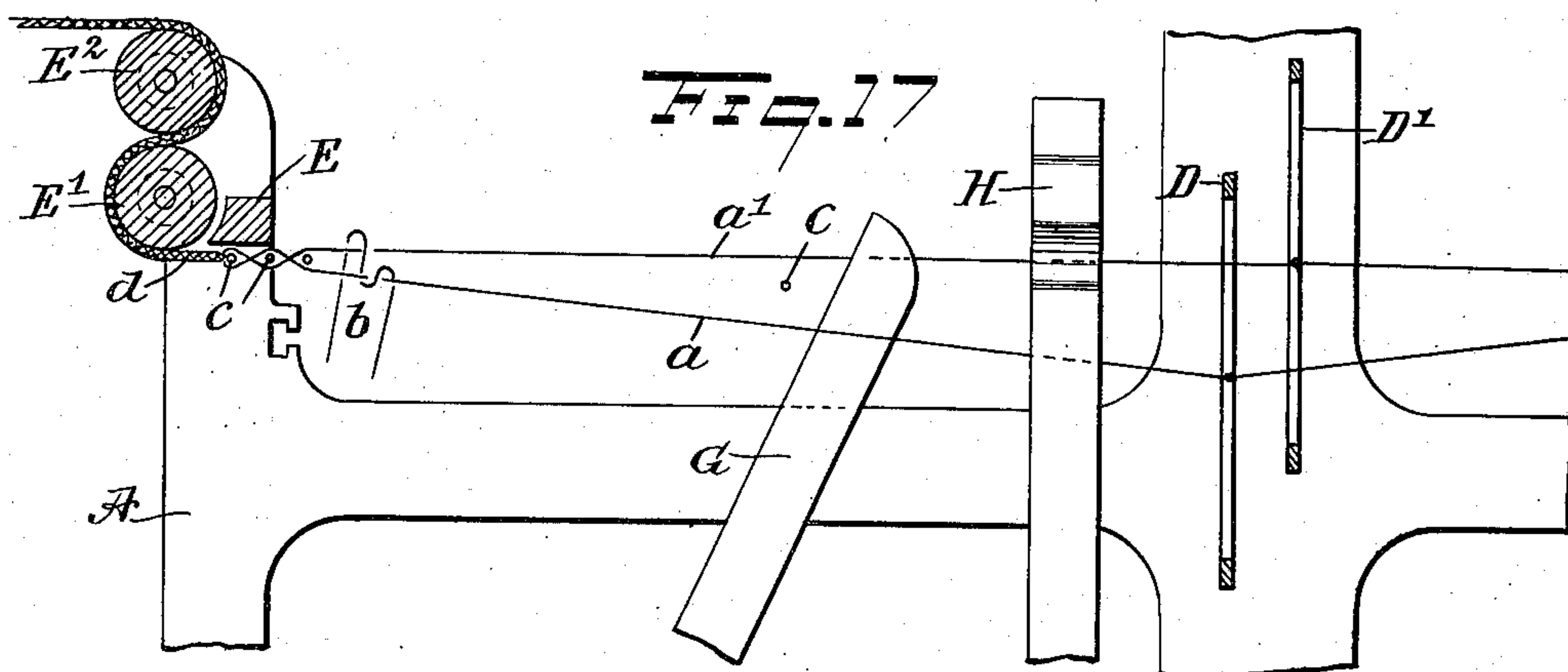
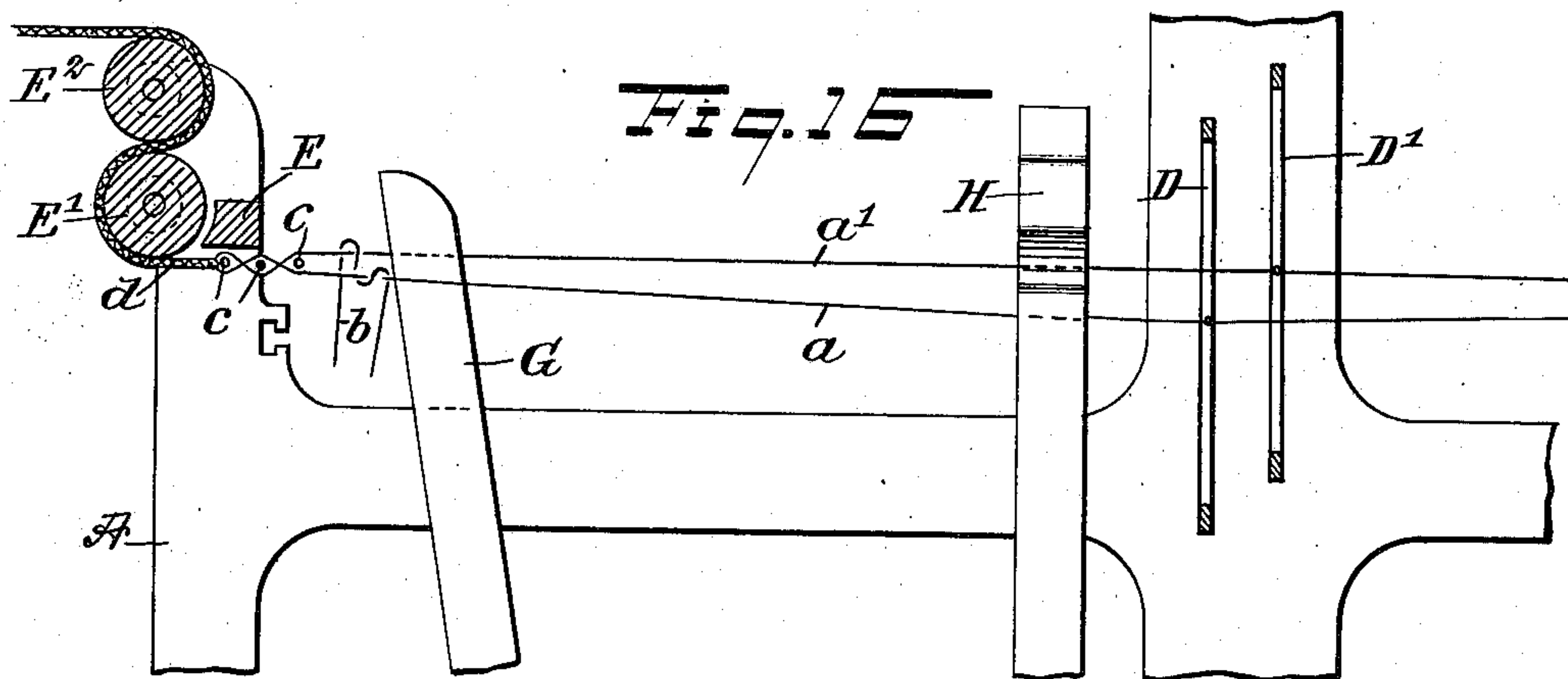
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8 SHEETS—SHEET 6.



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Memorandum

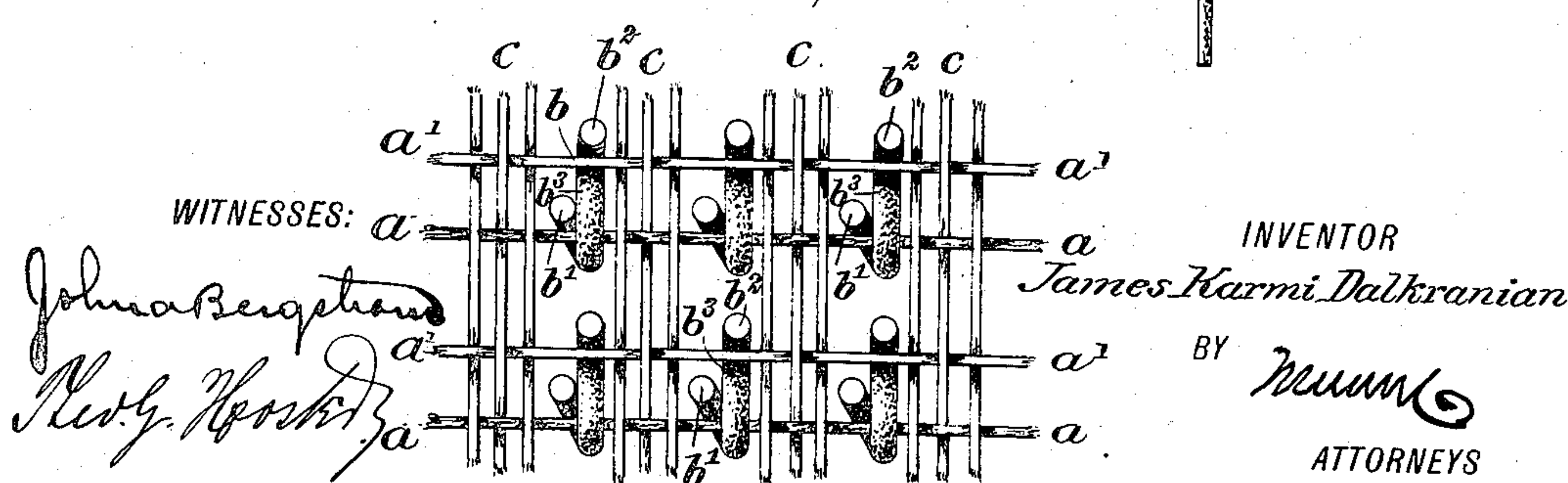
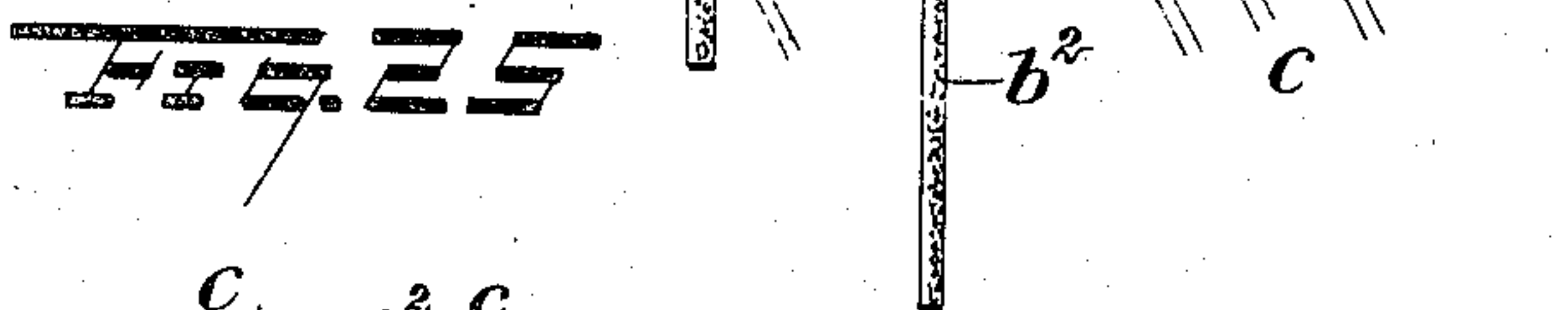
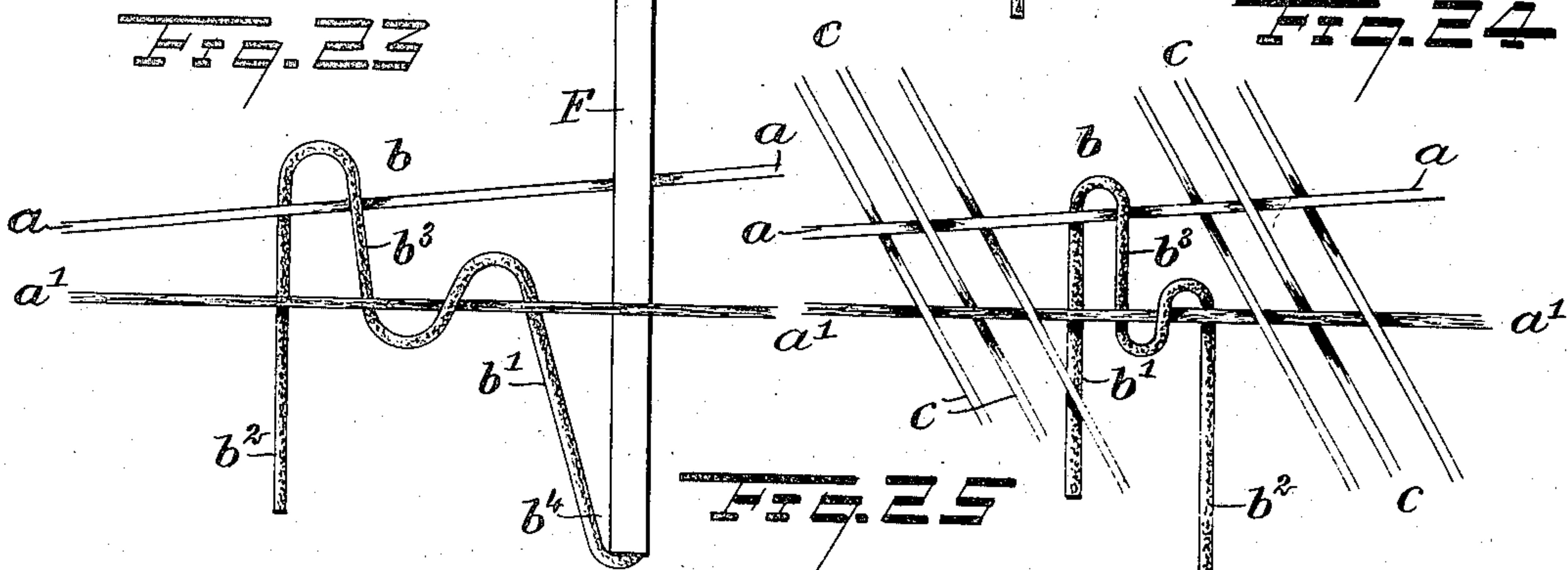
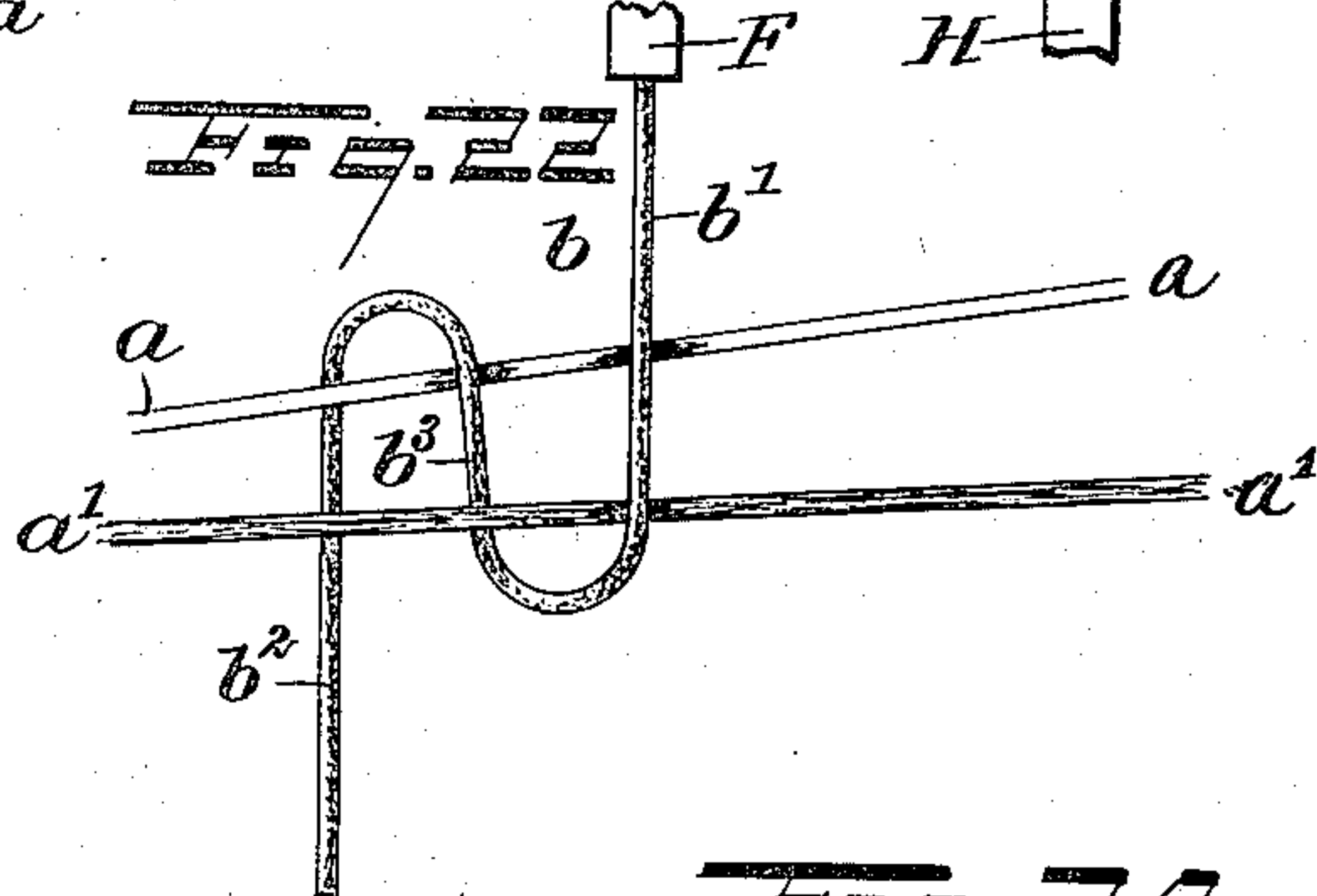
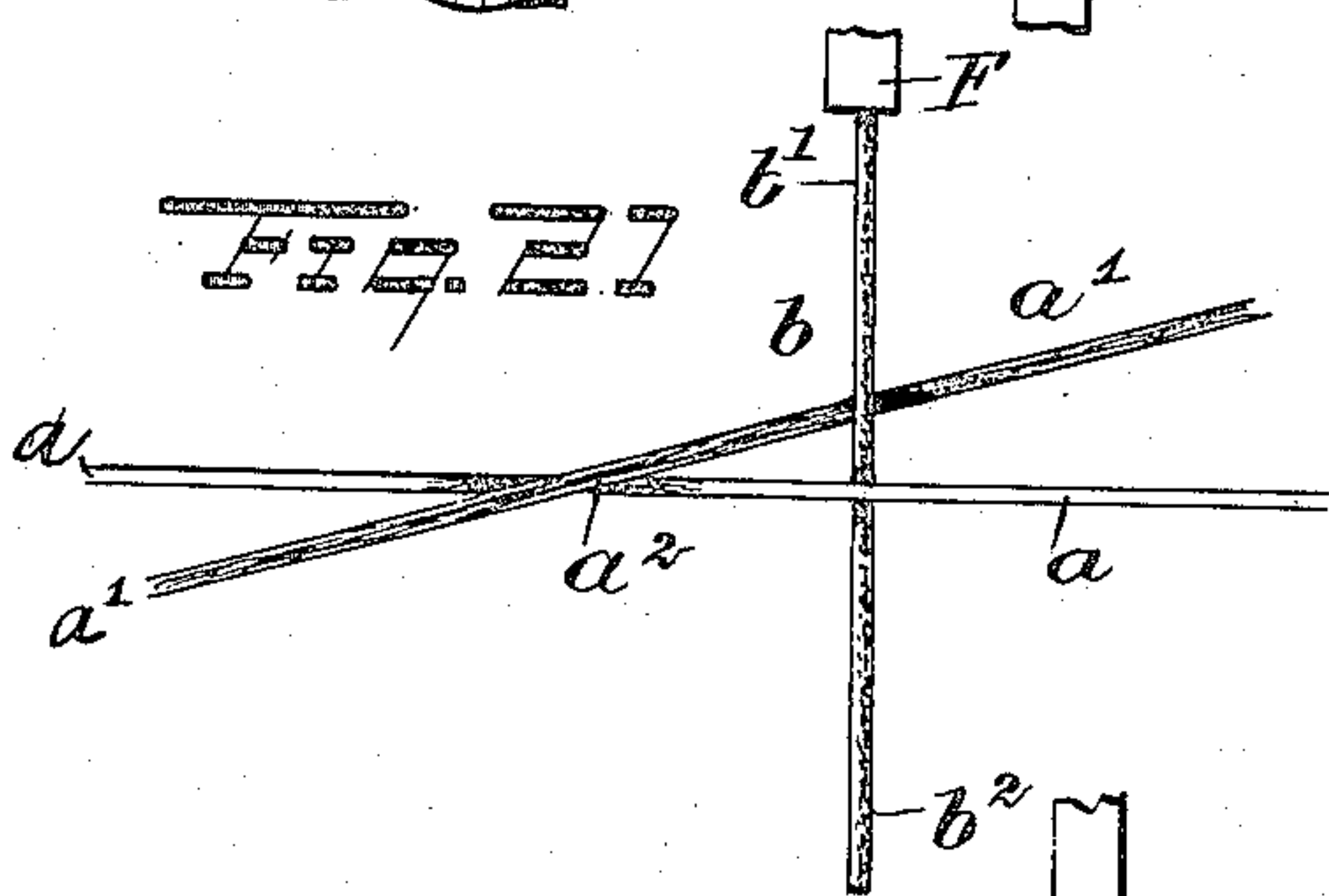
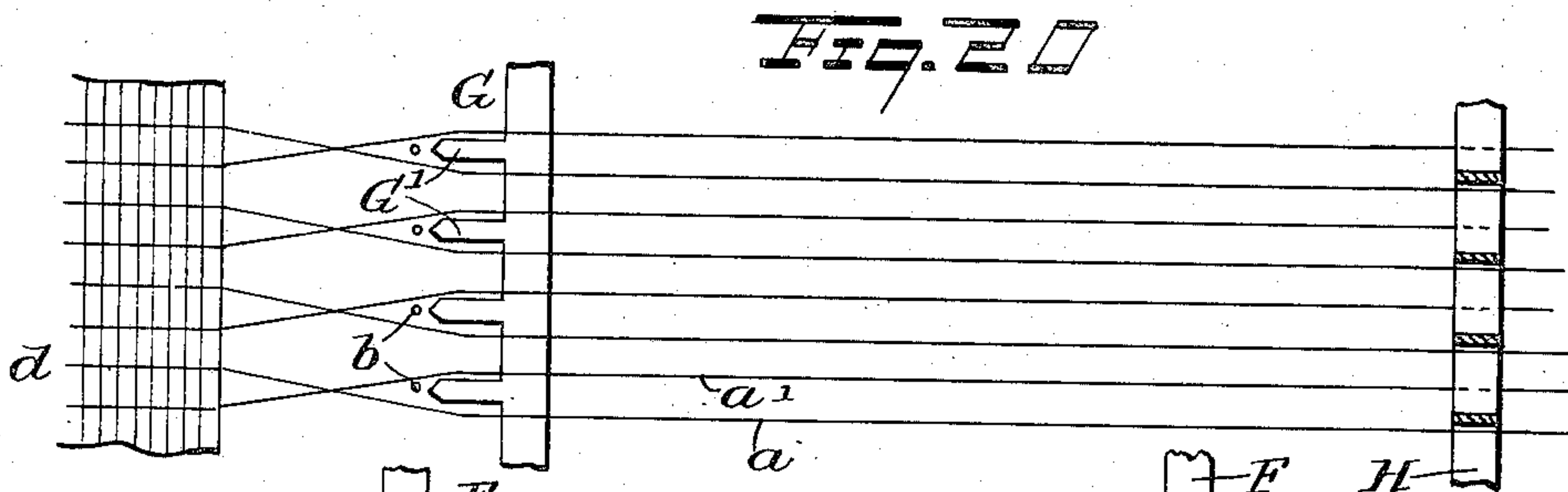
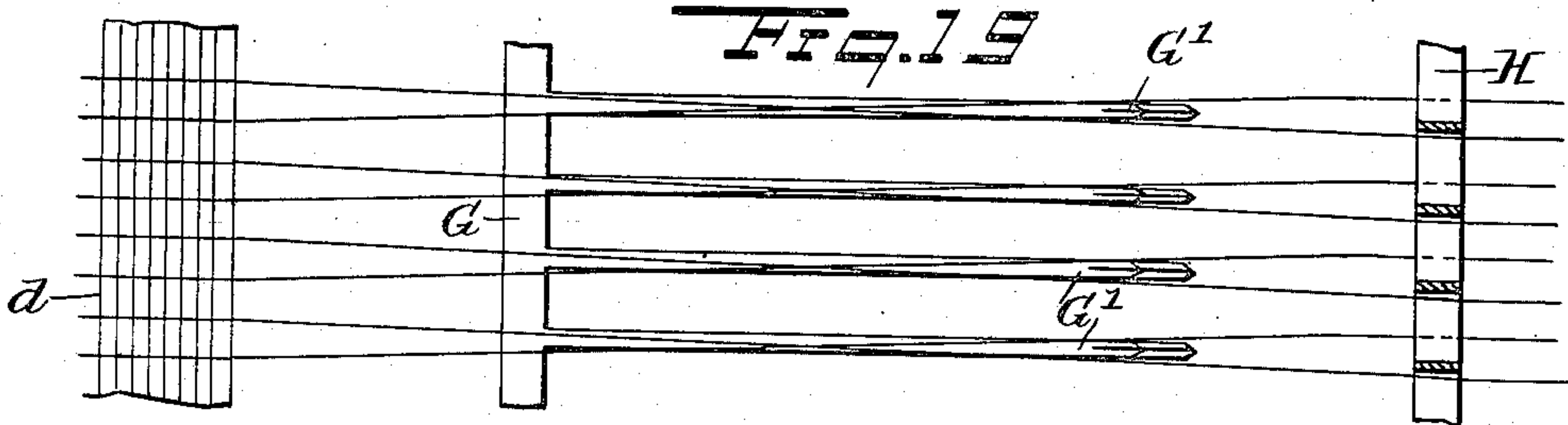
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8 SHEETS—SHEET 7.



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8 SHEETS—SHEET 8.

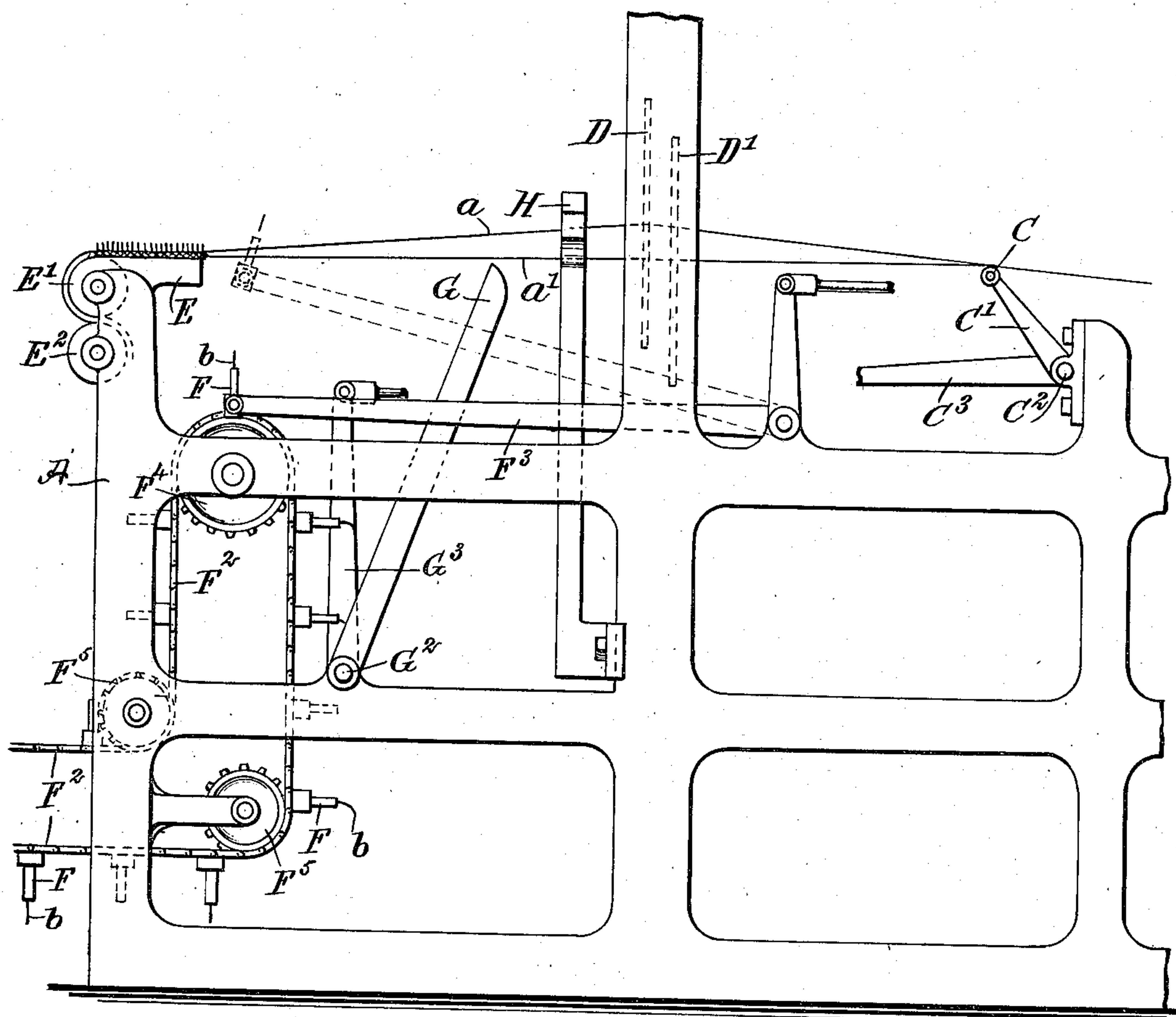


Fig. 26

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UNITED STATES PATENT OFFICE.

JAMES KARMI DALKRANIAN, OF NEW YORK, N. Y., ASSIGNOR, BY MESNE ASSIGNMENTS,
TO UNITED STATES PERSIAN CARPET COMPANY, OF NEW YORK, N. Y., A CORPORATION
OF NEW YORK.

PILE-FABRIC LOOM.

No. 858,963.

Specification of Letters Patent.

Patented July 2, 1907.

Application filed June 19, 1905. Serial No. 265,886.

To all whom it may concern:

Be it known that I, JAMES KARMI DALKRANIAN, a citizen of the United States, and a resident of the city of New York, borough of the Bronx, in the county 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 pile fabric loom, more especially designed for weaving pile fabrics of the oriental rug type and preferably such having Persian knots formed in accordance with the method described and shown in the application for Letters Patent Serial Number 265,887 filed by me under even date herewith.

The invention consists of novel features and parts and combinations of the same which will be more fully described hereinafter and 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 front end elevation of the same; Fig. 3 is an enlarged face view of part of the shogging device; Fig. 4 is an enlarged sectional plan view of the cutting device for cutting the pile threads; Fig. 5 is an enlarged perspective view of one of the tuft yarn tubes for the pile threads; Fig. 6 is an enlarged cross section of the ground warp threads in position relative to the shogging device and the reeds of the lay; Fig. 7 is a like view of the same, showing the parts in a different position; Figs. 8 to 18 are sectional side elevations of the loom, showing the parts thereof in different positions for illustrating the several steps necessary for the formation of the weave;

Fig. 19 is a plan view of the same, showing the parts in the position illustrated in Fig. 8; Fig. 20 is a like view of the same, showing the parts in the position illustrated in Fig. 12; Fig. 21 is an enlarged perspective view of a pair of crossed ground warp threads, the tuft yarn tube and the pile thread extending between the pair of ground warp threads; Fig. 22 is a like view of a pair of ground warp threads uncrossed, the tuft yarn tube and the pile thread partly looped on the ground warp threads; Fig. 23 is a similar view of the same, showing the tuft yarn tube in final knot-forming position and previous to cutting off the pile thread to complete the Persian knot; Fig. 24 is a like view of the same, showing a pair of ground warp threads, a pile thread looped thereon in the form of a Persian knot, and preceding and succeeding weft threads interwoven with the ground warp threads; Fig. 25 is an enlarged plan view of the fabric; and Fig. 26 is a side elevation of a modified form of the loom.

In the fabric (Fig. 25) to be woven by the loom

illustrated in the drawings, the ground warp threads a, a' are arranged in pairs, and the pile threads b , arranged in sets, each are interwoven with a pair of ground warp threads a, a' to form a Persian knot, and suitable weft threads c (preferably three) are interwoven with the ground warp threads a, a' between adjacent sets of pile knots to insure the formation of a weave of the oriental rug type having Persian knots. As is well known, the pile thread b in a Persian knot passes under the ground warp thread a' , then over to the top of the other ground warp thread a , and then completely around this ground warp thread a for the pile end b' to extend up between the ground warp threads a, a' , and the pile end b^2 to extend up on the opposite ground warp thread a' . In the loom shown in Figs. 1 and 2, the knots are formed with the pile ends b', b^2 extending downwardly, while in the loom illustrated in Fig. 26, the knots are formed with the pile ends b', b^2 extending upwardly. In producing the desired result, the ground threads a, a' are first crossed (see Fig. 21), and then the pile thread b is inserted between the crossed ground warp threads adjacent to the crossing a^2 ; then the ground warp threads a, a' are uncrossed, as shown in Fig. 22, after which the pile end b' is passed between the uncrossed ground warp threads, as shown in Fig. 23, and then the pile end b' is cut at b^4 to leave the pile thread interlooped with the ground warp threads a and a' in the form of a Persian knot. When this has been done the first weft thread c is passed through the open shed in the rear of the knots, after which the weft thread and the knots are beaten up, and then the other two weft threads are successively placed in the shed and beaten in; but it is evident that any desired number of weft threads may be used between adjacent rows of knots. For the sake of brevity I prefer to use the term "uncrossed" thereby indicating the normal approximately parallel position of the ground warp threads.

In order to produce the weave as described, the following arrangement is made: On a suitably constructed loom-frame A is mounted the usual warp-beam (or beams) B , from which unwind the ground warp threads a, a' , to then extend upwardly and pass over a tension-rod C and through heddles D, D' , respectively, and finally to the fell of the fabric d passing under a breast-beam E fixed on the front end of the loom-frame A . The fabric, after leaving the breast-beam E , also passes under a spike roller E' and a loose roller E^2 , both being journaled on the loom-frame A adjacent to the breast-beam E . For each fourth pick a different set of pile threads b is used, each set of pile threads b being carried by a set of tuft yarn tubes F , and each set of tuft yarn tubes F

is held in a frame removably mounted on an endless carrier of the usual construction and common in Axminster looms, so that further showing and description of this part of the machine is not deemed necessary, it being understood, however, that for each fourth pick a frame and its set of tuft yarn tubes F is disconnected from the carrier and transferred, by a transferring device F', to the place for forming the knots (adjacent to the breast-beam E), and after the knots are formed the frame and its set of tuft yarn tubes F are returned, by the transferring device F', to the carrier and the latter is caused to travel to move the following frame into active position, the carrier traveling in unison with the movement of the loom.

On the loom-frame A is mounted to reciprocate intermittently a lay G having dents G', each adapted to pass between the ground warp threads a a' of a pair of ground warp threads, and each pair of ground warp threads passes through adjacent guideways H' of a shogging device H, preferably located intermediate the heddles D, D' and the lay G, the shogging device serving to alternately cross and uncross the ground warp threads, as hereinafter more fully described. The weft threads c are passed through the open shed by a suitable shuttle I or other weft-carrying device (see Fig. 2), and a cutting device J is provided for cutting off the pile threads at b^4 , as before stated. The tension-rod C is preferably mounted on its ends on arms C' attached to a shaft C² journaled on the loom-frame A, and on the said shaft C² is secured an arm C³, pressed on by a spring C⁴ connected with the loom-frame (see Fig. 1), to press the rod C in an upward direction to give the desired tension to the ground warp threads a and a' . The heddles D, D' are hung in the usual manner on heddle-levers D², D³ connected with suitable cam mechanism actuated from the main shaft of the loom to shift the heddles at the proper time and as hereinafter more fully described. The lay G is journaled, at its lower end, by a shaft G² in the sides of the loom-frame A. On one end of the said shaft G² is arranged an arm G³ connected with a suitable actuating mechanism so that when the loom is in motion an intermittent forward and backward swinging motion is given to the said lay G as hereinafter more fully described.

The shogging device H is stationary and secured to the loom-frame A, and the guideways H' of the said shogging device H are formed of parallel bars H² having their lower ends disposed vertically and in longitudinal alinement with the dents G' of the lay G, as plainly shown in Figs. 6 and 7. The upper ends of the bars H² are bent transversely, to give the upper portions of the guideways H' a V-shape in a transverse direction. The ground warp threads a , a' of a pair of ground warp threads extend through adjacent guideways H', and when the said ground warp threads are in a lowermost position they lie side by side (see Fig. 6) and are then in an uncrossed or parallel position and spaced apart for the ready entrance of the corresponding dent G' and the tuft yarn tube F between the ground warp threads a , a' of each pair of ground warp threads. When the ground warp threads a , a' are raised by the heddles D, D' to the different levels shown in Fig. 7, then the ground warp thread a of a pair of ground warp threads crosses its mate a' and moves to a higher level, the

point of crossing a^2 of the ground warp thread of a pair of ground warp threads being approximately midway between the shogging device H and the fell of the fabric. When the lay G is swung forwardly to a vertical position, each dent G' passes between the ground warp threads a , a' of a pair of ground warp threads, and at a point in the rear of the point of crossing a^2 , and consequently as the lay moves forward, the point of crossing a^2 of the ground warp threads remains in front of the lay. When the lay is returned to a rearmost position and the heddles D and D' are returned to lower the ground warp threads a , a' to their original position, then the ground warp threads a , a' of each pair of ground warp threads are uncrossed, and again assume their horizontal uncrossed position. It is understood that on raising the ground warp thread a' to the middle portion of the bend in the guideway H', and lifting its mate a through the entire bend to the upper end of the bent, it is evident that the ground warp thread a crosses its mate a' in a lateral direction and moves to a higher level.

By having the ground warp threads a , a' of a pair of ground warp threads crossed and at different levels, a ready entrance is had for the dents G' and the tuft yarn tubes F between the crossed ground warp threads.

From the foregoing it will be seen that the shogging of the ground warp threads a , a' is accomplished by the use of fixed guideways having lateral bends, and the heddles.

The cutting device J consists preferably of a knife J' (see Fig. 4), disposed horizontally and having its cutting edge at an angle to the transverse row of pile ends b' , to cut the latter with a shearing action, as will be readily understood by reference to Fig. 4. The knife J' is provided with a head J², mounted to slide in transverse guideways J³ secured to the loom-frame A (see Figs. 1, 2 and 4). On the head J² is secured a rod J⁴ connected with suitable mechanism forming part of the loom and arranged for imparting an intermittent reciprocating motion to the knife J' for the latter to cut the ends b' of the pile threads b at the time previously stated. Normally the knife J' is at rest on one side of the loom.

The operation is as follows, special reference being had to Figs. 8 to 20: When the several parts are in the positions as shown in Fig. 8, the lay G is in a rearmost position and the upper ends of its dents are somewhat below the ground warp thread a' , now in a raised position, standing at the middle portion of the bend of the guideway H', as plainly shown in Fig. 7, the other ground warp thread a being in its uppermost position, so that the ground warp threads a and a' are crossed. The lay G is now swung forward into a vertical position, as shown in Fig. 9, so that the point of crossing a^2 is in front of the dents of the lay and approximately midway between the lay G and the fell of the fabric b . A set of tuft yarn tubes F (see Fig. 10) is now moved downward immediately in front of the lay G, so that each tuft yarn tube passes between the ground warp threads a , a' of a pair of ground warp threads, the tuft yarn tube in its downward movement swinging forwardly and downwardly to the position shown in Fig. 11; and then the tuft yarn tubes rise to the position shown in Fig. 12 so that the loose end of each pile thread b extends between the ground warp threads a , a' of a pair

of ground warp threads and approximately equal distances above and below the ground warp threads a and a' and in the rear of the point of crossing a^2 . A further forward swinging movement is now given to the lay 5 G to move the same to the position shown in Fig. 12, with a view to move the pile thread b as close to the crossing a^2 and the latter as close to the fell of the fabric as possible. By this arrangement the free end portions of the pile thread b is practically clamped between 10 the ground warp threads a, a' . When this has been done, the lay G is swung into a rearmost position, and then the heddles D and D' are changed to move the same into the lower, uncrossed position previously referred to, it being understood that the ground warp 15 thread a of a pair of ground warp threads passes a short distance below the ground warp thread a' , as plainly shown in Fig. 13. The ground warp threads a and a' , during the change of the heddles, pass the upper end of the lay G to allow the ground warp threads to return 20 to the uncrossed position. When the ground warp threads a and a' uncross, it is evident that the ends b' and b^2 extend in opposite directions and outside of their corresponding ground warp threads a, a' (see Figs. 13 and 22), while the middle portion b^3 of each 25 pile thread extends between the ground warp threads a, a' . The lay G now swings forward, so that the dents G' thereof pass between the uncrossed ground warp threads and at approximately the same time the tuft yarn tubes F move downward between the un- 30 crossed ground warp threads in front of the lay G for each tuft yarn tube F to carry the end b' down between the ground warp threads, thus looping the pile thread completely around the ground warp thread a , the several parts then having the positions shown in 35 Fig. 14. The cutting device J now cuts the end b' of the pile thread at a point between the ground warp thread a and the terminal of the tuft yarn tube F (see Fig. 15). The Persian knot is now complete on the warp threads a, a' . The tuft yarn tubes F now rise 40 completely out of engagement with the ground warp threads a, a' , after which the lay G swings forward a short distance to partly beat up the knot formed; and then the lay swings rearwardly into the position shown in Fig. 17, after which the shed is opened by the hed- 45 dle D moving into an extreme lowermost position; that is, to bring the ground warp thread a into the lower, vertical portion of the guideway H'. The shuttle device I now carries a weft thread c through the open shed in front of the lay G (see Fig. 17), and 50 then the lay G swings forward to beat up this weft c and the row of knots formed on the several pairs of ground warp threads a and a' (see Fig. 18). After this has been done, the lay G swings rearward and the heddles D and D' change, to move the heddle D' into a 55 lowermost position; that is, to bring the ground warp thread a' into the lower, vertical portion of the guideway H', so that the shed is again opened and the second weft thread is now passed through the open shed in front of the lay G. This weft thread is now beaten 60 in by the lay, and the latter returns, the heddles D and D' again change to open the shed in the reverse direction, and the third weft thread is then passed through its open shed and finally beaten up by the lay. The lay then returns to its rearmost position, 65 after which the heddles D and D' move into the upper-

most position to again cross the ground warp threads a, a' (see Fig. 8), and the above-described operation is then repeated.

From the foregoing it will be seen that, for forming a knot, each tuft yarn tube F makes two full down and 70 up movements between the ground warp threads a, a' of a pair of ground warp threads, and while the ground warp threads are alternately crossed and uncrossed. It is understood that after the first full down and up 75 movement, the tuft yarn tube F remains temporarily stationary until the ground warp threads a, a' are uncrossed. During the time the tuft yarn tube F is at the end of its second descent, it remains stationary sufficiently long for the knife J' to cut the pile threads 80 b at b^4 , it being understood that the tuft yarn tube F moves down sufficiently far at the second descent to leave a sufficient length of pile thread projecting beyond the terminal of the tuft yarn tube (after the 85 knife J' has cut the pile thread b) for forming the next knot, whenever the set of tuft yarn tubes is again brought down from the carrier by the transferring de- 90 vice F'. After the pile threads b are cut by the knife J', the tuft yarn tubes are raised and returned by the transferring device to the tuft yarn tube-carrier.

In the modified form illustrated in Fig. 26, the tuft 90 yarn tubes F, instead of working downward and upward, as previously described, work upward and downward so as to bring the pile ends b' and b^2 to the upper face of the fabric. For the purpose described, the sets of tuft yarn tubes F are held on the endless 95 carrier F² and are carried successively by the transferring device F³ up to the ground warp threads a and a' to be interlooped with the same in the manner previously described. As shown in Fig. 26, the end- 100 less carrier F² passes over sprocket-wheels F⁴, F⁵, journaled on the loom-frame A so as to bring the sets of tuft yarn tubes F into proper position for the transferring device F³ to take hold of a set at a time for the purpose above described.

As the remaining parts of the loom shown in Fig. 26 105 are the same as above described in reference to Figs. 1 and 2, further description of the same is not deemed necessary.

From the foregoing it will be seen that a set of pile threads b is formed into a row of Persian knots on the 110 pairs of ground warp threads a, a' by first passing the pile threads between the crossed threads of a pair of ground warp threads, then uncrossing the threads of each pair of ground warp threads, and finally passing 115 the end of the pile thread still held by the tuft yarn tubes down between the ground warp threads of a pair of ground warp threads so as to complete the Persian knot.

It is further understood that the several mechanisms described for producing the desired result operate in 120 unison and are driven from the main shaft of the loom, and as the means for actuating the several mechanisms from the main shaft may be of any approved construction, it is not deemed necessary to further illustrate or 125 describe the same.

I do not limit myself to any detailed construction of any one of the several mechanisms employed for producing the desired result, as the same may be varied without deviating from the invention.

Although I have described and give preference to the 130

arrangement in first passing the pile thread between he crossed ground warp threads, and then uncross the ground warp threads and then pass one end of the pile thread between the uncrossed ground warp threads to
 5 form the Persian knot, I may reverse the operation by first passing the pile thread between the uncrossed ground warp threads, then crossing the latter, and finally passing one pile end between the crossed ground warp threads.

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

1. A loom for interweaving a pile thread with a pair of ground warp threads, comprising means for passing the pile thread twice between the ground warp threads of a pair, and means for crossing and uncrossing the ground warp threads alternately relative to the movement of the pile thread.
 15

2. A loom for interweaving a pile thread with a pair of ground warp threads, comprising means for alternately crossing and uncrossing the ground warp threads, and means for passing the pile thread twice between the ground warp threads, that is, once while the ground warp threads are in crossed condition, and a second time while the ground warp threads are in an uncrossed condition.
 20

3. A loom for interweaving a pile thread with a pair of ground warp threads, comprising means for alternately crossing and uncrossing a pair of ground warp threads, and means for passing a pile thread between the ground warp threads after the crossing is made and passing one end of the pile thread between the ground warp threads after they are uncrossed.
 25 30

4. A loom for interweaving a pile thread with a pair of ground warp threads, comprising means for alternately crossing and uncrossing a pair of ground warp threads, means for passing a pile thread between the ground warp threads after the crossing is made and passing one end of the pile thread between the ground warp threads after they are uncrossed, means for shifting the ground warp threads to form an open shed, and means for passing a weft thread through the open shed.
 35 40

5. A loom for interweaving a pile thread with a pair of ground warp threads, comprising means for alternately crossing and uncrossing a pair of ground warp threads, and a pile thread carrier for passing a pile thread between the ground warp threads after they are crossed and for passing one end of the pile thread between the ground warp threads after they are uncrossed.
 45

6. A loom for interweaving a pile thread with a pair of ground warp threads, comprising means for alternately crossing and uncrossing a pair of ground warp threads, a pile thread carrier for passing a pile thread between the ground warp threads after they are crossed and for passing one end of the pile thread between the ground warp threads after they are uncrossed, heddles for operating the ground warp threads to form open sheds, and a shuttle mechanism for passing weft threads through the open sheds.
 50 55

7. A loom for interweaving a pile thread with a pair of ground warp threads, comprising means for alternately crossing and uncrossing a pair of ground warp threads, a pile thread carrier for passing a pile thread between the ground warp threads after they are crossed and for passing one end of the pile thread between the ground warp threads after they are uncrossed, and a knife for cutting the pile thread adjacent to the said carrier.
 60 65

8. A loom for interweaving a pile thread with a pair of ground warp threads, comprising a lay and heddles, a shogging device for alternately crossing and uncrossing the said ground warp threads, and a tuft yarn tube carrying the pile thread and adapted to pass between the ground warp threads when the ground warp threads are crossed and again when the ground warp threads are uncrossed.
 70

9. A loom for producing an oriental weave having Persian knots, comprising heddles for operating the ground warp threads in pairs, an intermittently-reciprocating lay having dents adapted to pass between the
 75

ground warp threads of a pair of ground warp threads, a set of tuft yarn tubes for carrying the pile threads and adapted to pass between the ground warp threads of the pairs of ground warp threads, a shogging device for alternately crossing and uncrossing the ground warp threads during the formation of each row of knots, and means for actuating the tuft yarn tubes twice for the formation of each row of knots.
 80 85

10. A loom for producing an oriental weave having Persian knots, comprising heddles for operating the ground warp threads in pairs, an intermittently-reciprocating lay having dents adapted to pass between the ground warp threads of a pair of ground warp threads, a set of tuft yarn tubes for carrying the pile threads and adapted to pass between the ground warp threads of the pairs of ground warp threads, a shogging device for alternately crossing and uncrossing the ground warp threads during the formation of each row of knots, and means for actuating the tuft yarn tubes twice for the formation of each row of knots and alternately with the said shogging device.
 90 95

11. A loom for producing an oriental weave having Persian knots, comprising heddles for operating the ground warp threads in pairs, an intermittently-reciprocating lay having dents adapted to pass between the ground warp threads of a pair of ground warp threads, a set of tuft yarn tubes for carrying the pile threads and adapted to pass between the ground warp threads of the pairs of ground warp threads, a shogging device for alternately crossing and uncrossing the ground warp threads during the formation of each row of knots, means for actuating the tuft yarn tubes twice for the formation of each row of knots and alternately with the said shogging device, and a cutting device for cutting the pile threads adjacent to the tuft yarn tubes and while the latter are at rest at one end of the last half stroke.
 100 105 110

12. A loom for producing an oriental weave having Persian knots, comprising a tuft yarn tube, means for imparting two full strokes to the tuft yarn tube to move the latter twice between the ground warp threads of a pair of ground warp threads during the formation of the knots, a shogging device for intermittently crossing and uncrossing the ground warp threads of a pair of ground warp threads and alternately relative to the movement of the tuft yarn tubes and during the formation of the knot, and a cutting device for cutting the pile thread adjacent to the tuft yarn tube and at the time the tuft yarn tube is at the end of its last half stroke.
 115 120 125

13. A loom for producing an oriental weave having Persian knots, comprising a tuft yarn tube, means for imparting two full strokes to the tuft yarn tube to move the latter twice between the ground warp threads of a pair of ground warp threads during the formation of the knots, a shogging device for intermittently crossing and uncrossing the ground warp threads of a pair of ground warp threads and alternately relative to the movement of the tuft yarn tube and during the formation of the knot, a cutting device for cutting the pile thread adjacent to the tuft yarn tube and at the time the tuft yarn tube is at the end of its last half stroke, heddles for operating the pair of ground warp threads, a shuttle mechanism for passing the weft through the open shed, and a lay for beating in the weft and knots.
 130 135 140

14. A loom for producing an oriental weave having Persian knots, comprising a tuft yarn tube means for imparting two full strokes to the tuft yarn tube to move the latter twice between the ground warp threads of a pair of ground warp threads during the formation of the knots, a shogging device for intermittently crossing and uncrossing the ground warp threads of a pair of ground warp threads and alternately relative to the movement of the tuft yarn tube and during the formation of the knot, a cutting device for cutting the pile thread adjacent to the tuft yarn tube and at the time the tuft yarn tube is at the end of its last half stroke, heddles for operating the pair of ground warp threads, a shuttle mechanism for passing the weft through the open shed, and a lay for beating in the weft and knots, the lay having dents adapted to pass between the ground warp threads.
 145 150 155

15. A loom for producing an oriental weave having

Persian knots, comprising a tuft yarn tube, means for imparting two full strokes to the tuft yarn tube to move the latter twice between the ground warp threads of a pair of ground warp threads during the formation of the knots,
5 a shogging device for intermittently crossing and uncrossing the ground warp threads of a pair of ground warp threads and alternately relative to the movement of the tuft yarn tube and during the formation of the knot, a cutting device for cutting the pile thread adjacent to the
10 tuft yarn tube and at the time the tuft yarn tube is at the end of the last half stroke, heddles for operating the pair

of ground warp threads, a shuttle mechanism for passing the weft through the open shed, a lay for beating in the weft and knots, the lay having dents adapted to pass between the ground warp threads, and means for intermittently reciprocating the said lay.

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

JAMES KARMI DALKRANIAN.

Witnesses:

THEO. G. HOSTER,

EVERARD B. MARSHALL.