L. L. SUMMERS.

FIBER CLEANING MACHINE.

APPLICATION FILED DEC. 9, 1907.

938,722.

Patented Nov. 2, 1909.

3 SHEETS—SHEET 1.

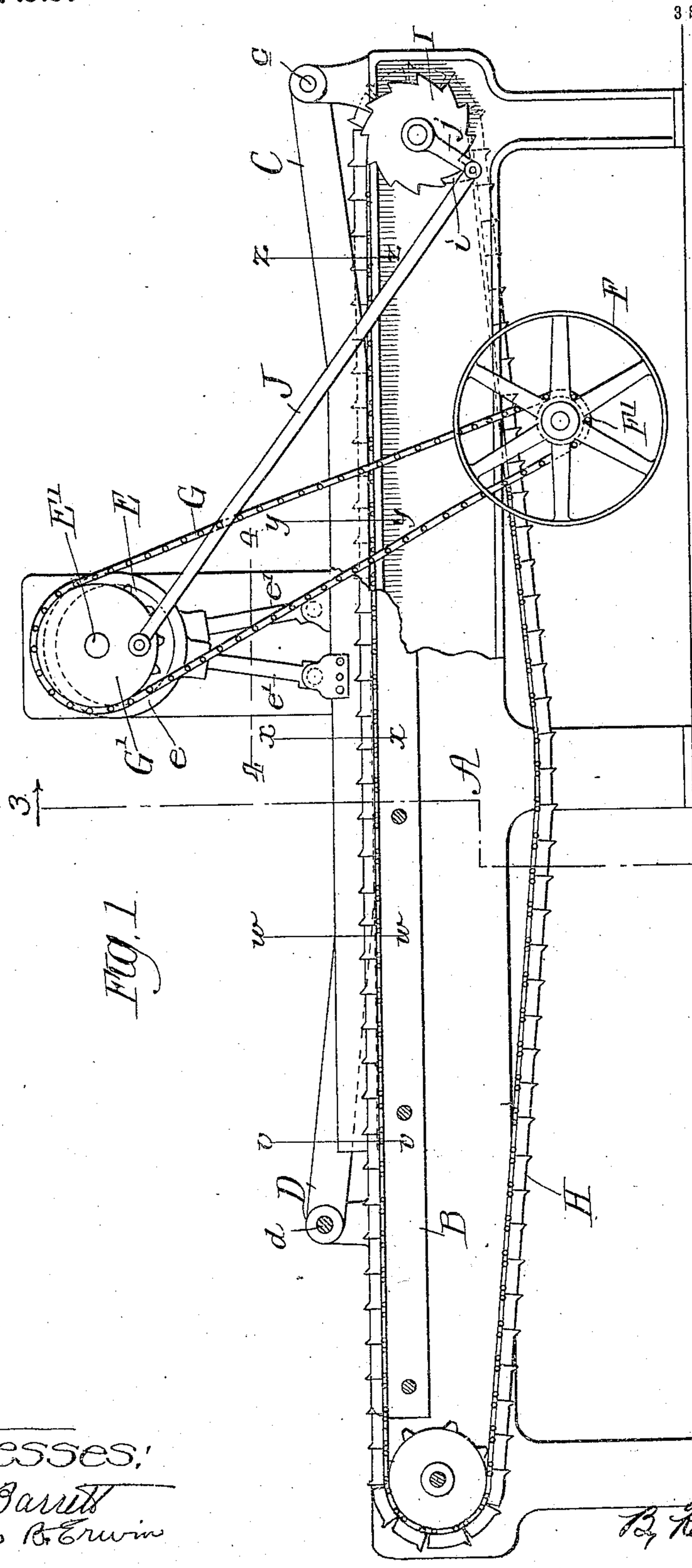

Fig. 1

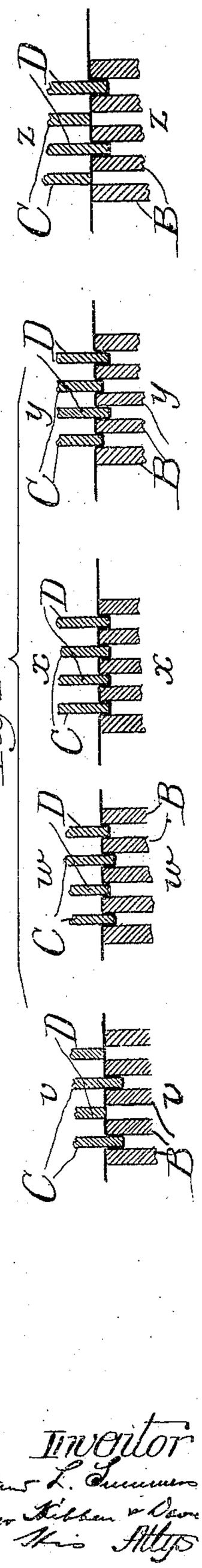

Fig. 2

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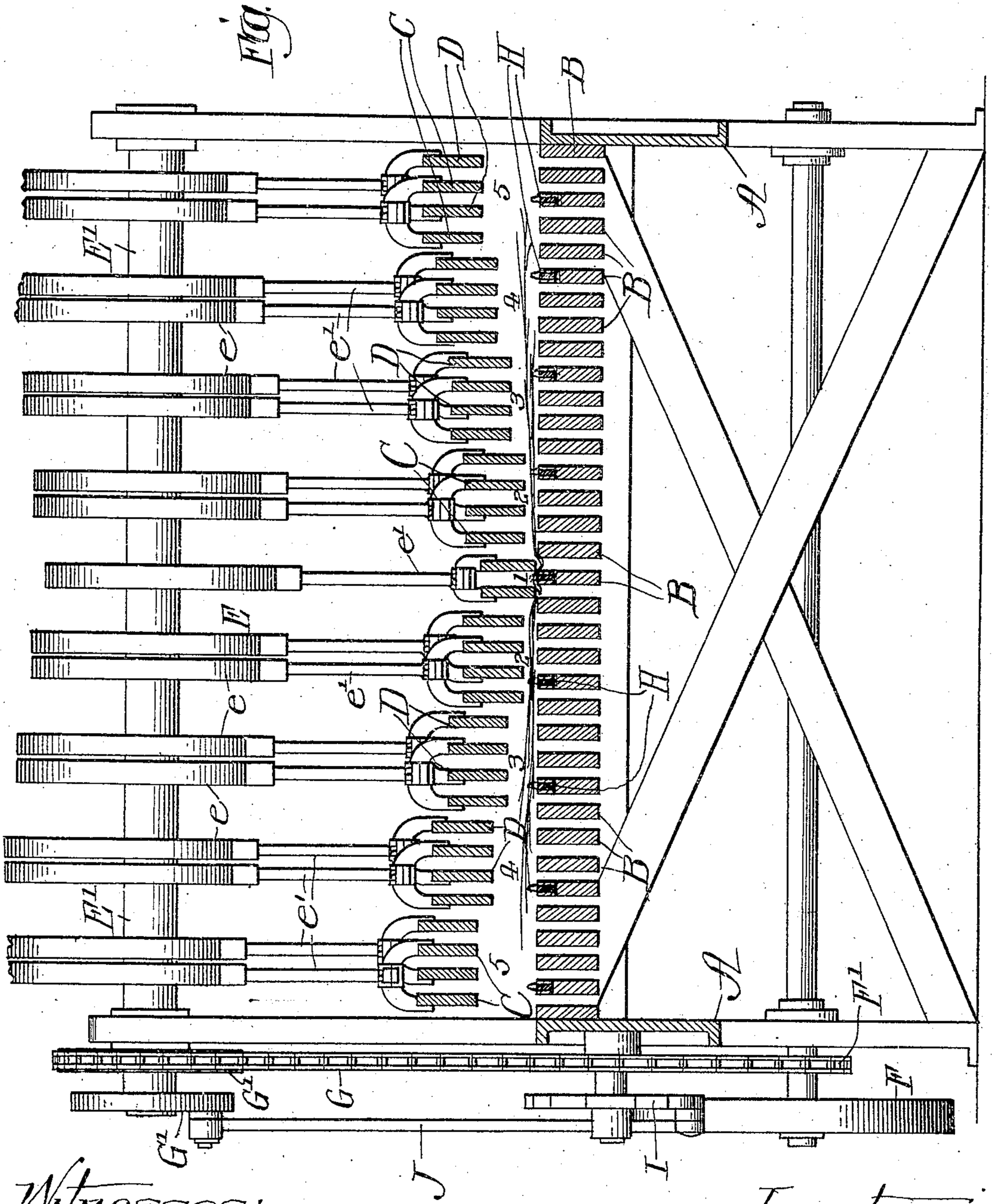
3 SHEETS—SHEET 2.

Fig. 3



Witnesses:

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3 SHEETS—SHEET 3.

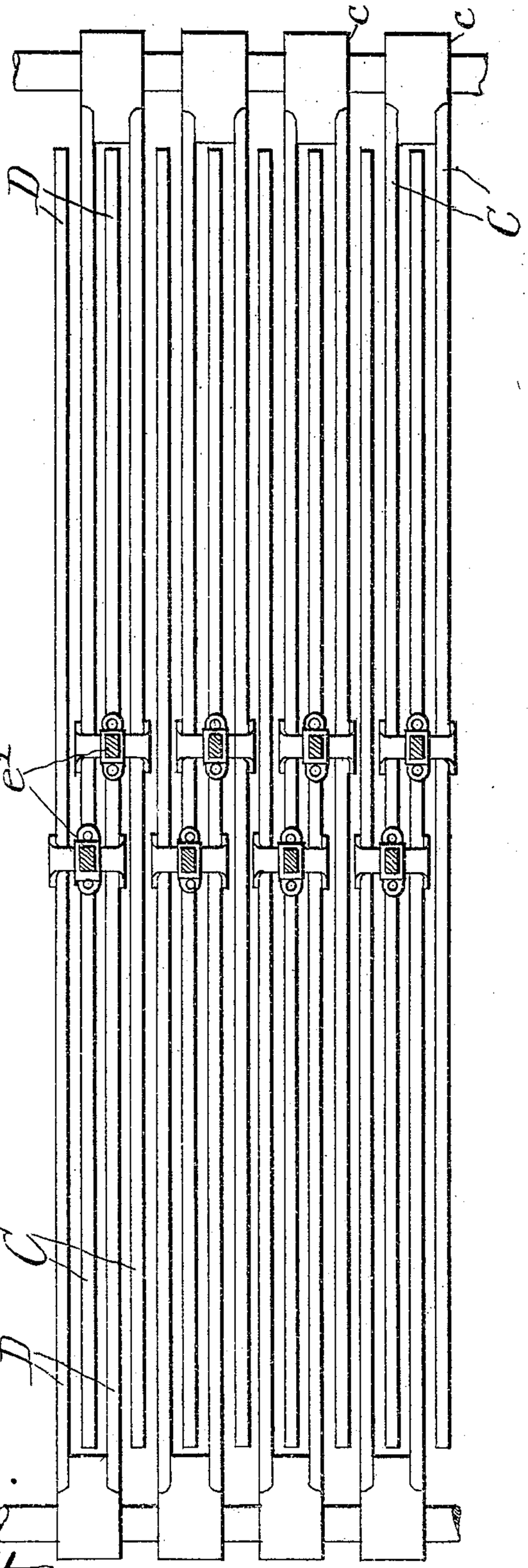

Fig. 4.

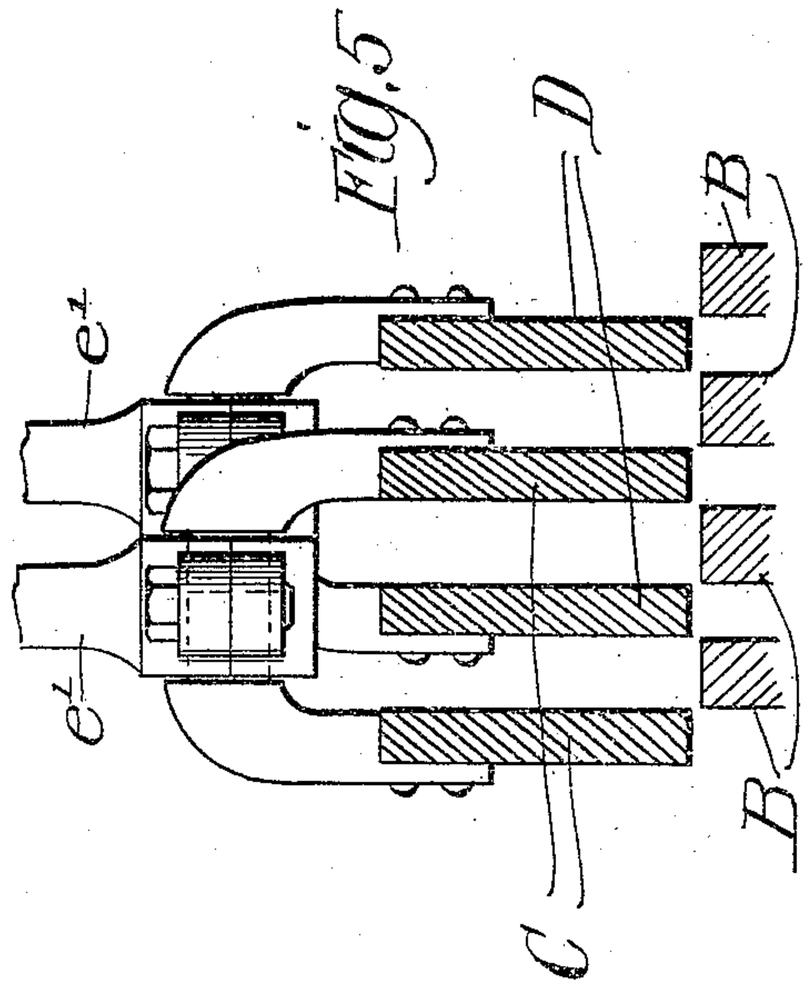

Fig. 5.

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UNITED STATES PATENT OFFICE.

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FIBER-CLEANING MACHINE.

938,722. Specification of Letters Patent. **Patented Nov. 2, 1909.**

Application filed December 9, 1907. Serial No. 405,821.

To all whom it may concern:

Be it known that I, LELAND L. SUMMERS, a citizen of the United States, residing at Chicago, Cook county, Illinois, have invented certain new and useful Improvements in Fiber-Cleaning Machines, of which the following is a specification.

My invention relates to the art of cleaning and preparing fiber, such as flax fiber, hemp fiber, etc., and has for its object the provision of a machine so constructed and operated as to separte the fiber from the woody materials of the stalk in an efficient and economical manner and without affecting or impairing in any way the strength of the fiber.

My invention is embodied in a flax cleaning machine of the type having breaking blades designed and adapted to break or beat the fiber by their depression upon and in coöperation with a fixed grid, and having also a conveyer system by means of which the fiber is successively moved forward or advanced, the fiber being preferably successively advanced during intervals between the blows of the breaking blades.

My invention relates more particularly to the construction and arrangement of these breaking blades whereby provision is made for a transverse movement of the fiber from the end thereof inwardly toward the center of middle line of the grid without any possibility of breaking or impairing the fiber, and a subsequent transverse movement of the fiber across the grid from one set of blades to the other, and to this end the breaking blades, which are placed side by side, are alternately pivoted at opposite ends. By preference, these breaking blades are arranged in sets of two pairs of blades each, the pairs of blades being pivoted at opposite ends.

In the drawings, Figure 1 is a side elevation of a machine embodying my invention; Fig. 2 is a series of sections on the lines *v v*, *w w*, *x x*, *y y*, *z z* of Fig. 1; Fig. 3 a sectional elevation on the line 3—3 of Fig. 1, but made on a somewhat larger scale; Fig. 4 a sectional plan view illustrating the arrangement of the sets of breaking blades, such view being a plan view of the breaking blades illustrated in Fig. 1, and the eccentric rods being shown in section on the line 4—4 of Fig. 1; Fig. 5 an enlarged detail view of one of the sets of four breaking blades such as illustrated in Fig. 2.

Referring to the present embodiment of my invention as illustrated in the drawings, I mount upon a suitable frame A a series of parallel bars B which, as herein shown, are in the form of a fixed grid. With this grid coöperates a series of breaking blades which are adapted to be depressed toward the grid and to enter slightly in the interstices in the grid, with the result that the fiber which is carried across the grid longitudinally of the machine is indented or convoluted so the the woody material of the stalk becomes broken and more or less disengaged from the fiber. These breaking blades are arranged in two sets or series, of which the series C are pivoted at their rearward or right hand ends to a fixed part of the machine at *c*, while the series of breaking blades D are pivoted at their forward or left hand ends to a fixed part of the machine at *d* (Fig. 1). Moreover, the members of the two sets or series of breaking blades are parallel and alternate with each other. Furthermore, these blades, instead of being straight, are slightly curved or angular, as shown in Fig. 1, the greater portion of their length being, however, horizontal and positioned in proximity to the grid. As clearly shown in Fig. 4, the breaking blades are connected at their outer ends in pairs and alternate with the members of the opposing pairs.

In order to operate the different sets of breaking blades at the proper time and to occasion the successive breaking action or blows from the center of the grid outwardly in opposite directions, I provide suitable mechanism for raising and lowering these blades at the proper time. According to the present illustrated construction, I employ for this purpose a series of eccentrics E which are mounted upon a shaft E^1 having suitable driving connections, as for instance the drive pulley F, sprocket wheel F^1, sprocket chain G and sprocket wheel G^1. These eccentrics which correspond in number to the number of pairs of breaking blades employed, have different angular positions or adjustments upon the shaft E^1 for producing the operation of the different breaking blades at the proper and desired times and in the proper order. Each ec-

centric is provided with an eccentric strap e and an eccentric rod e^1, which latter is connected at its lower end with its particular pair of breaking blades.

Referring to the illustrated construction of breaking blades in which the same are arranged in pairs, as hereinbefore described, the arrangement and timing of the eccentrics are such that the different sets of blades are caused to descend in succession beginning at the middle line of the grid and progressing outwardly in opposite directions to the opposite sides of such grid. In the present instance I have illustrated five different sets or groups of these blades, the innermost or middle set being marked 1 and the similar sets on opposite sides thereof being marked 2, 3, 4 and 5. Referring to Fig. 2, the set 1 descends first, followed by the two sets of blades marked 2, which in turn are followed by the two sets of blades 3 and so on, until the outermost set 5 act, with the result that the blades, which are here shown as 34 in number, descend successively in groups and at regular intervals. Inasmuch as the straw or fiber is fed longitudinally upon the upper surface of the grid, the same is longitudinally held or bound first by the set 1 and by the other sets of blades in regular succession, as just explained.

Upon the descent or depression of the innermost set of blades 1, the straw or fiber is rigidly held at its central portion and upon the descent of the sets of blades 2 the straw or fiber is drawn from its outer or free portion and clamped thereby. Upon the descent of the sets of blades 3, a further inward movement of the fiber is effected and this inward movement thereof continues in succession until the descent of the blades 5. If the sets of blades were pivoted on the same end, there would be a tendency to bind the fiber between the four blades of the same set. This is prevented by the fact that in each set of four blades two of the blades are pivoted at one end as at c' and two of them at the other end as at d', as clearly indicated in Figs. 1 and 4. Moreover, owing to the described location of the pivots and the shape of the blades a further effect in the cleaning of the fiber is accomplished, for on the first descent of the blades only the blades C engage the straw or fiber, the blades D being out of contact by reason of the shape of the blades and location of the pivot. The straw is thus forced into the spaces in the fixed grid and convoluted and indented only by the blades C, the woody portion of the straw being broken and crushed by the blades in contact with the grid. As the straw or fiber is further advanced by the conveyer mechanism hereinafter described the blades D begin to engage the straw or fiber, at first slightly and then entirely, as the blades C having diminished their effect on the straw are out of contact with the straw.

The blades D engage the straw at first slightly and later the entire convoluting and indenting of the straw is done by the blades D, the blades C being entirely out of contact. The breaking effect is thereby transferred from the blades C to the blades D as the convolution or indentation given the straw first by the blades C has been transferred from the space occupied by the blades C to the space occupied by the blades D, the effect has been to cause a transverse movement of the fiber across the grid. This transverse movement of the fiber by the transfer in the breaking from one set of blades to the other, is illustrated diagrammatically in the Fig. 2. In the cross-section v v the fiber has been convoluted by the blades C, the blades D being entirely out of depressing contact. At the point w—w the blades D begin to engage the fiber slightly. As the fiber is approaching the pivot C′ and receding from the pivot d' the natural effect is to diminish the stroke or depression of the blades C, and increase the stroke or depression of the blades D. At the point x—x the motion of these blades will be equal, as the distance from the pivots is practically equal. At the cross-section y—y the breaking effect of the blades C is greatly diminished, while that of the blades D has increased. At the cross-section z—z the blades C have ceased to engage the fiber, while the breaking effect from the blades D is at a maximum, due to the stroke or depression of the blades D being at a maximum by reason of the location of the pivot d', in other words, while the action of the different sets of breaking blades is what may be termed successive, the effect thereof is overlapping in its character. In this manner the contact with the straw or fiber and the breaking effect is transferred from the spaces in the grid occupied by one set of blades to the spaces occupied by the other set of blades, the effect being to cause a greatly increased transverse motion of the fiber across the surface of the grid, and to increase the breaking or cleaning effect. In order to augment this effect, the blades C and D are alternated on the grid as shown more particularly in Fig. 3 and to further augment this transverse movement of the fiber and to facilitate the described action, the blades C may be made to descend slightly in advance of the blades D, by proper timing adjustment of the eccentrics, so that the fiber may be engaged by blades C still further in advance of being clamped by the blades D. Moreover, the various blades of the set may also be of slightly different shape or be cut away or notched so that the time of engaging the fiber or method of engaging may be varied as is well known in the art.

The machine is provided with a conveyer which may be of any of the types well known in the art for conveying the straw longitudinally of the machine. In the present instance as shown in Fig. 1 I employ a conveyer H driven at one end by means of a ratchet I, the pawl *i* of which is actuated from the main shaft E′ which carries the eccentrics through the medium of the connecting rod J connected at its upper end with the sprocket wheel G′ and at its lower end to a crank arm *j* on whose outer end said pawl is pivotally mounted. In this manner the conveyer chain *h* may be moved forward during the interval when the eccentrics have lifted the breaking plates out of contact with the grid.

I claim:

1. In a fiber cleaning machine having a fixed grid, two sets of movable blades pivoted at opposite ends and alternately placed side by side along the grid producing a transverse movement of the fiber, and means for actuating the blades; substantially as described.

2. In a fiber cleaning machine, the combination of a fixed grid, a series of breaking blades arranged to coöperate therewith and alternately pivoted at opposite ends, and means for actuating said blades successively from the center of the grid outwardly in opposite directions; substantially as described.

3. In a fiber cleaning machine, the combination, with a fixed grid, of sets of blades arranged to coöperate therewith and to thereby indent or convolute the fiber on the grid, said blades being alternately pivoted at opposite ends and arranged parallel to each other, and means for actuating the sets of blades separately and causing a set of blades to engage the fiber before the blades of the precedingly acting set have become disengaged from the fiber; substantially as described.

4. In a fiber cleaning machine, the combination of a fixed grid, a series of breaking blades arranged to coöperate therewith and alternately pivoted at opposite ends, and a series of differently timed eccentrics operatively connected with the blades and arranged to actuate the middle blades first and the others successively thereafter from the middle outward; substantially as described.

5. In a fiber cleaning machine, the combination of a fixed grid, a series of breaking blades arranged to coöperate therewith and alternately pivoted at opposite ends, said blades being angular and parallel to each other, and means for depressing the blades toward the grid in succession beginning at the middle and progressing outwardly, thereby causing a horizontal and transverse movement of the fiber; substantially as described.

6. In a fiber cleaning machine, the combination of a fixed grid, a series of breaking blades arranged to coöperate therewith and alternately pivoted at opposite ends, said blades being arranged in sets of two pairs of blades each, the different pairs of blades being pivoted at opposite ends, and means for actuating said blades; substantially as described.

7. In a fiber cleaning machine, the combination of a fixed grid, a series of breaking blades arranged to coöperate therewith and alternately pivoted at opposite ends, said blades being arranged in sets of two pairs of blades each, the different pairs of blades being pivoted at opposite ends, and means for actuating said blades comprising eccentrics and eccentric rods connected with their respective pairs of blades; substantially as described.

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Witnesses:
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