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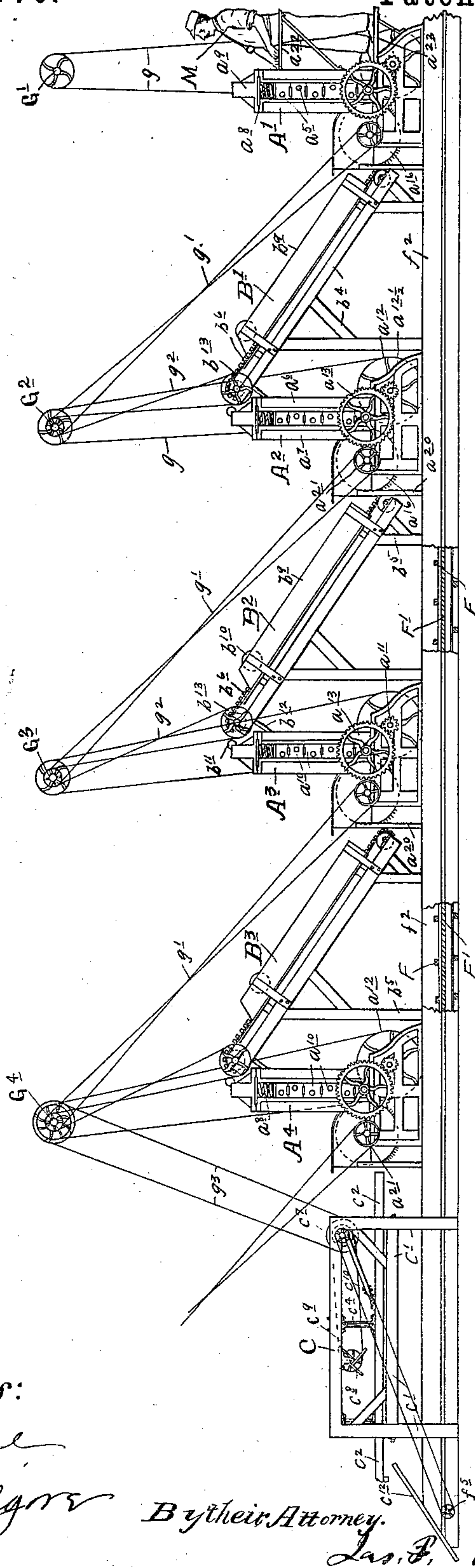
3 Sheets—Sheet 1.

C. E. LYMAN & G. N. LYMAN, Jr. .
FLAX WORKING MECHANISM.

No. 542,770.

Patented July 16, 1895.

Fig. 1.



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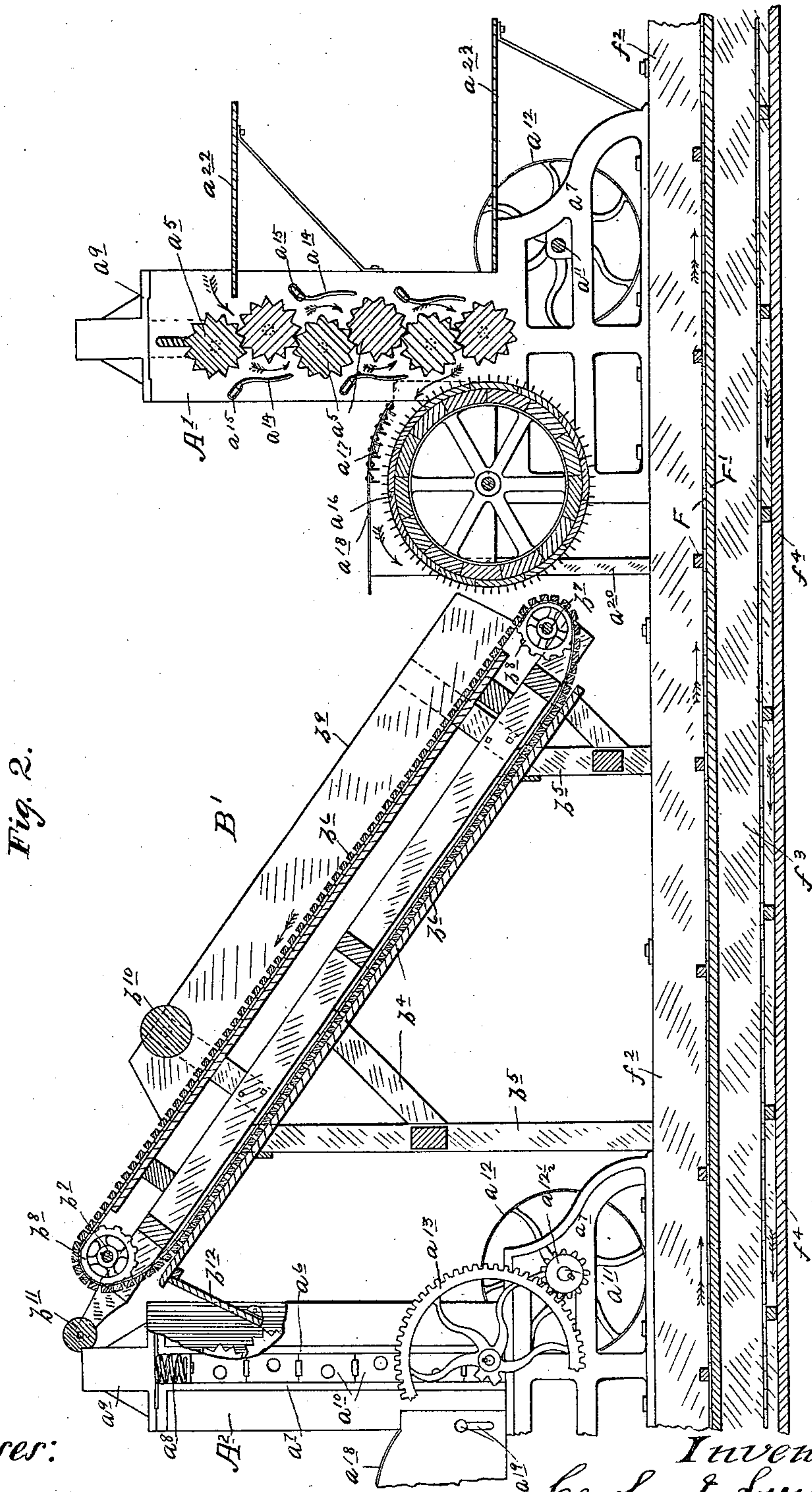
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No. 542,770.

Patented July 16, 1895.



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3 Sheets—Sheet 3.

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Fig. 3.

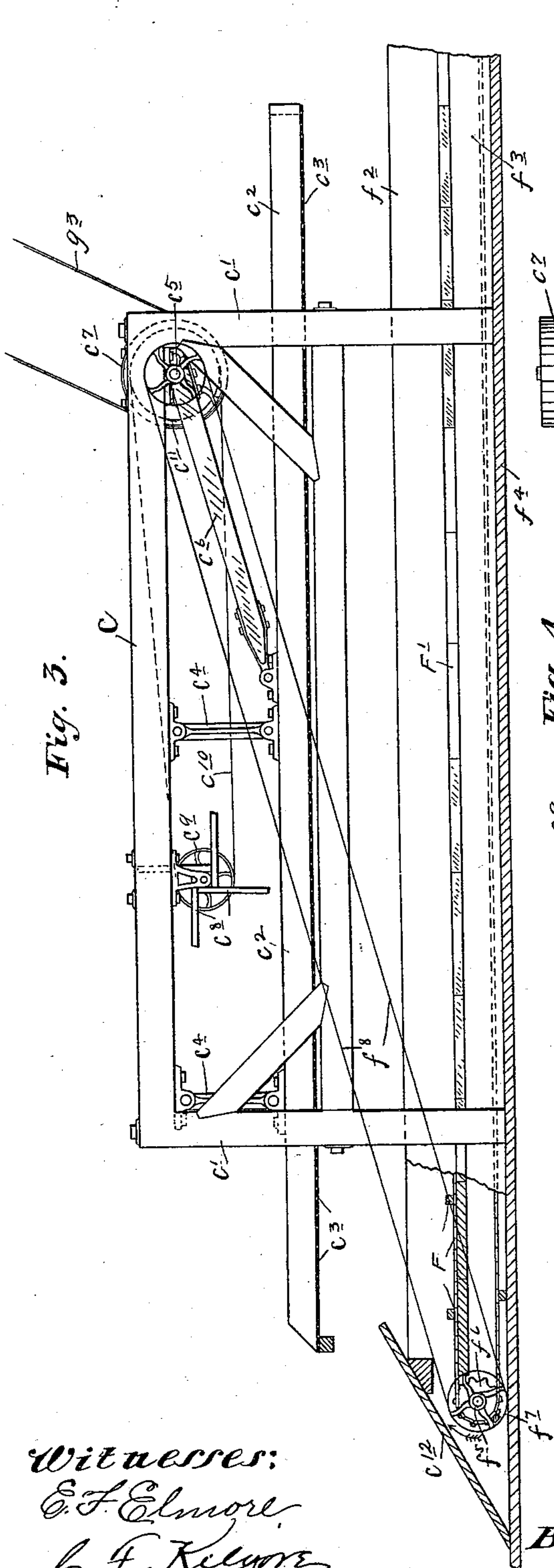
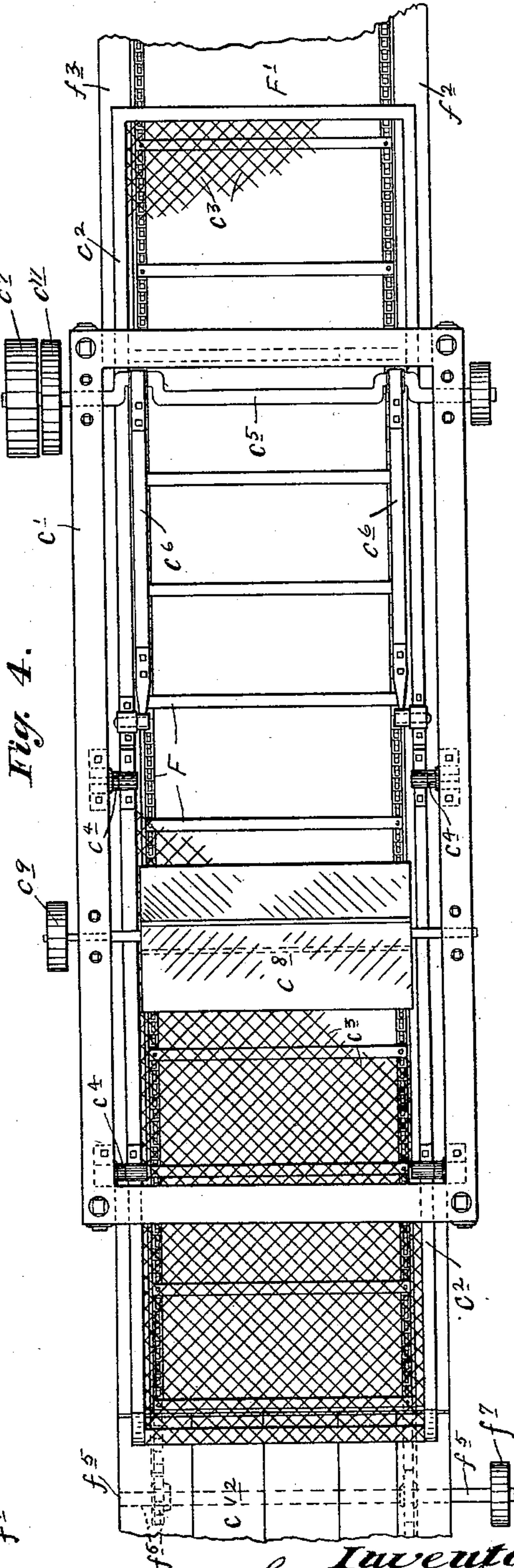


Fig. 4.



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UNITED STATES PATENT OFFICE

CEYLON E. LYMAN AND GEORGE N. LYMAN, JR., OF MINNEAPOLIS,
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FLAX-WORKING MECHANISM.

SPECIFICATION forming part of Letters Patent No. 542,770, dated July 16, 1895.

Application filed February 23, 1895. Serial No. 539,440. (No model.)

To all whom it may concern:

Be it known that we, CEYLON E. LYMAN and GEORGE N. LYMAN, Jr., citizens of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Flax-Working Mechanisms; and we do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

Our invention relates to mechanism for working flax or other fiber-bearing material, such as hemp, sisal, &c., with a view of separating the fiber from the shive or woody matter of the flax, straw, or other stock.

The invention involves as its chief feature the organization of a series of machines or mechanisms into a plant capable of automatic and efficient action at comparative small cost.

Other features relate to certain details of construction for improving the action of some parts of the mechanism on the stock.

The several novel features of our invention will appear from the following description, and be defined in the claims.

The accompanying drawings illustrate the invention. Therein like letters refer to like parts.

Figure 1 is a left-side elevation of our improved mechanism with some parts broken away and others removed. Fig. 2 is a view chiefly in longitudinal vertical section but partly in left-side elevation, showing the construction and relation of one pair of the series of combined brakes and pickers and one of the intervening separating conveyers for receiving from the forward and delivering to the rearward member of said combined brakes and pickers. Fig. 3 is a left-side elevation of the cleaner shown as the foot member or last member of the series of machines, to the action of which the stock is subjected in the plant illustrated in Fig. 1, some parts being broken away. Fig. 4 is a plan view of the said cleaner with some parts broken away.

Referring to Fig. 1, $A^1 A^2 A^3 A^4$ represent a series of combined brakes and pickers set tandem and spaced apart from each other. $B^1 B^2 B^3$ represent a corresponding series of separating-conveyers, arranged one between each pair of said combined brakes and pick-

ers and receiving from the forward and delivering to the rearward member thereof.

C is a cleaner to which the stock is subjected, as the last step of the process, after passing from the combined brake and picker A^4 .

F is an endless carrier under-running the entire series of the above-noted machines, and working over a deck F' , for receiving the shive or woody matter from all of the said machines and conducting the same away to any point desired, such, for example, as to the furnace-room, (not shown,) for use as fuel.

$G^1 G^2 G^3 G^4$ are a series of constantly-running counter-shafts from which, through suitable driving-belts, motion is imparted to the several machines of the plant.

The several combined brakes and pickers are all of the same construction, so far as the operative mechanism is concerned, and each involve a brake and a picker or hackle. The brake is made up of a stack or series of steepled and staggered rollers a^5 , journaled in suitable boxes, loosely mounted for sliding movement in vertical guideways in the side plates of the frame $a^6 a^7$ and subject to spring-pressure from springs a^8 , reacting between the top yoke a^9 of the frame and the top member of the series of rollers a^5 . The rollers are fluted and so set in their respective boxes a^{10} as to be staggered, and the said boxes are of such size as to permit the flutes or teeth of the one roller to nearly reach, but not quite touch, the bottom of the groove in its co-operating roller, so as to operate without cutting the fiber. A shaft a^{11} has a pulley a^{12} at its right end connected by belt g with the proper counter-shaft for that machine. The left end of the shaft a^{11} has a pinion $a^{12\frac{1}{2}}$ engaging a gear-wheel a^{13} on the left end of the lowermost member of the fluted braking-rollers a^5 . These connections give motion to the whole series of the rollers a^5 in the proper directions. The stock is fed in between the top pair of said rollers a^5 and pursues a zigzag course from the top to the bottom of the series, as shown by the arrows in Fig. 2, and is guided or changed in direction as required by the deflectors or guides a^{14} . The said deflectors or guides a^{14} are pivoted in angular slots a^{15} , as shown in Fig. 2, which permits the same both to swing and slide outward when required to afford clearance for the passage of

the stock and prevent clogging from tangled masses or bunches thereof. As the stock leaves the lowermost pair of said braking-rollers a^5 it is received by the hackle or picker drum a^{16} , with which co-operates a concave comb a^{17} in the overarching hood a^{18} . The hood or cover a^{18} is connected to the frame by slot-and-pin connections a^{19} , as shown in Fig. 2, and has legs a^{20} , which loosely support the same when in its lowermost position, which construction permits the hood to rise, if necessary, to afford clearance for the passage of any excess or tangled masses of stock. The picker-drum a^{16} has on its left end a pulley a^{21} , connected by cross-belt g' with the next rearward member of the counter-shafts $G^2 G^3$, &c., for imparting motion to the drum in the direction shown by the arrow in Fig. 2. The machine-frame $a^6 a^7$ is bolted or otherwise made fast to a pair of longitudinal sleepers f^2 , which rest directly over the underlying or ground-sills f^3 . The said pairs of sills f^2 and f^3 are spaced apart from each other and form a trough for the shive-carrier F. The deck F' for the shive-carrier F is shown as secured between the upper and lower pairs of the said longitudinal sills f^2 and f^3 . The bottom sills f^3 rest on the floor f^4 , and the floor is thereby made to serve as a return deck or guide for the return fold or section of the shive-carrier F.

Each of the separating-conveyers $B' B^2 B^3$ consists of a suitable frame $b^4 b^5$, supported from the sills f^2 , or otherwise, in an angular or inclined position, an endless carrier b^6 of the slat-and-chain variety, with the slats spaced apart short distances only, carrier-shafts b^7 with sprockets b^8 engaged by the chains of the carrier, side boards b^9 fixed to the frame with an idle roller b^{10} near the upper end of the same, an idle roller b^{11} on the upper end of the frame beyond the carrier-shaft b^7 , a chute-board b^{12} , and a pulley b^{13} , connected by belt g^2 to the counter-shaft adjacent thereto. The head member of the series of combined brakes and pickers is provided with a feed-board a^{22} and a foot-board a^{23} for an operator M, as shown in Figs. 1 and 2.

The cleaner C has mounted thereon, within the skeleton-frame c' , a screen-frame c^2 with wire screen c^3 of large mesh. The screen-frame c^2 is connected to the main frame c' by hangers c^4 . At the head of the cleaner-frame is located a crank-shaft c^5 , the cranks of which are connected by pitmen c^6 with the screen-frame c^2 . The crank-shaft c^5 is provided with a pulley c^7 , which is connected by belt g^3 with the adjacent counter-shaft. The cleaner is also provided with a combined fan and beater c^8 , supported directly over the screen $c^2 c^3$, and having a pulley c^9 on its shaft for imparting motion thereto from the crank-shaft c^5 through a belt c^{10} , connecting the same with the inside pulley c^{11} on the shaft c^5 . A chute-board c^{12} is shown for directing the stock delivered from the screen to the floor or other point desired. The under-running

shive-carrier F is mounted on suitable shafts, one of which is shown at f^5 in Figs. 1, 3, and 4. Said shaft f^5 is shown as provided with sprockets f^6 , engaging the chains of the said carrier F and as having a pulley f^7 , connected by belt f^8 to a pulley on the left end of the crank-shaft c^5 of the cleaner, which connections will impart motion for moving the shive-carrier F in the direction shown by the arrows. The said shive-carrier F has been thus shown as driven from the crank-shaft c^5 of the cleaner, simply as a matter of convenience for illustration; but in practice the said carrier F is ordinarily driven from the other end by a belt from the line-shaft. (Not shown.)

Having regard to the action of the mechanism above described, the same may be briefly stated, as follows: The flax straw or other fiber-bearing material is hand-fed by an operator M to the head member A' of the combined brakes and pickers. All the subsequent actions are automatic. The stock, for example, as it passes from the head machine A' is received by the separating-conveyer B' and delivered by the endless carrier b^6 thereof to the top pair of rollers of the next rearward combined brake and picker A^2 . From A^2 the stock is received by the conveyer B^2 and delivered to the machine A^3 , and so on to the last or rearmost member of the said combined brakes and pickers, whence the stock passes to the cleaner C. Under the action of the fluted brake-rollers a^5 the woody matter of the straw is broken up and more or less set free from the fiber by the crushing and rubbing action of the said rollers. By the picker or hackle-drum a^{16} , in combination with the overarching concave cone a^{17} , the woody matter and the fiber are loosened up and separated and the fiber combed out to a greater or less extent. Under the action of the endless carriers b^6 of the conveyers B' the woody matter which was broken up by the brakes and pickers, but left lodged in the fiber, together with the dust and dirt, will fall out and pass down through the slats of the carrier. In this way, by the successive actions of the several machines, by the time the stock reaches the cleaner C the shive or woody matter will have become thoroughly broken up and loosened from the fiber and most of the same will have been removed and dropped on to the shive-carrier F. Considerable finely-divided woody matter or shive, together with more or less dust, sand, and dirt will still remain with the fiber when the stock reaches the cleaner C. Under the action of the cleaner this loose foreign material will be removed and the fiber will be delivered in its finished state over the end of the screen ready for baling and shipping. In the cleaner the stock is subject to the shaking action of the screen and the beating-and-blast action of the fan, which combined actions are very effective for the purposes had in view.

Inasmuch as the shive-carrier F under-runs

all of the said machines above noted the woody matter or stock removed from the fiber by the said machines in their action on the straw or stock will all fall on to the said carrier F and be conducted off to the furnace or other point desired.

From the foregoing description it will be seen that only one man is required for feeding the entire plant, or, as above stated, the feed after the head machine is automatic. This is a great improvement in mechanisms for working flax straw or other similar material. Hitherto, so far as we are aware, the different machines to which the stock has been subjected in succession have always been hand-fed, thereby requiring the stock to be rehandled at every machine with the extra expense of one or more men for each machine. Our mechanism, as above arranged, will therefore effect a saving of at least four men, even supposing that the men would handle the stock as rapidly as the automatic feed devices. As a matter of fact, however, the automatic feed devices will handle the stock more rapidly on account of their uniform and continuous action. Hence, if the head machine of the plant be fed up to its full capacity, which may be insured by the use of two or more operators, if necessary, all the other machines will keep up therewith without being subject to the delays incidental to the intermittent or irregular hand-feeding action. Moreover, this form of mechanism insures better results in point of quality. All the stock is subjected to exactly the same kind and extent of treatment. Hence, supposing the straw to be of the same kind and in the same condition, the grades of the finished product will run uniform and the quantity of finished product for a ton or other unit of straw will be nearly the same. Under the hand-feeding actions hitherto employed for the successive machines this result of uniform grade and uniform quantity cannot be secured, because the different feeders will handle the stock differently and will vary the percentage of waste.

We have shown a mechanism with four combined brakes and pickers, with the necessary intermediate feeding and cleaning conveyers, and a single final cleaner; but it will be understood, of course, that the number of the said machines may be varied according to the kind or condition of straw to be worked or according to the grade of finished product desired. The number of machines shown will produce tow of the highest grade required for upholstering. For some other grades of tow two or three combined brakes and pickers are sufficient.

The form of brake herein shown composed of a stack of steepled and staggered fluted rollers is similar to the machine disclosed in the McGrath and Smith patent, No. 456,156, of date July 21, 1891, entitled "Fiber-Separating Machine," but differs from the said McGrath and Smith machine in the arrangement of the picker or hackle drum in the ad-

dition of the concave overarching comb for co-operation with said drum, and in certain other details relating to the mounting of the guides a^{14} and the hood a^{18} .

The mechanism herein shown and described, however, and the other features defined in the annexed claims are of our invention.

What we claim, and desire to secure by Letters Patent of the United States, is as follows:

1. A mechanism for working flax straw or other material, comprising a series of combined brakes and pickers, each having steepled and staggered fluted rollers, and a picker or hackle drum with cooperating concave or comb receiving from said rollers, a series of separating conveyers, located one between each of said combined brakes and pickers and having endless carriers receiving from the foot of the advance member and delivering to the top of the rearward member thereof, a cleaner receiving from the last member of said combined brakes and pickers, and an endless carrier under-running all of said machines, for receiving and conducting off the shive dropped from said machines, substantially as described.

2. A mechanism for working flax straw or other material, comprising a series of combined brakes and pickers, each having a stack of steepled and staggered fluted rollers and a picker or hackle drum with co-operating concave or comb receiving from said rollers, a series of separating conveyers, located one between each pair of said combined brakes and pickers and having endless carriers receiving from the foot of the advanced member and delivering to the top of the rearward member thereof, a cleaner, provided with a shaking screen and a beater fan, receiving from the last member of said combined brakes and pickers, and an endless carrier under-running all of said machines, for receiving and conducting off the shive dropped from said machines, substantially as described.

3. In a brake, for flax or other material, the combination with the series or stack of steepled and staggered and fluted rollers a^5 , of the guides a^{14} pivoted in the angular slots a^{15} , whereby the said guides will both swing on their pivots and move bodily outward, to afford clearance to the stock, when necessary, to avoid clogging, substantially as described.

4. In a combined brake and picker, the combination with the picker drum a^{16} , of the hood a^{18} , having therein the toothed concave or comb a^{17} , and having slot and pin connection a^{19} , for permitting the hood to rise on a straight line under the pressure of the stock, when necessary, to afford clearance, substantially as described.

In testimony whereof we affix our signatures in presence of two witnesses.

CEYLON E. LYMAN.

GEORGE N. LYMAN, JR.

Witnesses:

JAS. F. WILLIAMSON,

F. D. MERCHANT.