(No Model.) 2 Sheets—Sheet 1.

J. McGRATH & G. Y. SMITH.

FIBER SEPARATING MACHINE.

No. 456,156. Patented July 21, 1891.

Fig. 1.

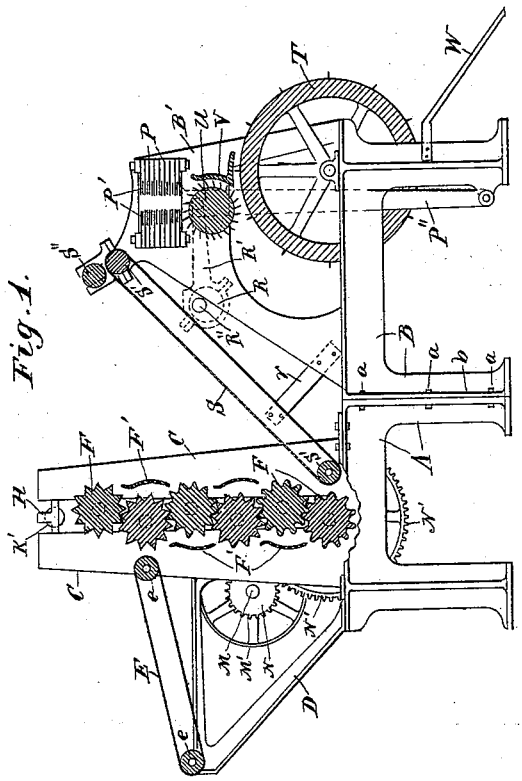
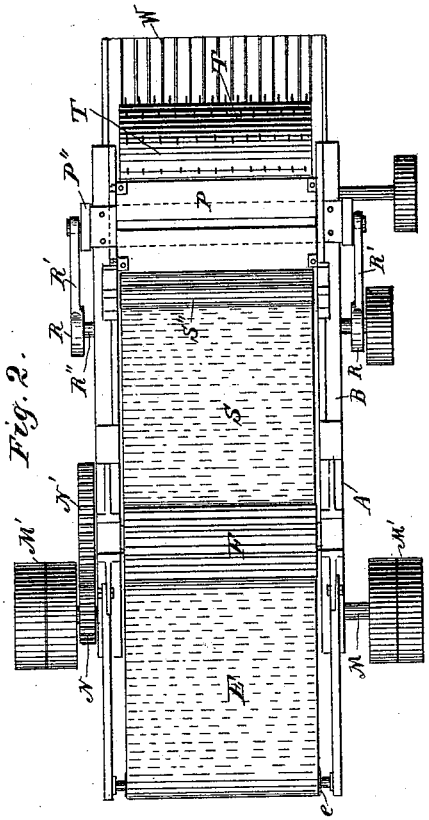


Fig. 2.



Witnesses.
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Frank D. Merchant.

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(No Model.) 2 Sheets—Sheet 2.

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Fig. 3.

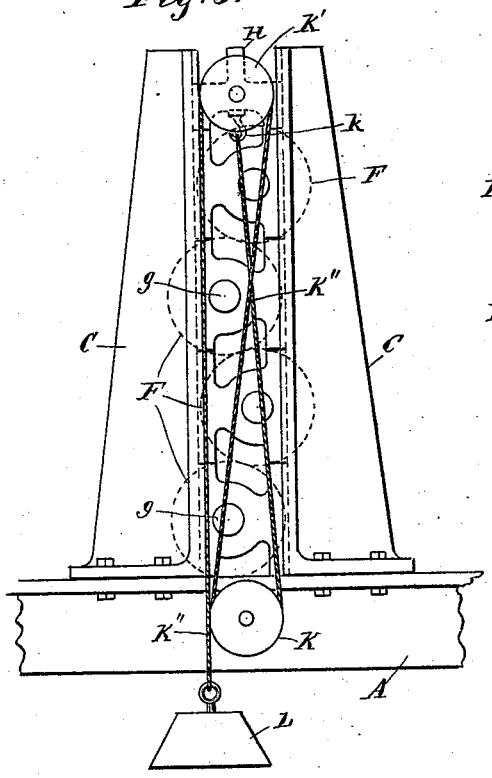


Fig. 4.

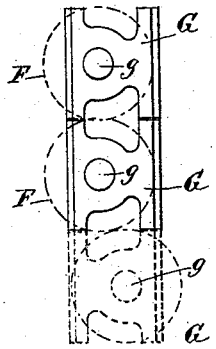
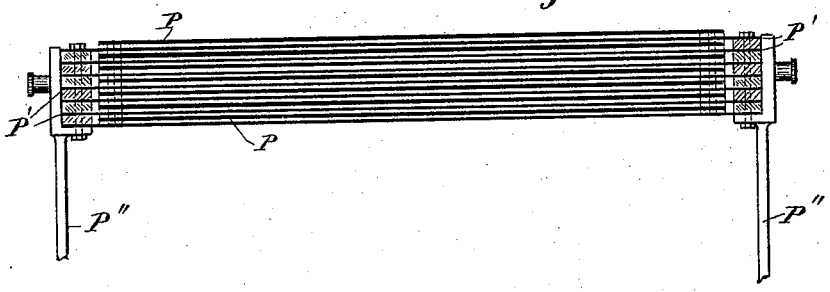


Fig. 5.



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UNITED STATES PATENT OFFICE.

JOHN McGRATH AND GEORGE Y. SMITH, OF MINNEAPOLIS, MINNESOTA, ASSIGNORS TO GEORGE N. LYMAN, SR., OF SAME PLACE.

FIBER-SEPARATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 456,156, dated July 21, 1891.

Application filed February 19, 1891. Serial No. 382,089. (No model.)

To all whom it may concern:

Be it known that we, JOHN McGRATH, a citizen of Great Britain, and GEORGE Y. SMITH, a citizen of the United States, residing at Minneapolis, in the county of Hennepin and State of Minnesota, have invented certain new and useful Improvements in Fiber-Separating Machines; 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.

This invention relates to fiber-separating mechanism, and has for its object to provide an efficient machine for the working of fibrous straw—such as flax, hemp, sisal, or other fibrous plants—regardless of its condition, whether of high or low grade, long or short, straight or tangled. To this end we conjoin with suitable feeding devices a set of staggered steepled breaking-rollers under yielding pressure and having fluted surfaces, through which the material is first passed for the removal of the coarser shive or woody matter, a set of crimping-blades adapted to receive the fibrous matter after it has been reduced to sheet-like form comparatively free of the coarser shive and subject the same to crimping and rubbing actions, and a hackling-drum in co-operation with a pinned feed-wheel and shell for combing out the woody matter and delivering the fiber separated therefrom. The steepled rollers and their feeding and driving mechanism and the crimping-blades and drum with their feeding and driving mechanism are supported from the separate sections of a two-part or divisible frame, which construction permits the two sets of mechanism to be separated and spaced apart to give room for an attendant to work between the two, if so desired, as may be the case with some classes of stock. The steepled rollers are provided with journal-boxes, the journal-seats of which are located eccentrically to the center of the box. Hence when the boxes are placed in their supporting-guides with their eccentric seats in alternate relation to each other it brings the rollers into staggered positions, while by simply reversing every alternate box they may, if so desired, be brought into a true vertical line. The rollers are so held by their boxes that the teeth or flutes of one roller just reach to but do not quite touch the bottom of the space between the teeth of its co-operating roller, which avoids the cutting of the fiber common to most other rollers. The journal-bearings being loosely mounted in their guides, one over the other, are free to move therein. There is, therefore, an increasing pressure due to the accumulated weight of the successive rollers from the top or uppermost of the series to the bottom or lowermost of the same; also, in virtue of the steepled and staggered arrangement of the rollers in loose bearings, there is a rubbing action upon the stock by the flutes of the rollers.

The machine is illustrated in the accompanying drawings, wherein like letters refer to like parts throughout.

Figure 1 is a longitudinal sectional elevation of the entire machine, the bed of the frame being shown in side elevation. Fig. 2 is a plan of the same. Fig. 3 is a side elevation of the steepled rollers and the pressure-delivering device detached. Fig. 4 is a detail in end elevation, showing the boxes detached; and Fig. 5 is a front or rear elevation of the crimping-blades detached.

A B are the two sections composing the divisible or separable bed of the frame-work detachably connected by bolts *a* through lateral flanges *b*.

C are the guide-plates secured to the bed-section A for the steepled rollers and the pressure-bar.

D is a forwardly-projecting bracket for supporting the outer end of the feed-table.

E is the endless-carrier feed-table, preferably of cloth, mounted on the rollers *e*, journaled in the frame-work.

F are the steepled rollers mounted in the guide C.

F′ are the shell-guides located in alternate arrangement on the delivery sides of the rollers.

G are the journal-boxes, having the eccentrically-located seats *g*.

H is the pressure-bar in the guides C above the top roller.

K K′ *k* K″ L is one of the pressure-delivering devices, consisting of a block and

tackle suspending a weight at the outer or free end of its cable. The cable K″ is attached to the under side of the pressure-bar by the hook *k*, passes down over the shive or pulley K, secured to the frame or other fixed base of resistance below the lowest roller, and then back up over the pulley K′ on the pressure-bar and down to its weight L. A pressure-delivering device of this kind is attached to each end of the pressure-bar, which affords an even or uniform pressure, while allowing the rollers to yield or separate to adapt themselves to the quantity of the stock.

M is the driving-shaft, provided with pulleys M′, and N N′ are a train of gears for communicating motion to the steepled rollers.

P P′ are the crimping-blades, the fixed set of which P are secured in the side brackets B′, projecting from the bed of the frame, and the movable set of which P′ are secured to the upper ends of rocking levers P″, to which a reciprocating motion is imparted by an eccentric and eccentric-rod R and R′ on a shaft R″. Each set of these blades consists of two tiers, arranged on the opposite side of a common central space through which the stock is passed. The movable blades alternate with the fixed blades, and the sets of blades are so constructed as to give an increase in crimp in the direction of the travel of the stock for affording a positive feed. This may be done by increasing the breadth of one or both sets of the blades. As shown, the sword-head or rocking levers P″, to which the movable blades are attached, are located outside the brackets B′, which are cut away to permit the outward passage of the blades.

S is an endless carrier mounted on the rollers S′ for receiving the material from the steepled rollers or an attendant and delivering the same to the crimping-blades in co-operation with the delivering-roller S″.

T is the hackling-drum journaled on the rear end of the bed-frame B. The crimping-blades and hackling-drum are spaced apart from each other, and between the two are placed the pinned feed-wheel U and the sharp angled shell V. The lower or outer end of the skeleton frame supporting the feeding-cloth rollers S′ may be held by a brace *r* from the bed-section B, so as to be independent from the section A.

The operation is as follows: The material is spread on the feeding-cloth E, by which it is supplied to the upper pair of fluted rollers F, whence it passes back between the second and third rollers, and so on, in a zigzag course to the elevating-carrier S. In the passage through these breaking-rollers most of the woody stock will have been broken up and removed and the fibrous matter will have been reduced into sheet-like form. The stock is then carried upward by the carrier S, by which, with the delivering-roller S″, it is supplied in an even sheet to the crimping-blades. These subject the same to a crimping and rubbing action, which pulverizes the woody stock and softens up the fiber. Thence the fibrous matter is fed forward by the pinned wheel and angular shell to the hackling-drum, which scrapes the same over the angle of the shell and combs out the remaining shive, delivering the separated fiber over the grating W at the end of the machine through which the dust and woody matter pass to the floor.

Although capable of general application, this machine was especially designed for working short flax—such as the machine-cut flax grown in the United States—and is well adapted to handling the same, whether the flax be in a straight or tangled condition. In case the stock be of such character that the fibrous portion is comparatively small in comparison with the broken-up woody matter as it comes from the steepled rollers, the two sets of mechanism will be worked to greater advantage by separating the parts of the frame and placing an attendant in the space between the two, whose business shall be to transfer the fibrous matter after shaking out the shive to the feeding-carrier S.

It will be understood that the different parts will be speeded up, so as to work at the greatest advantage.

It should be noted that when staggered the engaging flutes of the steepled rollers have, in addition to the breaking action, a rubbing or scraping action on the stock.

An important advantage of the steepled arrangement of the breaking-rollers is that the rollers themselves may afford the requisite pressure, increasing in the proper order when the stock is fed from the top of the steeple downward. They also take less floor-space and give more breaks to a given number of rollers than any other arrangement. Ordinarily six or more would be employed and never less than four.

What is claimed, and desired to be secured by Letters Patent of the United States, is as follows:

1. In a fiber-separating machine, the combination, with suitable guides, of journal-bearings loosely mounted in said guides, one over the other, and a series of steepled and staggered rollers journaled in said bearings, having fluted surfaces engaging with each other, between each engaging pair of which the stock is passed with continuous zigzag course, substantially as described.

2. In a fiber-separating machine, the combination, with suitable guides, of journal-bearings loosely mounted in said guides, one over the other, a series of steepled and staggered rollers journaled in said bearings, having fluted surfaces engaging with each other, and shell-guides for directing the stock, the said guides facing the delivery sides of said rollers, the alternate guides being on opposite sides of the steeple, substantially as described.

3. In a fiber-separating machine, the combination, with suitable guides, of journal-bearings loosely mounted in said guides, one

over the other, a series of steepled and staggered rollers journaled in said bearings, having fluted surfaces engaging with each other, a pressure-bar mounted in the said guides above the top roller, and one or more compound blocks and tackles having their pulleys connected, respectively, to the pressure-bar and a fixed base of resistance below the lower roller and suspending-weights for applying a yielding pressure to the rollers, substantially as described.

4. The combination, with the steepled rollers, of boxes for the same, having their journal-seats eccentrically located with reference to the center of the boxes, whereby when placed in alternate arrangement with reference to their journal-seats the rollers will be staggered, while by reversing every other box the rollers may be brought into a true vertical line, substantially as described.

5. The combination, with the steepled rollers, of the endless feeding-cloth, the delivery-roller, and the sets of stationary and reciprocating blades, each set of blades being composed of two tiers on the opposite sides of a common space through which the stock is passed, the fixed and movable blades being in alternate arrangement and constructed to have an increasing crimp in the direction of the travel of the stock, substantially as and for the purpose set forth.

6. The combination, with the steepled breaking-rollers, of the crimping-blades and a hackling-drum, to the actions of which devices the stock is subjected in the order named, and a conveyer intermediate between the crimping-blades and hackling-drum, substantially as described.

7. The combination, with the crimping-blades and hackling-drum, of the pinned feed-wheel and angular pointed shell located between the two, substantially as described.

8. The combination, with the staggered steepled rollers, of the crimping-blades, the feeding-apron between the said rollers and the said blades, the pinned feed-wheel and sharp angled shell, and the hackling-drum, substantially as and for the purpose set forth.

9. The fiber-separating machine comprising the endless feeding-cloth, the vertical guides, the journal-bearings loosely mounted in said guides, one over the other, the staggered and steepled breaking-rollers journaled in said bearings, the pressure-bar in said guides, the block and tackle for affording yielding pressure thereto, the crimping-blades, the endless carrier and delivery-roller between the steepled rollers and the crimping-blades, the pinned wheel, the sharp-angled shell, and the hackling-drum, substantially as described.

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

JOHN McGRATH.
GEORGE Y. SMITH.

Witnesses:
JAS. F. WILLIAMSON,
EMMA F. ELMORE.