

No. 668,421.

Patented Feb. 19, 1901.

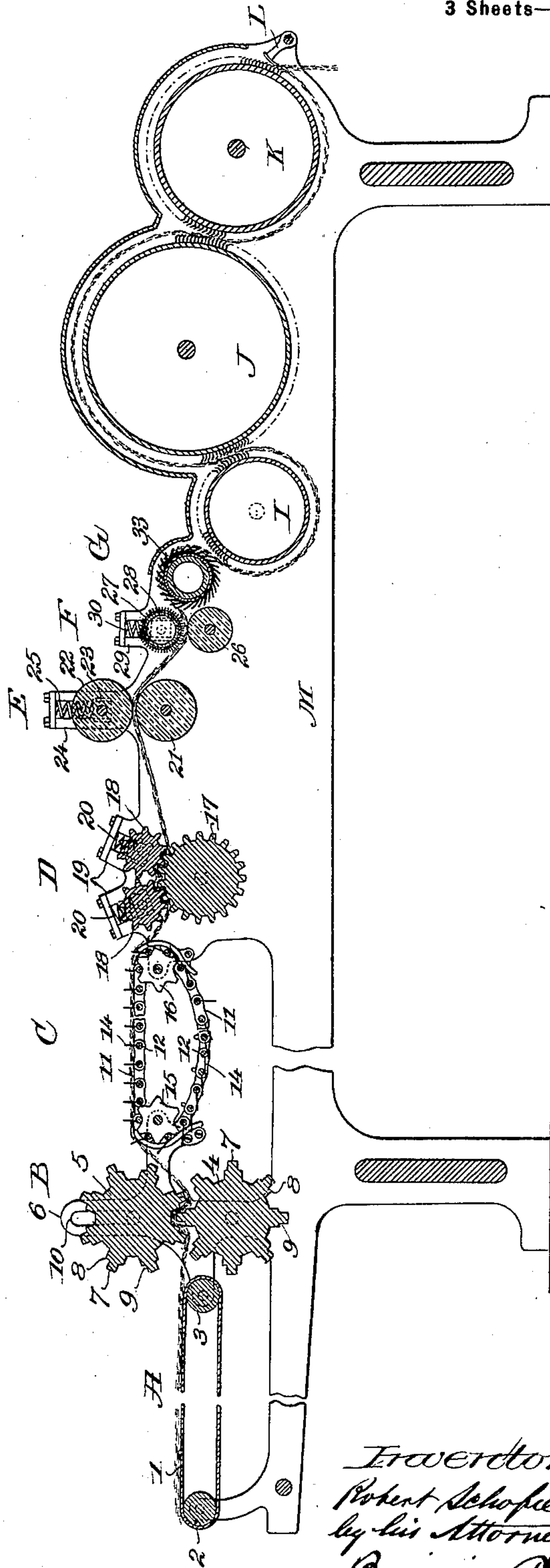
R. SCHOFIELD.
FLAX MACHINE.

(No Model.)

(Application filed Dec. 26, 1899.)

3 Sheets—Sheet 1.

Fig. 1.



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Fig. 2.
C.

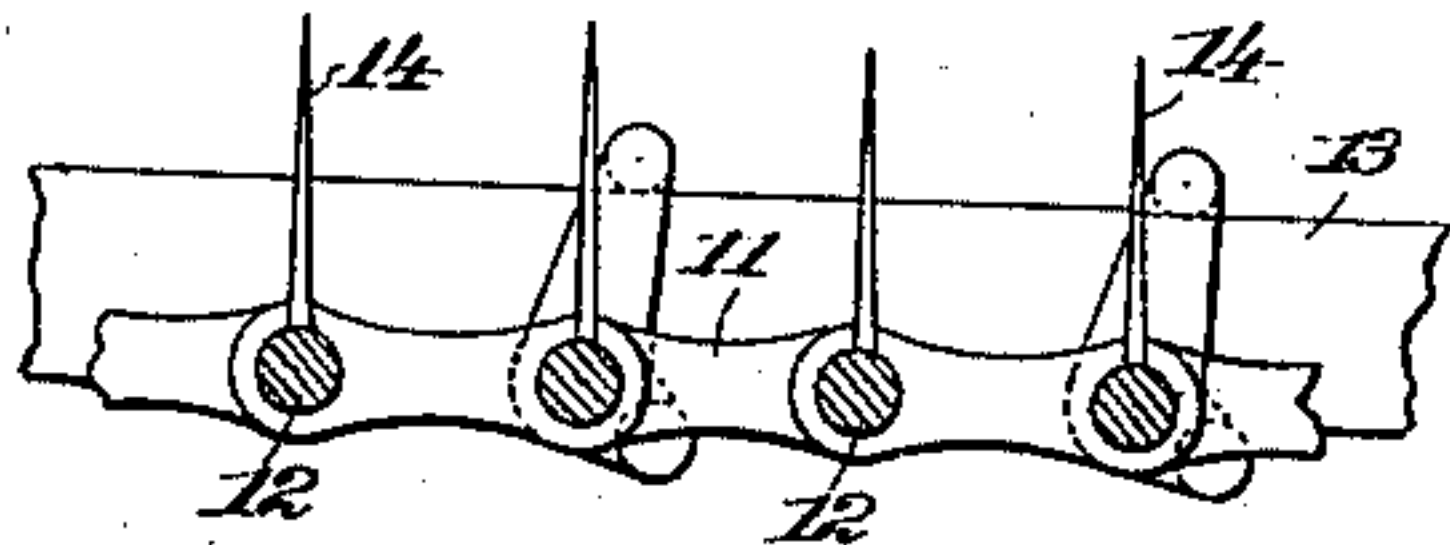


Fig. 3.

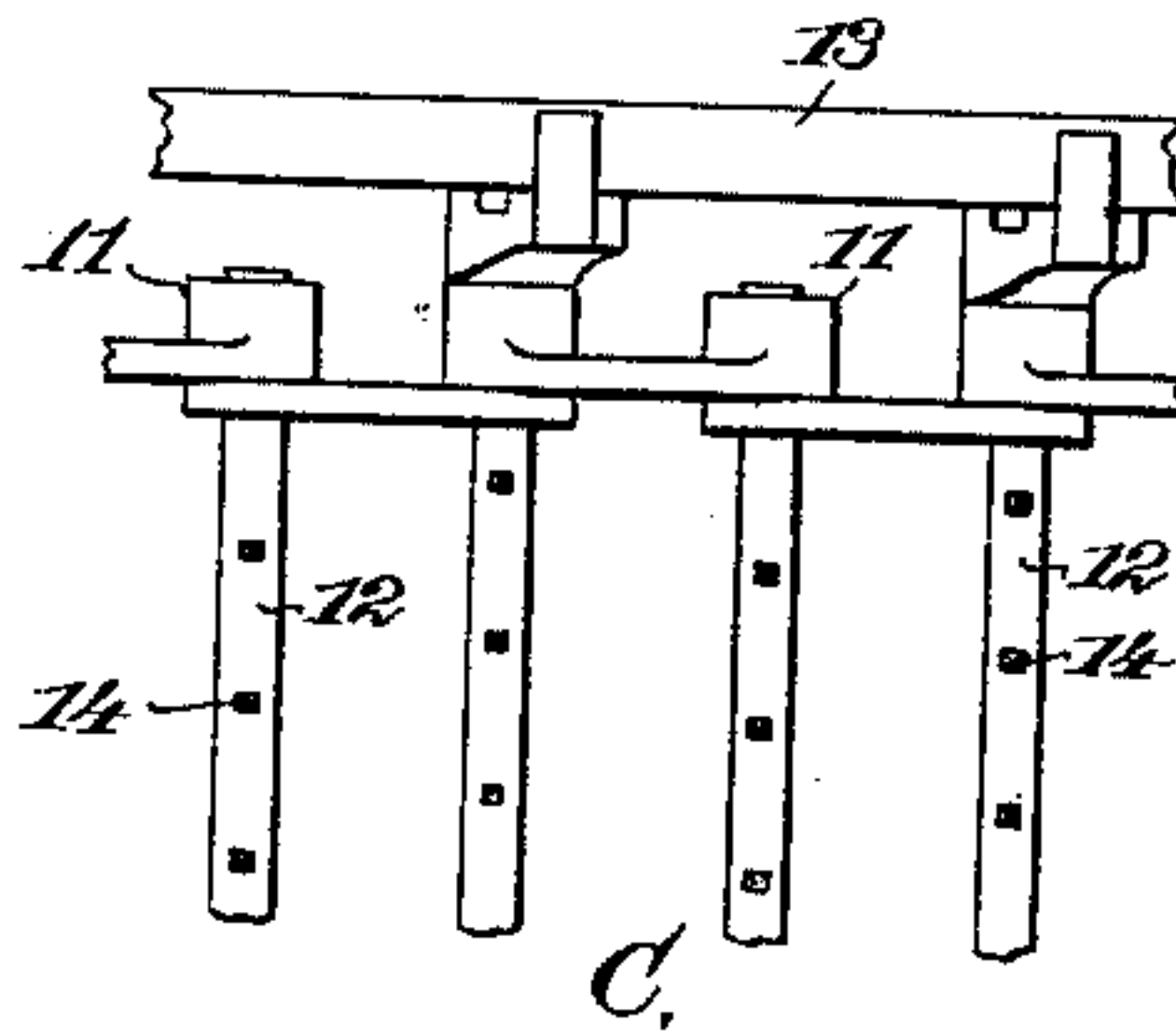


Fig. 4.

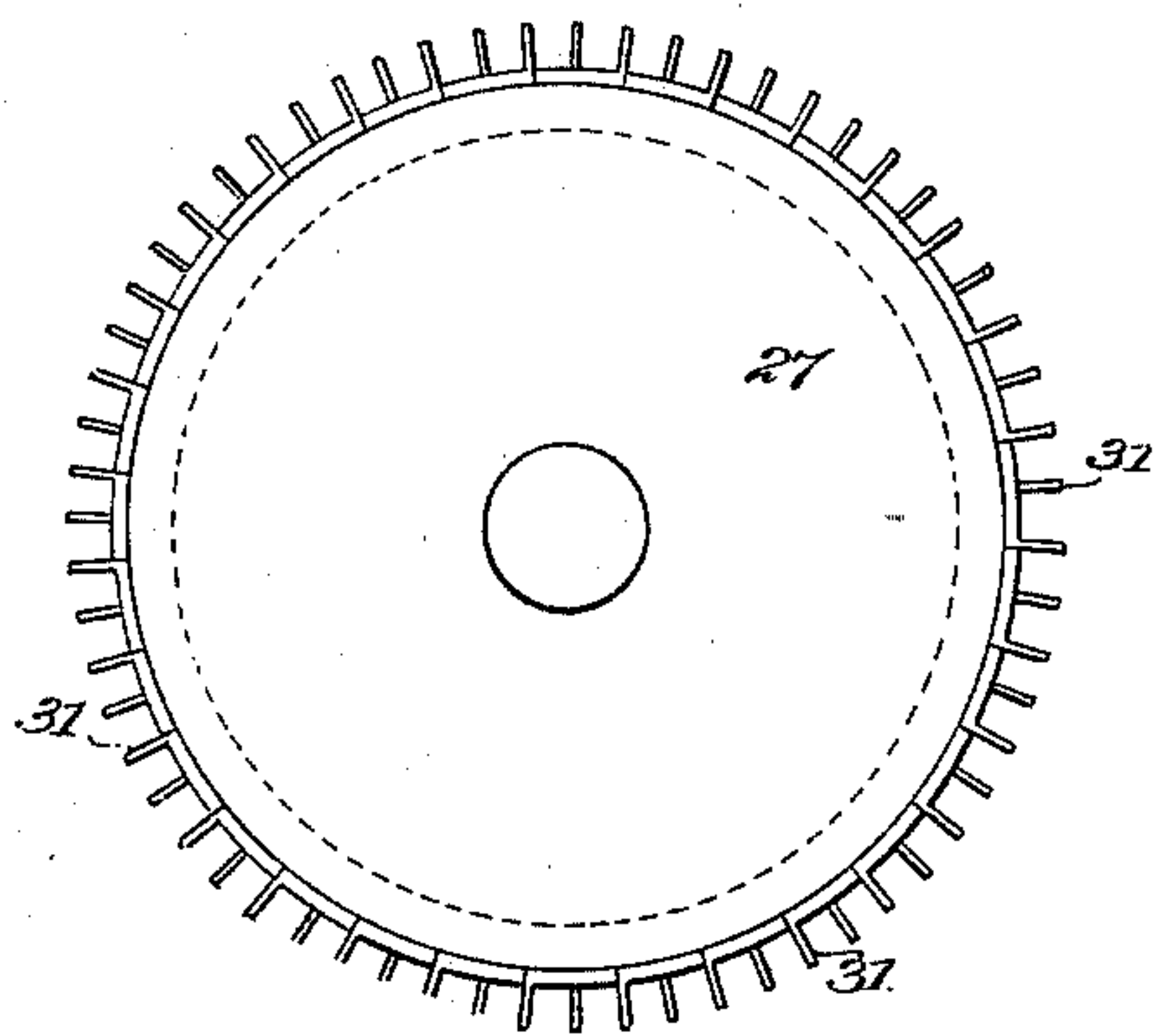
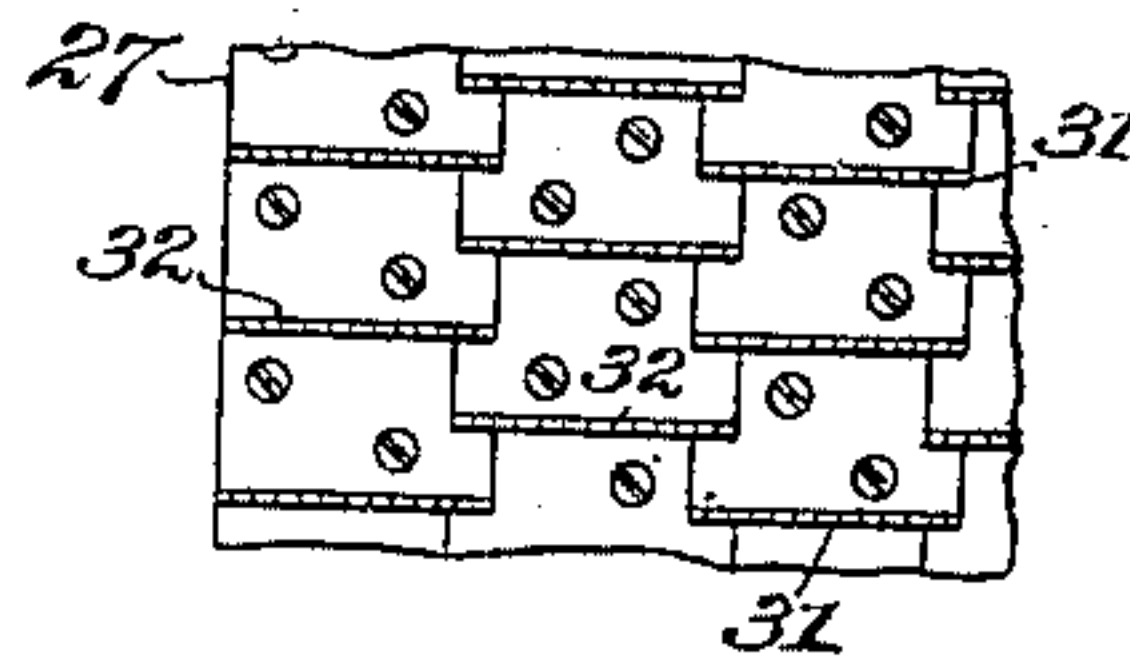


Fig. 5.



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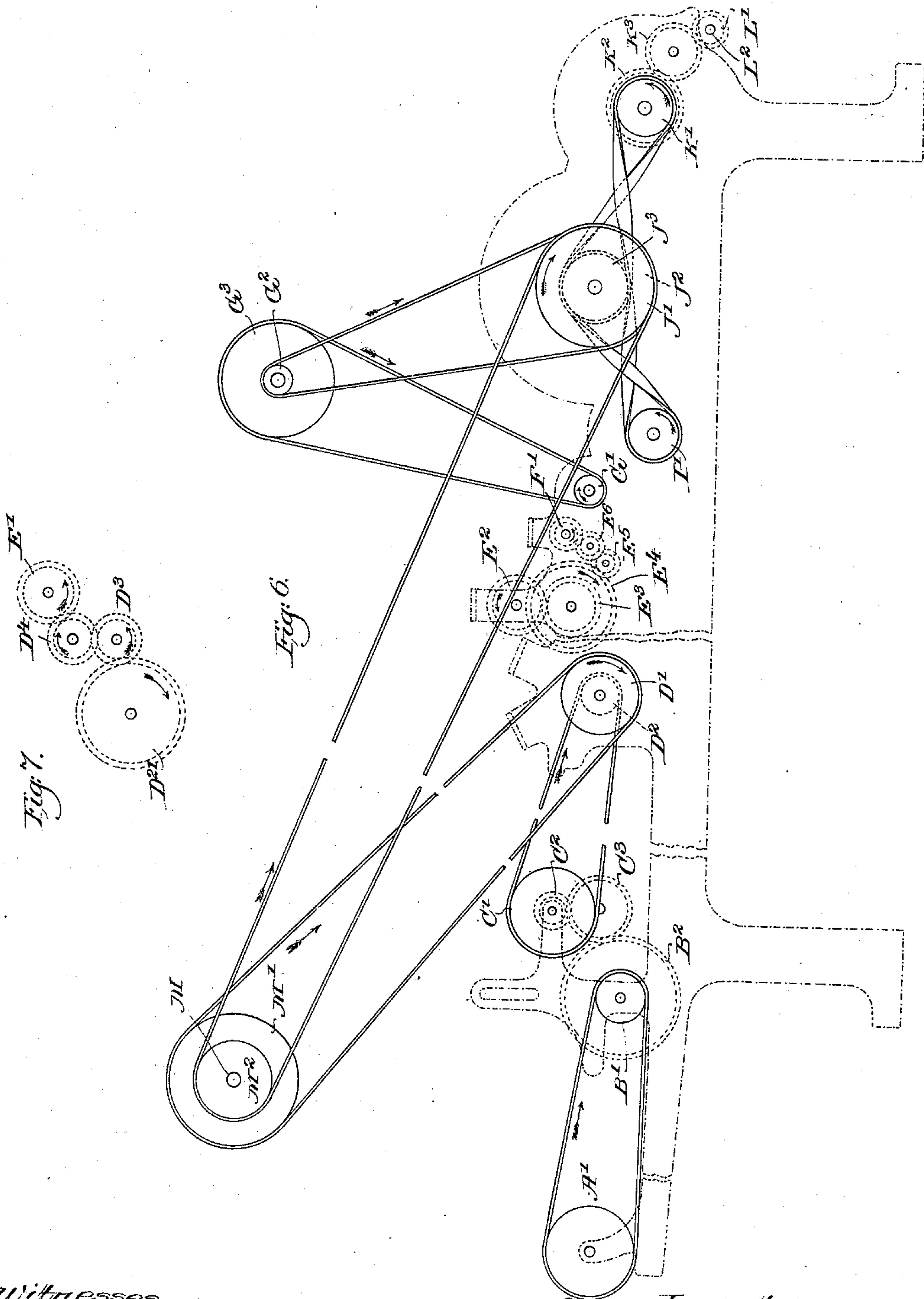
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3 Sheets—Sheet 3.



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UNITED STATES PATENT OFFICE.

ROBERT SCHOFIELD, OF NEW BEDFORD, MASSACHUSETTS.

FLAX-MACHINE.

SPECIFICATION forming part of Letters Patent No. 668,421, dated February 19, 1901.

Application filed December 26, 1899. Serial No. 741,500. (No model.)

To all whom it may concern:

Be it known that I, ROBERT SCHOFIELD, a subject of Queen Victoria, residing at New Bedford, in the county of Bristol and State of Massachusetts, have invented certain new and useful Improvements in Flax-Machines; and I 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.

The present invention relates to an improvement in flax-machines.

The object of the present invention is to produce a machine for cleaning flax and reducing it to a sliver suitable for use in spinning flax thread.

To the above end the present invention consists of the flax-machine hereinafter described and claimed.

In the drawings illustrating the preferred form of my invention, Figure 1 is a longitudinal medial section of the machine. Figs. 2, 3, 4, and 5 show details of construction hereinafter referred to, and Figs. 6 and 7 illustrate the driving connections for the machine.

In the drawings the feed-apron A, upon which the flax-stalks are laid by the attendant, feeds the flax to the preliminary crushing-rolls B, between which the flax-stalks pass and which crush the larger stalks. From these rolls the flax passes to a gill-chain C, which combs and loosens the flax. Between the crushing-rolls B and the gill-chain C and while the flax is passing over the gill-chain the larger pieces of shive fall out of the mass of flax, and thus is effected a preliminary cleaning of the flax. From the gill-chain the flax passes to the secondary crushing-rolls D, which crush the smaller flax-stalks and loosen the smaller pieces of shive therefrom. Drawing-rolls E receive the flax from the crushing-rolls D and draw, stretch, and thin out the fleece. From the drawing-rolls the flax passes to the scraper F, which consists of a scraping-roll and a pressing-roll between which the flax passes. The scraping-roll is made to rotate faster than the passage of the flax between the rolls, and so it kicks off the smaller pieces of shive which are still present in the fleece and effects a cleaning of the fleece. From the scraper the flax passes onto the porcupine-roll G, the teeth of which penetrate the fleece and comb, draw, and straighten

it. This porcupine-roller also operates, since it rotates rapidly, to throw off all remaining pieces of shive by a centrifugal force. The carding-roll I receives the fleece from the porcupine-roll G and transfers it to the carding-cylinder J, from which it is removed by the doffing-roll K, from which latter it is doffed in the usual manner by means of the doffer L. A suitable framework M is provided for supporting these parts, and suitable gearing is employed for driving them.

Coming now to a more particular description of the preferred form in which the several elements above enumerated are embodied, the feeding-apron A may consist of the ordinary apron 1, mounted upon suitable rolls 2 and 3. Upon this apron the operator spreads the flax to present it to the crushing-rolls B.

The crushing-rolls B comprise two similar intermeshing toothed rolls 4 and 5. One of these rolls is mounted in stationary bearings and the other is mounted in bearings so that it may approach and recede from the stationary roll as the amount of flax varies. I prefer to mount the lower roll 4 in a stationary bearing and to support the journals of the upper roll 5 in slotted housings 6, so that the upper roll may approach and recede from the lower roll 4 as the amount of flax varies. These rolls 4 and 5 are heavy and operate to crush the larger stalks that pass between them. I prefer to make the teeth 7 on these rollers with corners 8, which intermesh with notches 9 in the teeth of the opposing rolls. By the use of this form of tooth the rolls operate effectively to crush and break the larger stalks. Suitable provision is made to prevent the rolls from approaching too closely together, and in the machine of the drawings this is effected by making the slot 10 in the housing 6 of such depth that the roll 5 may not approach nearer to the roll 4 than a certain predetermined distance. By this means I prevent a complete crushing of the stalks, so that only the larger stalks of flax will be crushed, allowing the smaller stalks to pass through without being crushed.

The gill-chain C has its surface above the crushing-line of the rolls B, so that the flax in passing from the crushing-rolls to the gill-chain passes upwardly, as shown, leaving an open space between the rolls and the gill-chain through which the shive may fall.

The details of the gill-chain are shown in Figs. 2 and 3. The chain is of the ordinary type, having links 11, bars 12, guide-rails 13, and pins 14. I prefer, however, to make the pins square instead of round, as is the ordinary practice, since I have found that square pins operate more satisfactorily in my machine. The chain is supported on suitable sprocket-wheels 15 and 16, by means of which it is driven. During the passage of the flax over the gill-chain pieces of shive fall there-through.

The secondary crushing-rolls D have smaller teeth than the roll B and operate to crush the smaller stalks of flax and to effect a further crushing of the larger stalks. The rolls D may be of any suitable form and relative proportion; but I prefer to make the lower roll 17 the larger and the roll 18 the smaller. I may use either one or two upper rolls or one or two lower rolls; but the arrangement shown I consider to be the best. These rolls are supported so that one of the rolls may yield with relation to the other, so that they may accommodate themselves to any variations in the amount of flax passing therethrough. I prefer to make the upper rolls yielding, and to this end I have mounted the lower roll 17 in stationary bearings and the upper rolls 18 in bearings mounted in slotted housings 19, providing the journal for the rolls with yielding means, as the springs 20, for pressing these rolls against the lower roll 17. The line of contact of these rolls is made lower than the level of the gill-chain, so that the flax will pass downward from the gill-chain and enter between the rolls, thus giving a larger surface to be operated upon by the rolls. The use of two upper rolls secures a better crushing action than the use of one. I prefer to make the teeth on these rolls of a truncated V shape.

It will be seen that the operation of the machine as thus far described contemplates a preliminary and a secondary crushing and the use of a gill-chain between the two sets of crushing-rolls which secures the elimination from the fleece of the larger pieces of the shive before the fleece is subjected to the secondary crushing operation, and while I have described the form in which I prefer to embody these devices it is to be understood that my invention is not specifically limited thereto, but comprehends the use of equivalent devices operating in this manner. So far the operation has been mainly that of crushing the stalks and removing the larger pieces of shive from the fleece and in effecting a slight drawing of the fleece to straighten it and incidentally to contribute in removing the larger pieces of shive.

Above and adjacent to the secondary crushing-rolls D, I have mounted a pair of drawing-rolls E. These rolls are mounted far enough from the crushing-rolls D so that the length of the staple shall be less than the distance between the crushing-rolls and the drawing-

rolls. These drawing-rolls rotate at a proper surface speed to draw, stretch, and thin out the fleece. These rolls are made of elastic material, so that they pinch and tightly hold the fleece between them, so that they may effect this drawing operation. While these rolls may be made of any suitable material, I prefer to make them of rubber, as I have found this material to work very satisfactorily in practice. Of course these rolls must be pressed yieldingly together, and to this end I make one of them stationary and the other movable and provide means for pressing the movable roll yieldingly against the stationary roll. As shown in the drawings, the lower roll 21 is mounted in stationary bearings and the upper roll 22 is mounted in journals 23, sliding in the slotted housing 24 and pressed downward by means of the spring 25. I prefer to raise these rolls above the crushing-rolls D, so that the fleece shall pass upwardly from the crushing-rolls to them. This construction gives a greater contact-surface to the crushing-rolls. Incidental to this drawing operation some of the smaller pieces of shive separate themselves from the fleece and fall away therefrom.

The fleece passes from the drawing-rolls E to the combing-roll G, which is a porcupine-roll. It is covered with wire comb having teeth set in leather or rubber in the usual manner. I prefer to incline the teeth in the direction shown in the drawings, because they catch the fleece quicker. The porcupine-roll G is located at a distance from the drawing-rolls E which is less than the length of the staple or fibers produced by the machine. The porcupine-roll rotates very much more rapidly than the drawing-rolls, and so it operates to comb and straighten the fiber. Furthermore, since the fleece sinks onto the teeth of the porcupine-roll and since small pieces of shive will not sink onto these teeth they are thereby separated from the fleece, and rapid rotation of the roll thus throws them off by centrifugal force.

The scraper consists of a number of scraping devices suitably supported and moved with relation to the surface of the fleece passing it, so as to scrape such fleece and remove the small pieces of shive therefrom. Co-operating with the scraper I have provided supporting means for supporting the fleece against the action of the scraper. In the illustrated embodiment of my invention this scraper consists of two rolls yieldingly pressed toward each other, one of which is the scraping-roll 27, provided with scraping-teeth, and the other of which is the supporting-roll 26, preferably made of some elastic material, so that the fiber shall not be broken by the contact of the teeth of the scraping-roll with it. The scraping-roll may be mounted either above or below the fleece and the supporting-roll on the opposite side thereof, and either one or both of these rolls may be supported in such manner as to be yieldingly pressed

against the other; but I prefer to mount the scraping-roll above the fleece in bearings yieldingly pressed toward the supporting-roll, which is mounted in stationary bearings below the fleece. The journals 28 of the scraping-roll are supported in the slotted housings 29 and pressed in the direction to press it against the supporting-roll 26 by means of the springs 30. The scraping-roll 27 is rotated in the same direction as the moving fleece passing under it, but much more rapidly than said fleece, so that it operates to scrape the fleece, and thereby kick off the small pieces of shive.

In Figs. 4 and 5 I have shown enlarged views of the scraping-roll. It is provided on its periphery with a series of teeth 31, secured in any suitable manner to the periphery of the roll. These teeth are short and preferably in a roll of about three inches in diameter would be only about an eighth of an inch long—that is to say, the teeth would project beyond the surface of the roll only about one-eighth of an inch. The scraping-faces of the teeth I prefer to leave rough, so that they may catch hold of the shive and drag it off of the fleece. In Fig. 5 I have shown a plan of a small part of the face of the roll 27, showing the staggered arrangement of the teeth 31 and the rough faces 32 of the teeth. The scraping-roll is preferably mounted in such a position as to deflect the course of the fleece in passing from the drawing-rolls to the porcupine-roll, and so I mount the scraping-roll on the concave side of the deflected fleece. By this means the scraping-roll is made to engage a considerable surface of the fleece, and its efficiency as a means for removing the smaller pieces of shive is thereby materially increased. In the construction which I have shown in the drawings, wherein the scraping-roll is mounted so that it will engage the upper side of the fleece, it is necessary to provide means for catching the shive which is thrown off by the scraping-roller and the porcupine-roller, and for this purpose I have provided a cover 33, which extends upwardly over about one-half of the porcupine-roll in position to receive upon it the pieces of shive which are thrown up by the scraping-roller and the porcupine-roller. Suitable conveying means may be provided for keeping the cover 33 clean.

The carding-roll I, cylinder J, doffing-roll K, and doffer L are provided to afford means for doffing the cleaned and combed flax. The roll I is an ordinary carding-roll, the roll J is an ordinary carding-cylinder without revolving flats, and the roll K is the ordinary doffing-roll from which the flax is doffed in the usual manner by the oscillation of the doffing-comb L. At this point the fleece may be gathered into a sliver and run into an ordinary roving-can.

The principal feature of my invention consists in the peculiar arrangement of the drawing, scraping, and combing rolls by means

of which the flax is drawn, cleaned, and combed into a fine fleece which is adapted to be used in spinning.

The operation of my machine from the point where the fleece leaves the secondary crushing-rolls is as follows: First the fleece is drawn, stretched, and thinned out by the drawing-rolls, then the fleece is subjected to a scraping and cleaning operation, after which it is combed and further cleaned by means of the porcupine-roller.

Suitable gearing will be employed for rotating the various parts of the machine—that is to say, means will be provided for driving the apron for rotating one of the crushing-rolls of each set, the other rolls being driven therefrom. Means will be provided for driving the gill-chain, for rotating one of the drawing-rolls, for rotating the porcupine-roll, and for driving the doffer-rolls I J K. The crushing-rolls B will be rotated at a certain rate of speed, and the gill-chain C will be actuated at a speed slightly in excess of the surface speed of the crushing-roll B. The crushing-rolls D will have a surface speed greater than the gill-chain, the drawing-rolls E will have a still more rapid surface speed, and the porcupine-roll will be very much more rapidly rotated than the drawing-roll, as will also be the scraping-rolls F. Of course the carding-roll I will have a surface speed exceeding the surface speed of the porcupine roll D, the surface of the carding-cylinder J will be still greater, and the doffing-roll K will have a less surface speed than cylinder J. The doffer L will be operated in the usual manner to doff the flax from the roll K.

The gearing for driving the machine forms no part of the present invention and may be of any suitable or desired form. In Figs. 6 and 7 I have shown convenient devices for this purpose. The counter-shaft M carries pulleys M' and M². From the pulley M' a belt runs to the pulley D' on the shaft of the crushing-roll 17. The pulley D² is also mounted on the shaft of the roll 17, and a belt runs from it to the pulley C' on the shaft which supports the sprocket-wheel 15, which drives the gill-chain C. A pinion C² on the same shaft engages the idler-gear C³, which in turn engages the gear B² on the shaft of the crushing-roll 4 to drive the latter. A pulley B', also mounted on the shaft of the roll 4, drives the pulley A' (through the connecting-belt) on the shaft of the feeding-apron roll 2. D²¹ is a gear mounted on the opposite end of the shaft of the crushing-roll 17, which meshes with the idler D³, which in turn meshes with the idler D⁴, which drives the gear E' on the shaft of the roll 22, by which motion is imparted to the drawing-rolls E. On the same shaft is mounted the gear E², which meshes with the gear E³ on the shaft of the other roll 21. The gear E⁴ is also mounted on the shaft of the roll 21, and it drives the scraping-roll 27 through the idler-gears E⁵ and E⁶, which latter drives the gear F', mounted on the shaft

of the scraping-roll 27. A belt runs from the pulley M² to the pulley J' on the shaft of the cylinder J. The pulley J², also mounted on the shaft of the cylinder J, drives the pulley G² on an idler-shaft bearing another pulley G³, from which a belt runs to the pulley G' on the shaft of the combing-roll G. From the other pulleys J³, also mounted on the shaft of the cylinder J, belts run to the pulleys I' on the shaft of the cylinder I, and K' on the shaft of the cylinder K, by means of which said cylinders are driven. The gear K² on the shaft of the cylinder K drives the idler-gear K³, which in turn drives the pinion L' on the eccentric shaft L², which imparts the oscillatory motion to the doffer L.

While I have thus described the preferred form of my invention, it is to be understood that it is not specifically limited thereto, but that it contemplates the use of equivalent devices operating to secure the same results.

Having thus described my invention, I desire to secure by Letters Patent of the United States of America—

1. In a flax-machine, the combination with preliminary crushing-rolls having large teeth for crushing the larger stalks of flax, of secondary crushing-rolls having smaller teeth for crushing the smaller stalks of flax, and a gill-chain intermediate the two sets of crushing-rollers for removing the larger pieces of shive, substantially as described.

2. In a flax-machine, the combination with means for crushing the stalks of flax, of drawing-rollers for drawing and stretching the fleece as it emerges from the crushing means, a porcupine combing-roller, and means for scraping the fleece between the combing-roller and the drawing-rolls, substantially as described.

3. In a flax-machine, the combination with means for crushing the stalks of flax, of drawing-rollers for drawing and stretching the fleece as it emerges from the crushing-rollers, a porcupine combing-roller located at a less distance from the drawing-rollers than the length of the staple, and a rapidly-rotating scraping-roller situated between the porcupine-roller and the drawing-rolls, for scraping off the small pieces of shive, substantially as described.

4. In a flax-machine, the combination with means for crushing the stalks of flax, of drawing-rolls for drawing the flax as it emerges from the crushing means located above and at one side of said crushing means, a porcupine-roll for combing and straightening the fleece located below and at one side of the drawing-rolls, and a rapidly-rotating scraping-roll mounted between the porcupine-roll and the drawing-rolls, and adapted to engage and to deflect the fleece out of a straight path as it passes from the drawing-rolls to the porcupine-roll, whereby it engages a large surface of the fleece and operates to kick off small pieces of shive, substantially as described.

5. In a flax-machine, the combination of crushing-rolls, of drawing-rolls, a porcupine combing-roll, a rapidly-rotating scraping-roll situated between said porcupine and drawing rolls, and means for doffing the porcupine-roll, substantially as described.

6. In a flax-machine, the combination with preliminary crushing-rolls, having large teeth, of secondary crushing-rolls having small teeth, a gill-chain situated between said sets of crushing-rollers, and having its operating-surface at one side of the straight path between the sets of crushing-rolls whereby the flax is deflected from said straight path and the larger pieces of shive are separated therefrom, substantially as described.

7. In a flax-machine, the combination with successive sets of crushing-rolls, of means between said sets of crushing-rolls for separating the larger pieces of shive from the fleece, drawing means, combing means, doffing means and means between said drawing and doffing means for removing the smaller pieces of shive, substantially as described.

8. In a flax-machine, the combination with a set of preliminary crushing-rolls, secondary crushing-rolls and means between them for removing the larger pieces of shive, of drawing-rolls receiving and drawing the flax from the secondary crushing-rolls, a porcupine combing-roll, located at a less distance from the drawing-rolls than the length of the staple, doffing means and a rapidly-rotating scraping-roll situated between said drawing-roll and the combing-roll for removing the smaller pieces of shive from the flax, substantially as described.

9. In a flax-machine, the combination with drawing-rolls, of a combing-roll located at a less distance from the drawing-rolls than the length of the staple and a rapidly-rotating scraping-roll located between the drawing-rolls and the combing-roll operating to scrape the fleece and remove the shive therefrom, substantially as described.

10. In a flax-machine, the combination with drawing-rolls, of a combing-roll located at a less distance from the drawing-rolls than the length of the staple, and a scraper located between the drawing-rolls and the combing-roll, consisting of a toothed scraping-roll and a co-operating supporting-roll to scrape the fleece and remove the shive therefrom, substantially as described.

11. In a flax-machine, the combination with preliminary crushing-rolls, of a gill-chain, secondary crushing-rolls, drawing-rolls, a scraping-roll, a combing-roll, a carding-roll, a carding-cylinder, a doffing-roll and a doffer, substantially as described.

In testimony whereof I affix my signature in presence of two witnesses.

ROBERT SCHOFIELD.

Witnesses:

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JOHN J. POWERS.