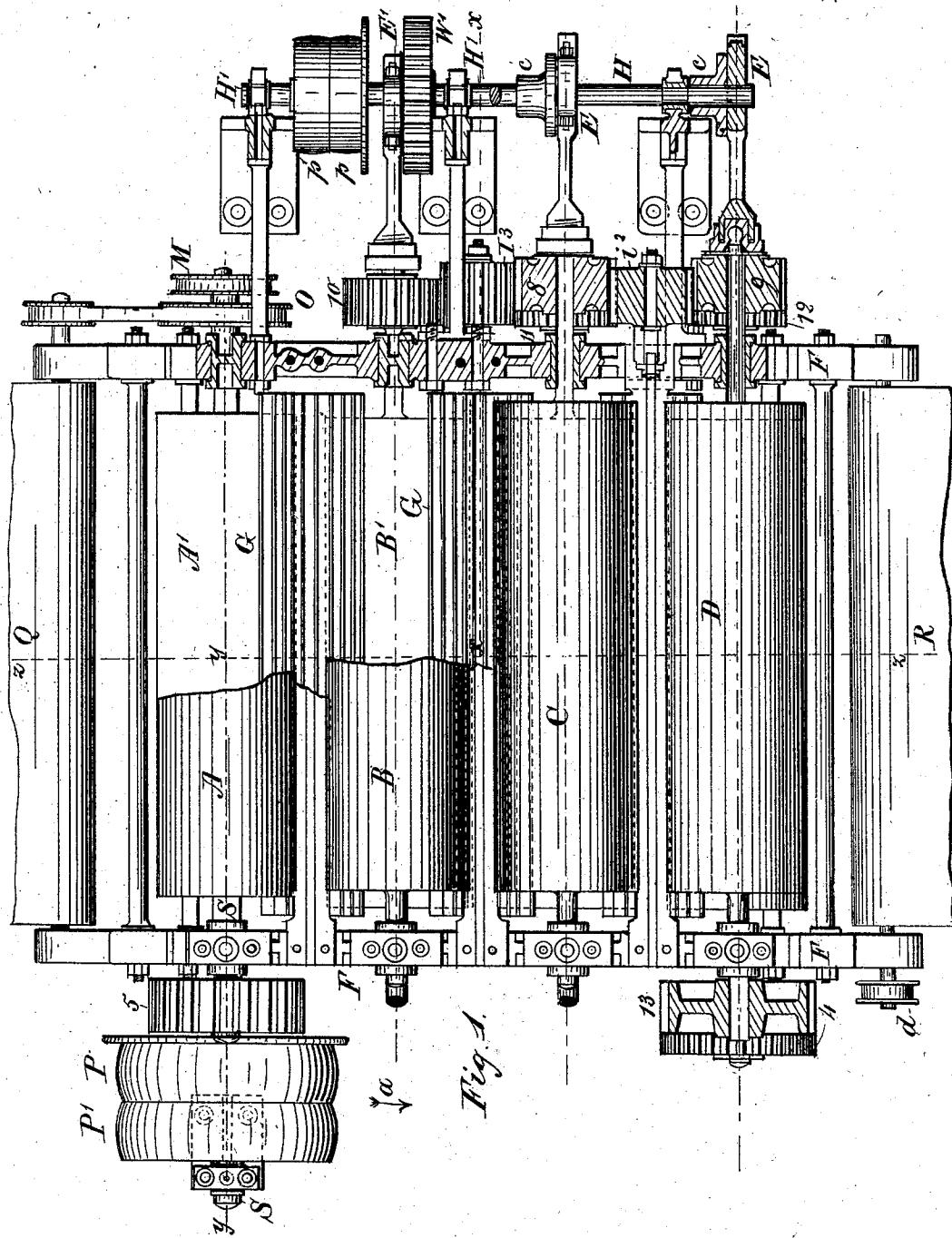


(No Model.)

5 Sheets—Sheet 1.

P. DE PUYDT.

MACHINERY FOR DECORTICATING FIBROUS SUBSTANCES.  
No. 289,999. Patented Dec. 11, 1883.



Witnesses

William S. Goulet,  
J. H. Proctor

Inventor  
Paul De Puydt  
for Henry Otto  
his att'y

(No Model.)

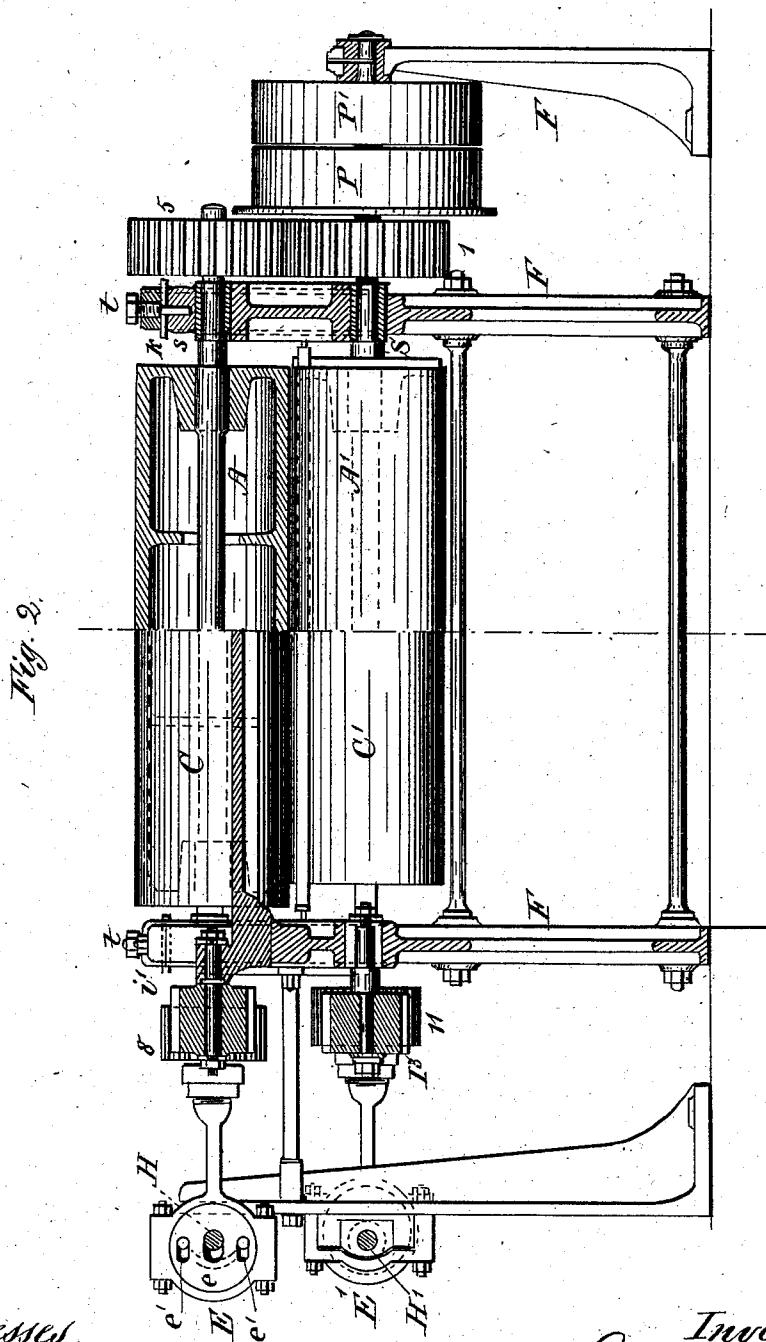
5 Sheets—Sheet 2.

P. DE PUYDT.

MACHINERY FOR DECORTICATING FIBROUS SUBSTANCES.

No. 289,999.

Patented Dec. 11, 1883.



Witnesses  
William J. Goulter  
A. W. Knotts

Inventor  
Paul De Puydt  
(for Navy Orth)  
his atty

(No Model.)

5 SHEETS—Sheet 3.

P. DE PUYDT.

MACHINERY FOR DECORTICATING FIBROUS SUBSTANCES.

No. 289,999.

Patented Dec. 11, 1883.

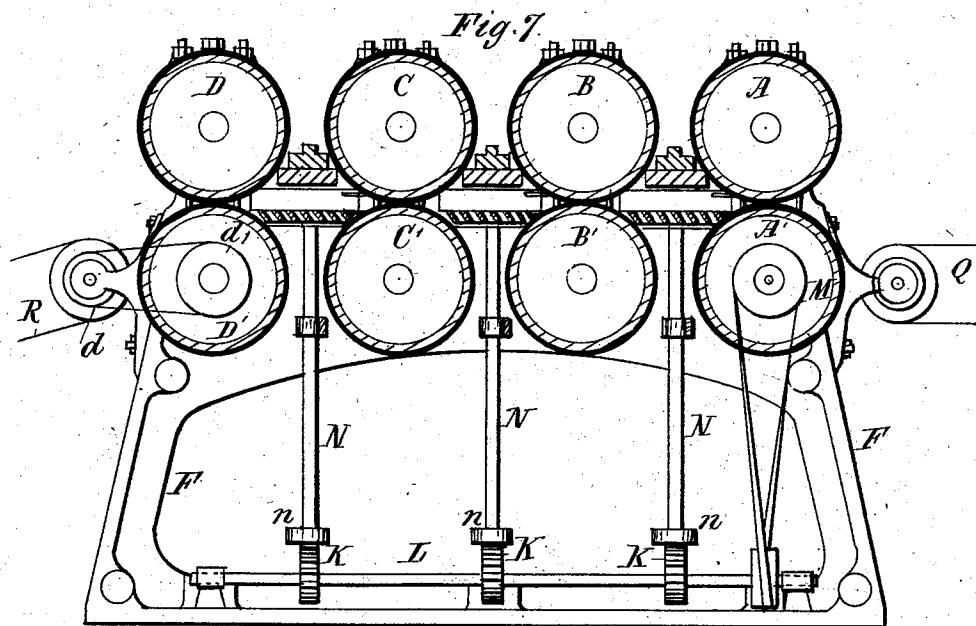
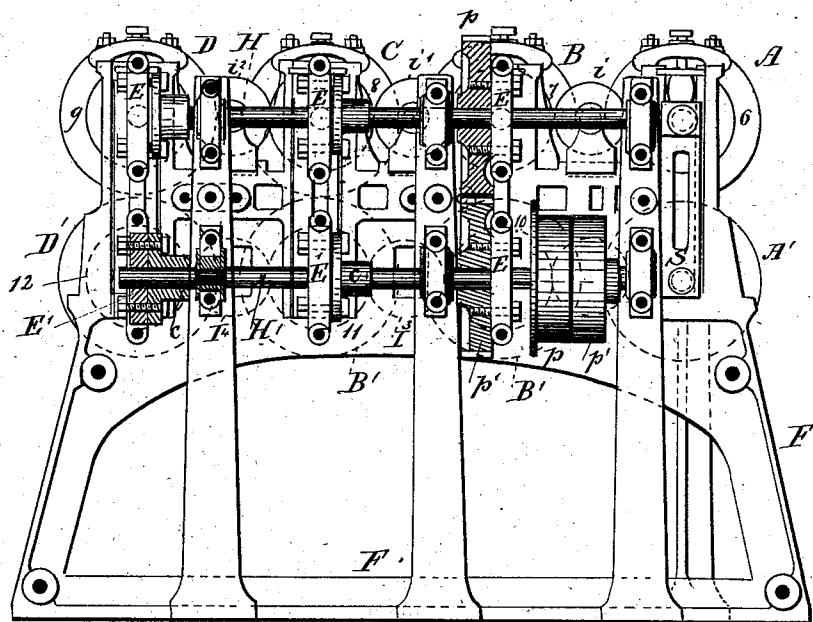


Fig. 3.



Witnesses  
William S. Boulter  
A. D. Knott

Inventor  
Paul De Puydt  
F. Mary Cott  
his atty.

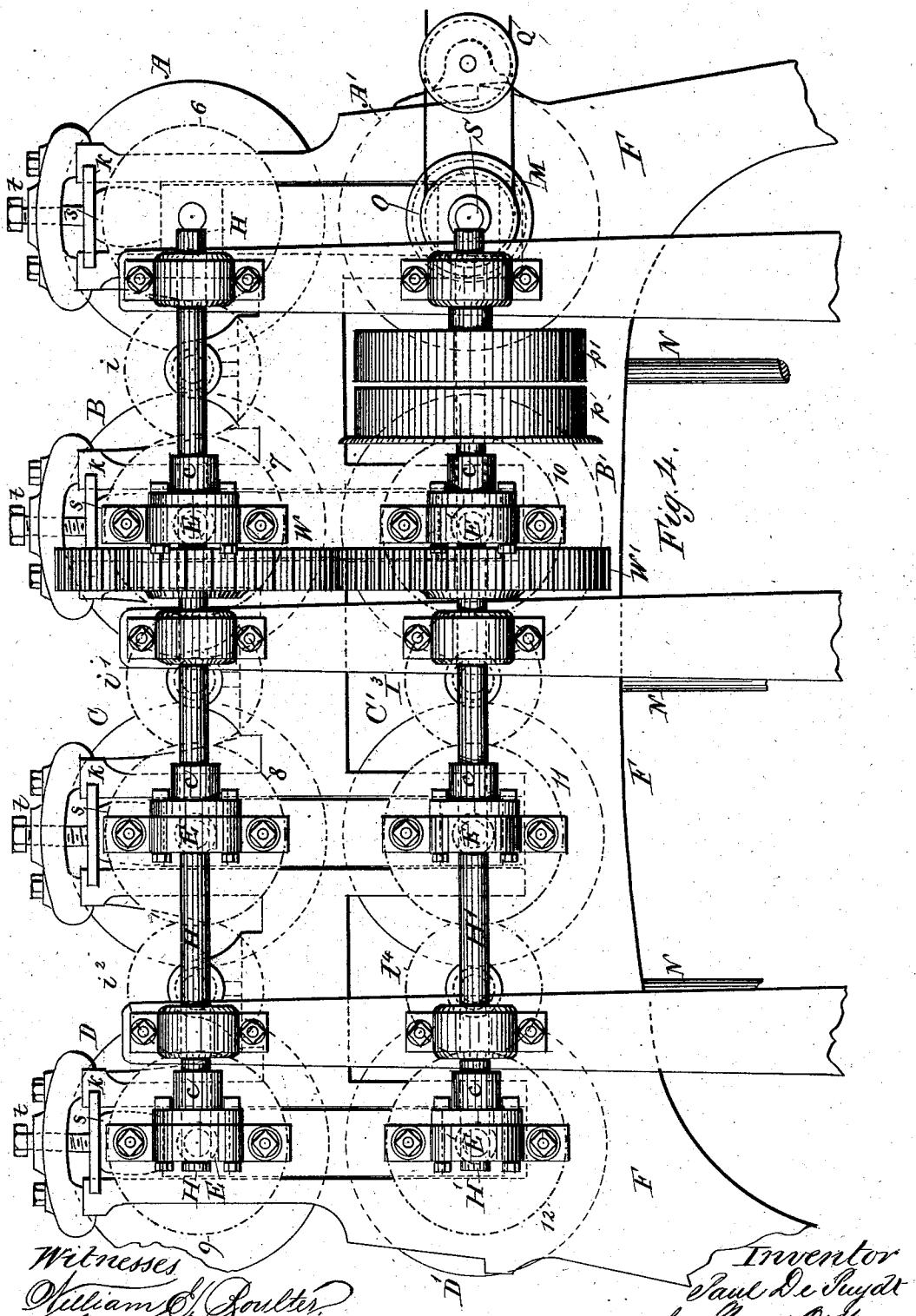
(No Model.)

5 Sheets—Sheet 4.

P. DE PUYDT.  
MACHINERY FOR DECORTICATING FIBROUS SUBSTANCES.

No. 289,999.

Patented Dec. 11, 1883.



Witnesses

William C. Goulter.  
J. W. Knott.

Inventor  
Paul De Suydt  
fr. Henry Ootd  
his atty

(No Model.)

5 Sheets—Sheet 5.

P. DE PUYDT.

MACHINERY FOR DECORTICATING FIBROUS SUBSTANCES.

No. 289,999.

Patented Dec. 11, 1883.

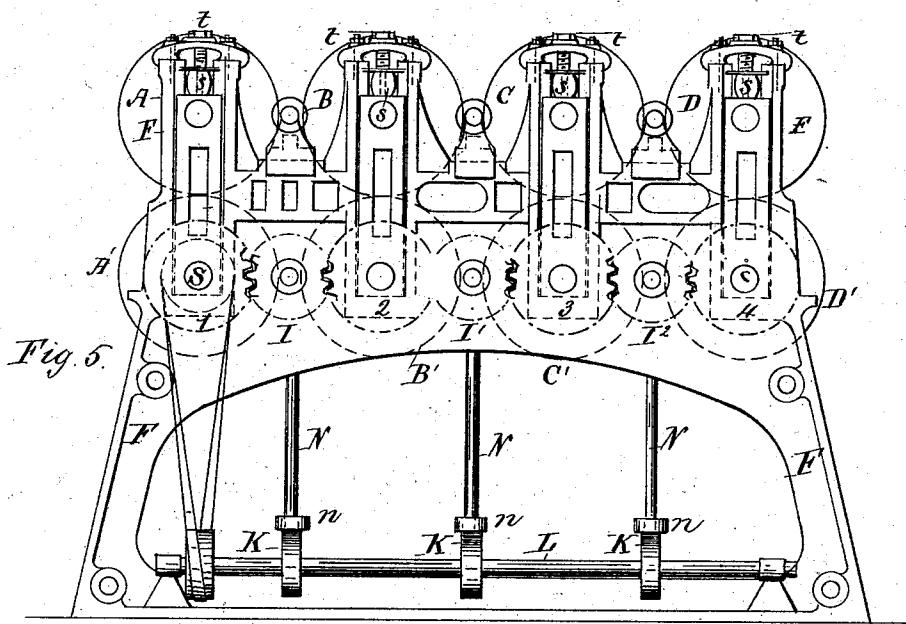
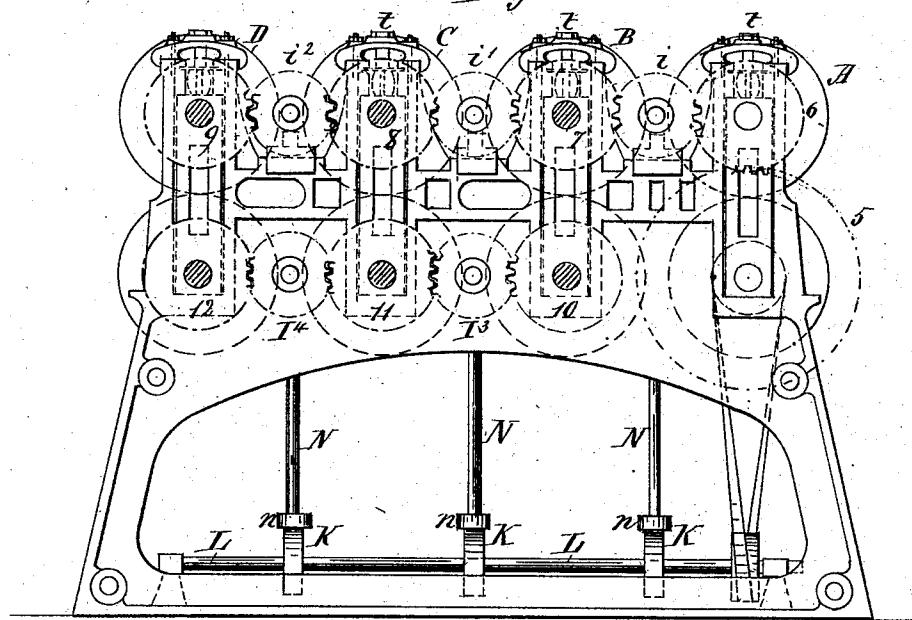


Fig. 6.



Witnesses

William S. Goulter  
G. W. Knott

Inventor  
Paul De Puydt  
to Henry C. Gandy

# UNITED STATES PATENT OFFICE.

PAUL DE PUYDT, OF BRUSSELS, BELGIUM.

## MACHINERY FOR DECORTICATING FIBROUS SUBSTANCES.

SPECIFICATION forming part of Letters Patent No. 289,999, dated December 11, 1883.

Application filed September 10, 1883. (No model.) Patented in Belgium July 24, 1882, No. 42,40.

*To all whom it may concern:*

Be it known that I, PAUL DE PUYDT, a citizen of the Kingdom of Belgium, residing at Brussels, in the Kingdom of Belgium, have invented certain new and useful Improvements in Machines for Decorticating Fibrous Substances; 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, reference being had to the accompanying drawings, and to letters or figures of reference marked thereon, which form a part of this specification.

This invention relates to machines for decorticating fibrous substances, and has for its object the better separation of the fibers from the wood or bark as well as from the incrustating or adhesive substances that envelop and cause them to adhere to one another, without either felting or breaking the fibers.

In the decorticating of fibrous substances two separate and distinct operations are necessary to effectually separate the fibers from the wood or bark as well as from the gummy or resinous adhesive substances that cause them to adhere to each other and to the wood or bark. These operations consist, first, in breaking or loosening the fibers from the wood or bark and said gummy or adhesive substances by the application of pressure, and, secondly, in removing the wood or bark and the gummy or adhesive substance from the fiber by the application of friction.

The hereinafter-described machine embodying my invention is designed to perform these two operations simultaneously; and to that end the invention consists in the construction, arrangement, and combination of the operating devices of the machine, substantially as hereinafter more fully described, and shown in the accompanying drawings.

Figure 1 is a plan view, partly in section. Fig. 2 is a longitudinal section taken on the interrupted line  $x x$  and  $y y$  of Fig. 1, looking in the direction of the arrow  $a$ . Fig. 3 is an elevation, partly in section, of one end of the machine. Fig. 4 is a like view on an enlarged scale, to better show the arrangement of eccentrics. Figs. 5 and 6 are elevations taken from the opposite ends of the machine, to more

clearly show the driving-gearing for the decorticating-rolls; and Fig. 7 is a transverse section taken on line  $z z$  of Fig. 1.

Like letters indicate like parts wherever such may occur.

The improved decorticating-machine is composed of a suitable frame, F, constructed to receive and support the operating devices, which consist, essentially, of eight (more or less) decorticating-rolls arranged in pairs of superposed rolls, A A', B B', C C', D D', respectively, as shown.

I have found in practice that in machines of this class of usual construction—that is to say, in which decorticating-rolls have either a corrugated or smooth but hard surface—the fibers of the material suffer considerably by being either torn or felted. To obviate these difficulties I employ decorticating-rolls the acting-surfaces of which are made flexible or yielding by covering the rolls with any suitable material, such as leather or other analogous material. I prefer, however, to cover the rolls with rubber, as I have found that this material answers the purposes best.

The several pairs of rolls may be driven at the same speed. I prefer, however, to drive the same at different speeds by varying the diameter of the gearing accordingly, the rolls A A' at the feed end of the machine rotating the fastest, while those D D' at the delivery end rotate the slowest.

As above stated, two operations are necessary to decorticate fibrous substances—namely, pressure and friction. The pressure I obtain by the rotation of the two rolls of a pair more or less in contact with one another, and the necessary friction is obtained by imparting to the rolls a horizontal reciprocating motion in opposite directions—that is to say, when the upper roll, for instance, is moving toward one end of the machine the lower roll is moving toward the opposite end, or vice versa. This longitudinal reciprocating motion is imparted to the rolls by means of eccentrics E E', and the amplitude of such motion is regulated by making the eccentrics adjustable.

Between every two sets of rolls is arranged a grate or grid, G, having a vertically-reciprocating or shaking motion imparted thereto. These grates or grids lie on the plane or slightly

below the plane of contact between the rolls of each set, and serve three purposes, first: to shake up and loosen the fibrous material after it leaves one set of rolls; secondly, to eliminate therefrom the bark and other foreign substances removed from the fibers by the action of the rolls, which substances fall through the grate-bars to the floor; and, thirdly, to feed the material so loosened and freed from foreign substances to the next succeeding pair of rolls.

The above-described mechanism is operated in the manner and by the means following: The decorticating-rolls are driven from the shaft S of roll A', an extension of which shaft S carries fast and loose belt-pulleys P P' and a gear-wheel 1, respectively. The latter communicates motion to an idler, I, that rotates the gear-wheel 2 on shaft of roll B', and the wheel 2 to an idler, I'. The latter gears with a wheel, 3, on shaft of roll C', which wheel gears with an idler, I<sup>2</sup>, that communicates motion to wheel 4 on shaft of roll D'. In this manner the four lower rolls are caused to rotate in the same direction. The gear-wheel 1 on shaft S of roll A' meshes with a like wheel, 5, on shaft of upper roll, A, said shaft carrying upon its opposite end a gear-wheel, 6, from which the other three upper rolls are driven through the medium of the idler i, gear-wheel 7 on shaft of roll B, idler i', gear-wheel 8 on shaft of roll C, idler i<sup>2</sup>, and gear-wheel 9 on shaft of roll D, said rolls rotating in the same direction, but in a direction the reverse of that of the lower rolls. The rolls B' C' D' may also be geared together on that side of the machine upon which the gearing of the upper rolls is located, as shown in Fig. 5, by gear-wheel 10 on shaft of roll B', idler I<sup>3</sup> gear-wheel 11 on shaft of roll C, idler I<sup>4</sup>, and gear-wheel 12 on shaft of roll D'.

It is evident that the gear-wheels 10, 11, and 12 and the idlers I<sup>3</sup> I<sup>4</sup> may be dispensed with, if desired, though I prefer to use them, as the weight of the operative parts will thereby be more evenly distributed.

If desired, the upper rolls, D C B A, may also be geared together on that side of the machine where the driving-pulleys are located, 50 the roll D carrying a gear-wheel, 13, Fig. 1, to which motion is communicated from gear-wheel 5 on shaft of roll A, gear-wheels on shafts of rolls B C, and intermediate idlers. The upper rolls, A B C D, are mounted in adjustable bearings, upon which are seated rubber blocks s, through which pass the adjusting-bolts t, and upon the blocks rests a retaining-plate, k, whereby the upper rolls may be adjusted relatively to the lower rolls, to increase 60 or diminish the pressure exerted thereby.

Any other well-known or usual means for adjusting the rolls vertically may, however, be employed.

Although I have shown the gearing arranged 65 to impart to all the decorticating-rolls the same speed, I prefer, as above set forth, to im-

part to them different speeds, which may be readily effected by varying the diameter of the gear-wheels; nor do I wish to limit myself to the arrangement of gearing shown and described, as this may be varied, such arrangements being clearly within the province of skilled mechanics.

The gearing is constructed with sufficiently-wide toothed rims to support the friction due to their reciprocating motion without undue wear, and for this purpose the roller-shaft bearings are made very wide. This reciprocating motion is imparted to the rolls by means of the eccentrics E E', mounted on two shafts, H H', and these may be operated from any of the rotating parts of the machine. I prefer, however, to operate them independently, so as to enable me to vary the speed of the reciprocations of the rolls, and to this end the shaft H is geared to shaft H' by gearing W' W, Figs. 1, 2, and 4, said shaft H' carrying fast and loose pulleys p p'.

To vary the amplitude of the reciprocating movement of the rolls, the eccentrics are made adjustable upon their shafts, as follows: Each eccentric has an axial longitudinal aperture, e, through which the shaft passes, the extremities of said aperture being equidistant from the center. Upon opposite sides of this axial aperture e are two like apertures, e', through which pass the adjusting-bolts b, said bolts passing also through flanged sleeves c, Figs. 1 and 3, rigidly secured on the shaft which passes loosely through the aperture e of the eccentrics.

I have shown three of the four pairs of rolls connected to eccentrics to reciprocate the same. The pair A A', serving as feed-rolls, have preferably a rotary motion only.

It is obvious that by loosening the nuts on the bolts b and moving the eccentrics toward or from the axial line of their shafts, and then securing the said bolts again, the extent of the reciprocating movement of the rolls may be adjusted to suit the material under treatment.

A vertical reciprocating motion is imparted to the grates or grids by means of cams or toothed wheels K, mounted on a counter-shaft, L, upon which cams bear rods N, that slide freely in guides g, secured to transverse brace-roads r of the machine. Each rod N has a foot or heel, n, which rests upon the toothed wheels or cams, as shown in Fig. 6. The counter-shaft L is driven from a belt-pulley, M, on shaft S of roll A', that carries also a second pulley, O, to impart movement to the feed-apron Q. The delivery-apron R is operated from a pulley, d, belted to a pulley, d', on shaft of roll D', as shown in Fig. 6.

By rotating the several pairs of rolls at a successively-decreasing speed, I vary the speed at which the material is passed through the machine, and as the rolls at the feed end of the machine rotate fastest, the next succeeding pair of rolls cannot carry away the material as fast

as it is fed thereto. Consequently such material is crowded upon said succeeding rolls, bent, and the more brittle substances of which it is composed broken up before it passes to said succeeding pair of rolls, the operation being repeated between each two pairs of rolls.

By means of this arrangement the process of decortication is not only materially hastened and made more thorough, but the danger of 10 felting the fibers avoided, and this is greatly assisted by the use of the vertically-reciprocating grate G, by the action of which the stems or the fibers are loosened and prevented from becoming matted, the foreign substances separated from said fibers by the action of the rolls 15 are shaken out, and the material fed to the next succeeding pair of rolls.

Having now fully described my invention, what I claim, and desire to secure by Letters 20 Patent of the United States, is—

1. In a machine for decorticating fibrous substances, decorticating-rolls covered with a flexible material such as described, substantially as and for the purposes specified.
2. In a machine for decorticating fibrous substances, a series of decorticating-rolls arranged in pairs, and mechanism for imparting to said rolls a successively-decreasing speed, substantially as described, for the purposes 25 specified.
3. In a machine for decorticating fibrous substances, a series of decorticating-rolls arranged in pairs, and mechanism for imparting

to said rolls a longitudinal reciprocating and a successively-decreasing rotary motion, substantially as and for the purposes specified. 35

4. In a machine for decorticating fibrous substances, a series of decorticating-rolls, in combination with intermediate grates or grids, substantially as described, for the purposes 40 specified.

5. In a machine for decorticating fibrous substances, the combination, with a series of decorticating-rolls having a longitudinal reciprocating motion and a successively-decreasing 45 rotary motion, of a series of vibrating grates or grids, substantially as and for the purposes specified.

6. In a machine for decorticating fibrous substances, the combination of the following 50 elements, to wit: a series of decorticating-rolls arranged to rotate at a successively-decreasing speed and to reciprocate longitudinally, a vibrating grid or grate for each pair of rolls, mechanism for adjusting the extent of the reciprocating movement of said rolls, and flexible coverings for the rolls, as described, for the purposes specified. 55

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

PAUL DE PUYDT.

Witnesses:

H. RACLORE,  
E. NANNARTS.