

(No Model.)

T. A. SMITH.
FIBER DECORTICATING MACHINE.

4 Sheets—Sheet 1.

No. 321,863.

Patented July 7, 1885.

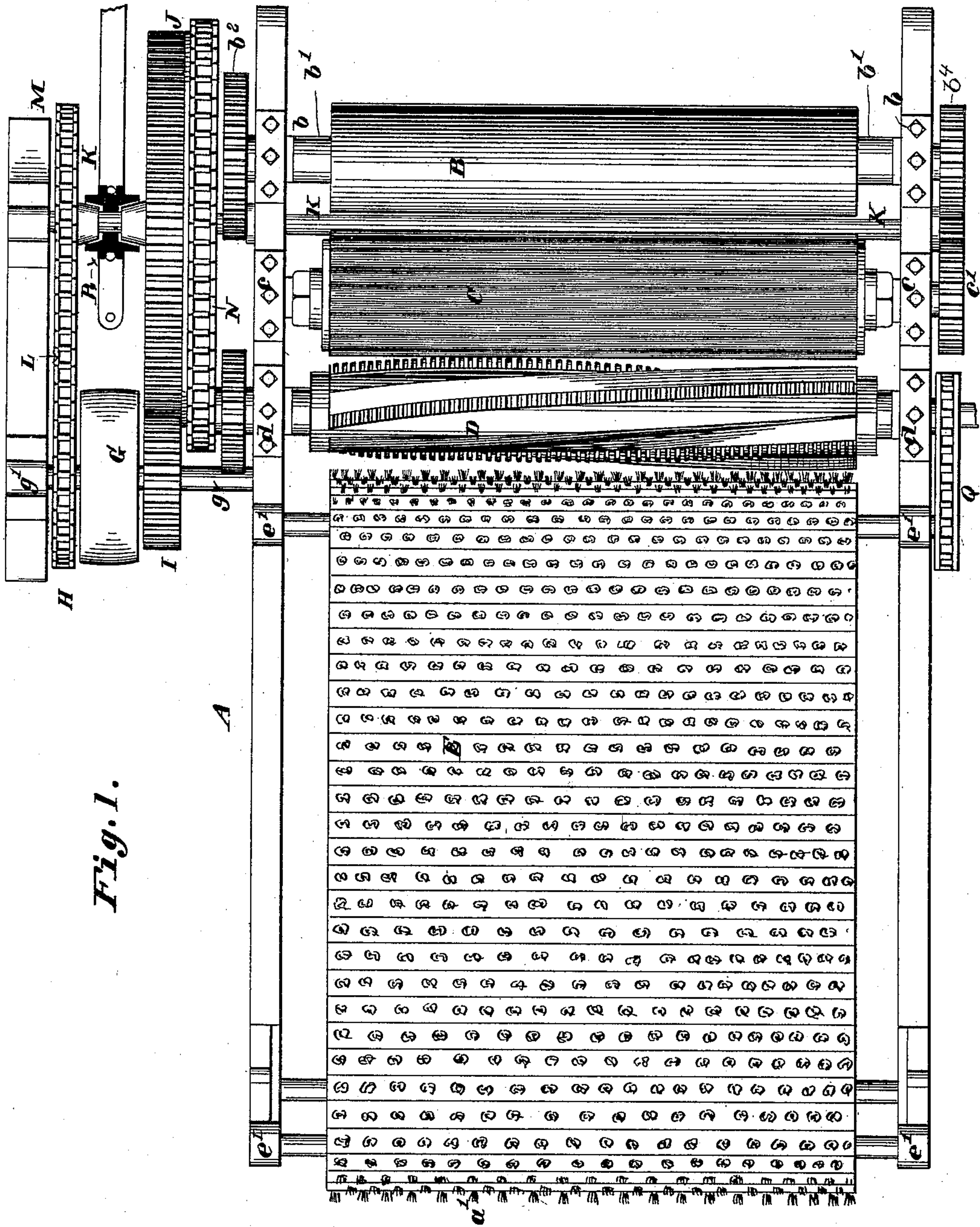


Fig. 1.

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Amel. S. Boyd

Inventor:
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by E. D. Moody atty

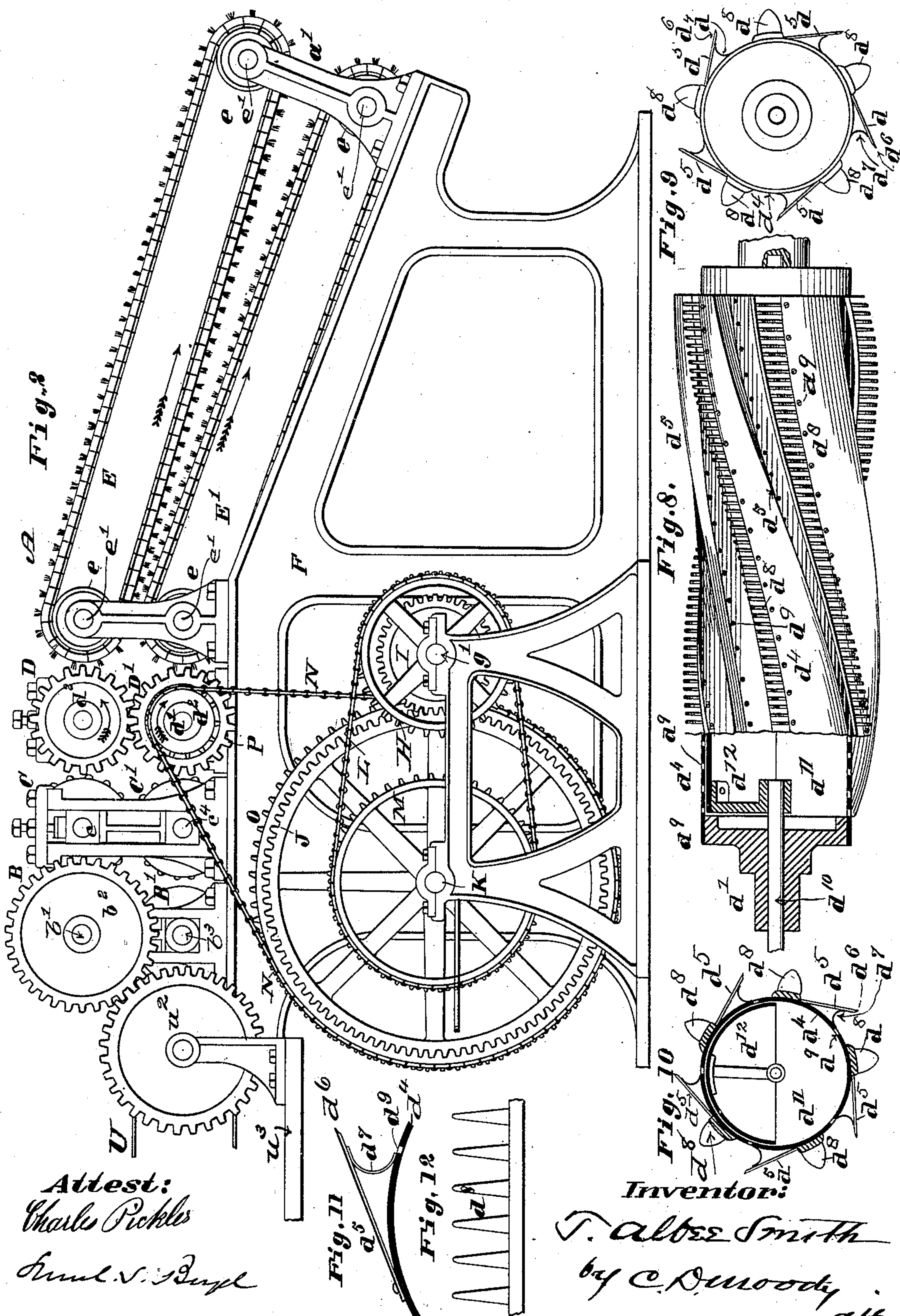
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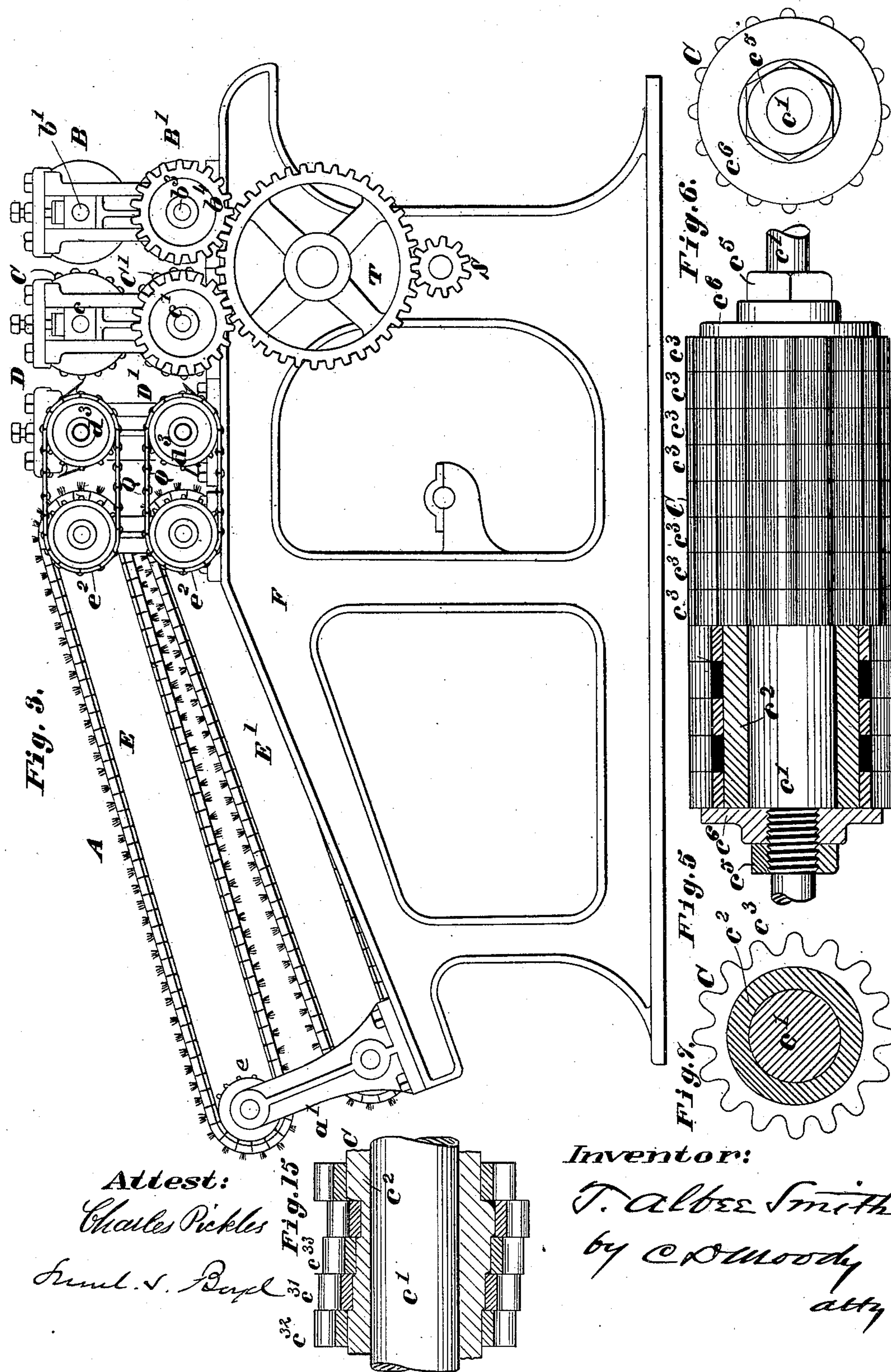
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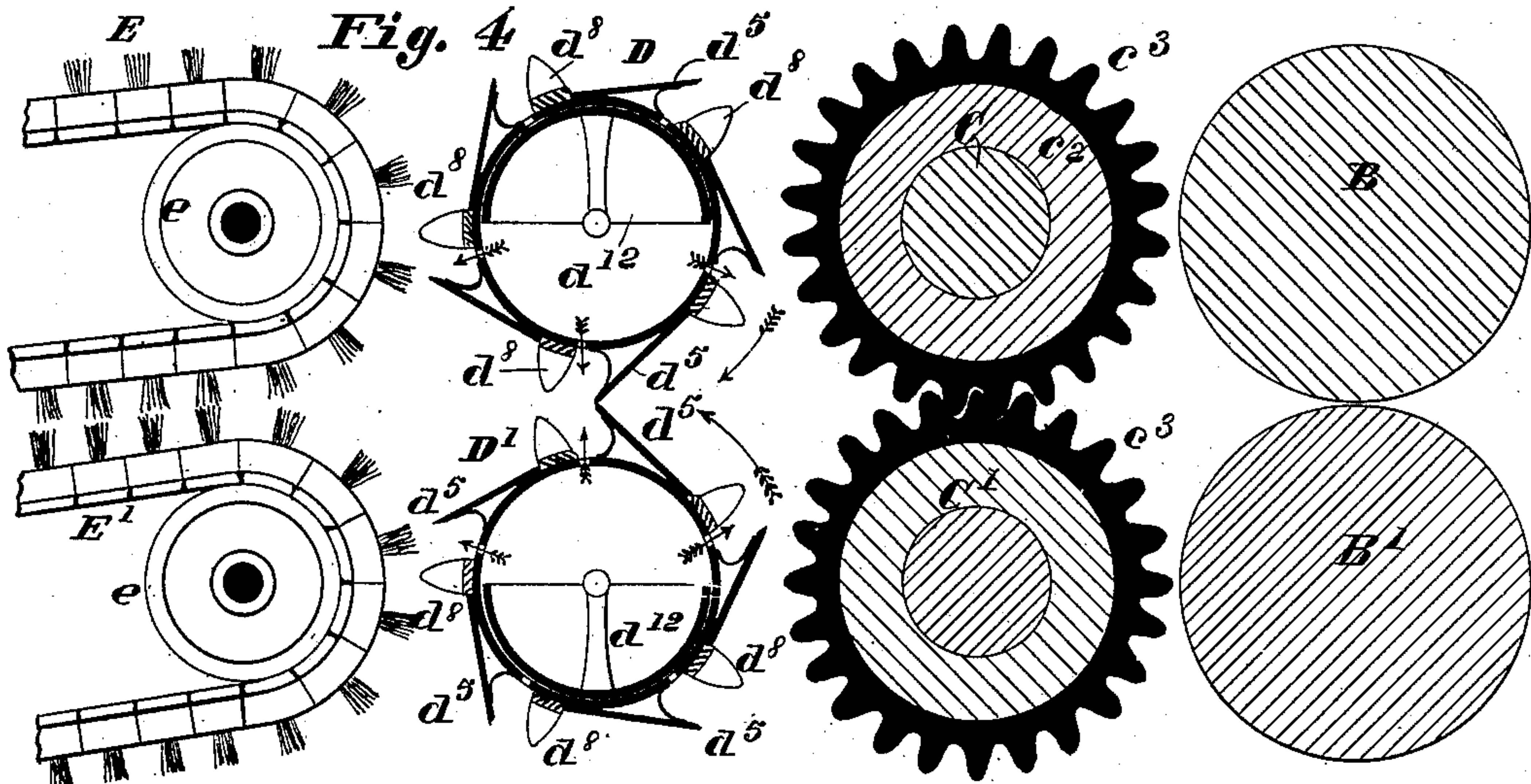
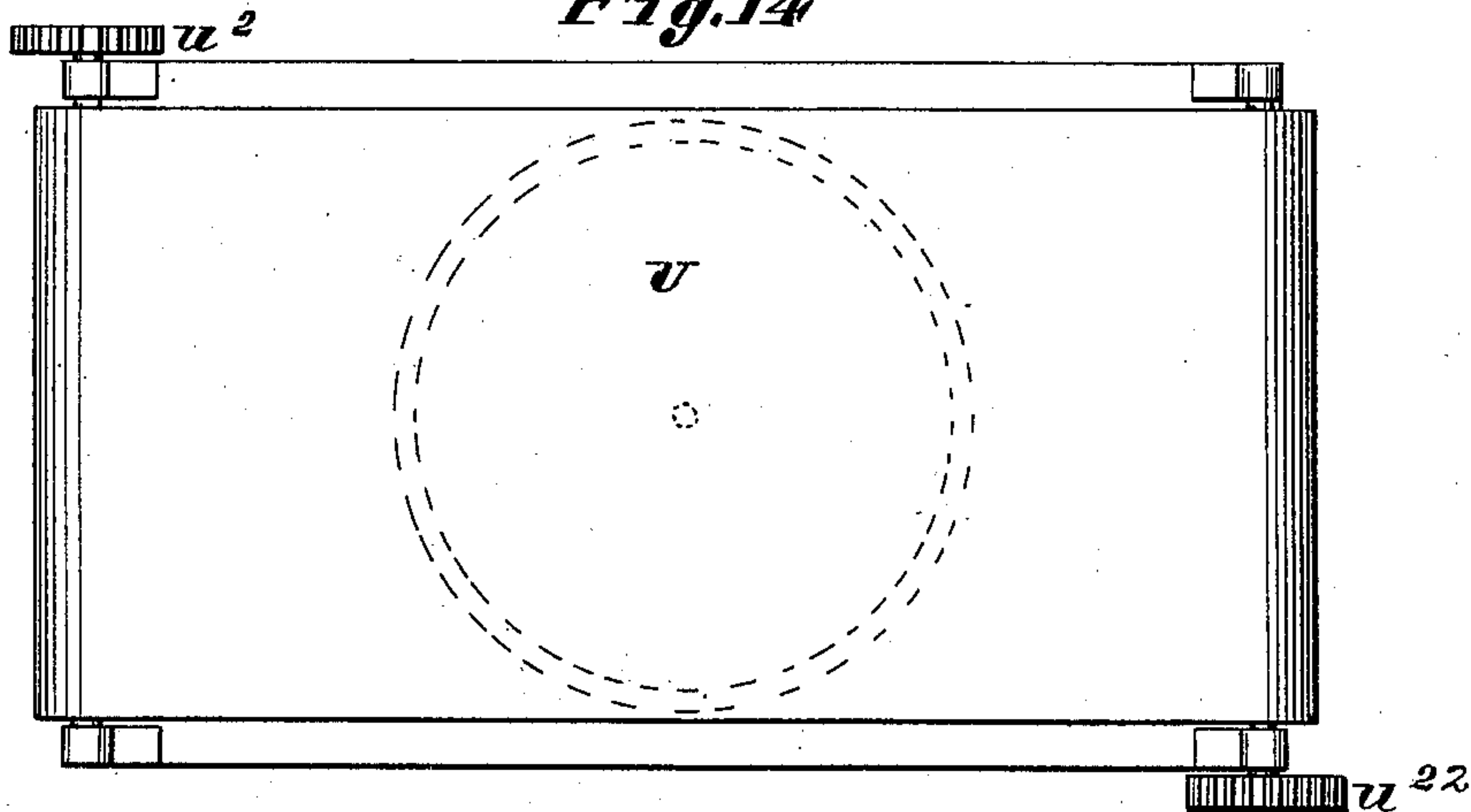


Fig. 13,



Fig. 14



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UNITED STATES PATENT OFFICE.

T. ALBEE SMITH, OF ST. LOUIS, MISSOURI, ASSIGNOR OF ONE-HALF TO L.
T. WOODS, OF SAME PLACE.

FIBER-DECORTICATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 321,863, dated July 7, 1885.

Application filed May 13, 1882. (No model.)

To all whom it may concern:

Be it known that I, T. ALBEE SMITH, of St. Louis, Missouri, have made a new and useful Improvement in Fiber-Decortivating Machines, of which the following is a full, clear, and exact description, reference being had to the annexed drawings, making part of this specification, in which—

Figure 1 is a plan of the improved machine; Fig. 2, a side elevation; Fig. 3, a side elevation of the opposite side to that shown in Fig. 2; Fig. 4, a sectional view upon an enlarged scale, showing the feed or flattening rolls, the breaking-rolls, the decortivating-rolls, and the brushes in part; Fig. 5, a side view, partly in section, of the upper breaking-roll; Figs. 6 and 7, respectively, an end view and a cross-section of the breaking-roll; Fig. 8, a side view, partly in section, of one of the decortivating-rolls; Figs. 9 and 10, respectively, an end view and a cross-section of the decortivating-roll; Fig. 11, a detail, being a cross-section upon an enlarged scale of one of the knives of the decortivating-rolls, a portion of the shell of the roll being shown; Fig. 12, a detail, being an elevation upon an enlarged scale of a portion of one of the combs of the decortivating-rolls; and Figs. 13 and 14, respectively, a side view and a plan of the feed-table, and Fig. 15 a detail.

The same letters denote the same parts.

In the present machine the material—such as hemp, jute, ramie, agaves, and other tropical plants from which fiber is obtained—is fed between a pair of smooth rolls, which serve to flatten the stalks. The flattened stalks then pass between a pair of breaking-rolls, which operate to break up the interior or pith portion of the stalks. The flattened and broken stalks then pass between a pair of what may be termed “decortivating-rolls,” by means of which the fiber is largely separated from the remainder of the stalk, decorticated, and divided into threads. The fiber and pith portion are then received between a pair of endless brushes, where the operation of separating the fiber from the remainder of the stalk is completed, the pith and the refuse being carried off by the brushes and discharged from the machine, and the fiber being withdrawn in the opposite direction.

The improvement relates to the flattening and decortivating rolls, in combination with the sectional breaking-rolls; to the construction of the decortivating-rolls, including the knives, the combs, and the provision for cleaning the knives; to the brush mechanism; to the means for supplying the fiber material to the flattening-rolls, and to minor details of the construction hereinafter specified.

In the drawings, A, Figs. 1, 2, 3, represents the improved machine. B B' represent the flattening-rolls; C C' the breaking-rolls; D D', the decortivating-rolls; E E', the brushes, and F the frame used in supporting the parts named and the various shafts, gears, and chains employed in operating them.

The flattening-rolls B B' are journaled at b b'. The shaft b' of the upper roll, B, is provided with a gear, b². The shaft b³ of the lower roll, B', is provided with a gear, b⁴.

The breaking-rolls are journaled at c c'; and the surfaces of these rolls are fluted, preferably as shown. The shaft c' of the lower roll, C', is provided with a gear, c'. The shaft of the upper roll, C, has a similar gear, but not here shown.

The interior construction of the upper breaking-roll, C, is shown more distinctly in Figs. 5, 7, the roll being in substance composed of the following parts: the shaft c', the sleeve c², of elastic material—such as rubber—and fitting closely to the shaft, and the series of rings c³ c³, of inelastic material—such as cast metal—and fitting closely to the sleeve. The collars c⁶ c⁶ and nuts c⁵ c⁵ confine the rings in the direction of the length of the roll, but transversely in the roll, or at right angles to the shaft. The rings c³ c³ can be moved independently of each other. The aim and effect of making the roll as thus described is to enable the fiber material to be properly held and compressed by the breaking-rolls, for in decortivating fiber it is impracticable to pass the fiber material through the various rolls of the decortivating machinery in the form of a layer of uniform thickness and hardness. On the contrary, the layer is constantly varying in thickness and hardness, and in consequence in fiber-decortivating machines as hitherto made, and in which rigid rolls of unyielding

surfaces are used, difficulty is experienced in not being able to perfectly separate the fiber from the stalk, and in not being able to properly retain the stalks in the breaking-rolls. The latter necessarily are forced apart sufficiently to admit the thickest portions of the layer, and, in consequence, the thinner portions, and which may be right alongside the thicker portions, are carried past the breaking-rolls without being broken. The stalks are also, from not being held back by reason of not being properly gripped in the breaking-rolls, carried too easily through the decorticating mechanism beyond. In the present machine this difficulty is obviated. The surface of the breaking-roll, as can be understood by referring to Fig. 15, is continually accommodating itself to the varying thicknesses of the layer of fiber material. By reason of the elastic foundation provided in the sleeve c^2 the surface of the roll can yield, and by reason of the surface being made in sections—such as the rings c^3 c^3 —one portion of the surface can yield more than another. The ring c^{31} , for instance, may yield more than the ring c^{32} , and the ring c^{33} more than the ring c^{31} , just according to the amount or hardness of the material immediately above the rings c^{31} c^{32} c^{33} , respectively. As soon as the thicker portions of the layer have passed, the rings opposite such thicker portions are, by reason of the resiliency of the sleeve, lifted, whereupon other rings may be forced to yield, according to the thickness of the layer immediately above them, and so on, the various rings c^3 c^3 rising and falling, so as to be farther from or nearer to the surface of the other roll, C' , as the varying thickness of the interposed layer may cause the rings to move.

The decorticating-rolls D D' are journaled at d d , the roll-shafts d' d' being furnished at one end with the gears d^2 d^2 and at the other end with the sprocket-wheels d^3 d^3 . The construction of the rolls is shown more distinctly in Figs. 4, 8, 9, 10. Attached to the shell d^4 of each roll is a series of knives, d^5 d^5 , the knives extending spirally upon the shell, and the spiral extending in opposite directions on the two rolls D D' . The knives do not stand directly out from the surface d^4 , but are inclined thereto, as seen in Figs. 9, 10. The knives are also yielding, the knife-edge d^6 being supported by a spring, d^7 . By reason of the knives being extended spirally in opposite directions upon the rolls D D' , the opposing knives come opposite each other, but at one point at a time, and as the knives are made to yield, as described, a layer of fiber material of varying thickness can be uniformly acted on by the knives. Between the knives d^5 d^5 , respectively, are combs d^8 d^8 . They serve to comb and straighten the disintegrated fiber. They also wind spirally around the shell d^4 . They can be used for the purpose named, irrespective of the knives d^5 d^5 , but in combination therewith are especially valuable. They are shaped preferably, as

shown in Figs. 9, 10, 11, and they are preferably made of composition, metal, or other suitable material to which the gums found on tropical fiber-producing plants will not adhere. The shell d^4 is perforated at d^9 d^9 . By means of a suitable inlet-pipe, such as d^{10} , and which passes through the shaft of the roll, water, steam, air, or any liquid or gas suitable therefor can be admitted or forced into the chamber d^{11} within the roll, and thence conducted or forced onto the outer surface of the roll and onto and against the knives, the liquid or gas passing through the perforations d^9 d^9 and directly against the under side of the knives. This serves to clean the knives, to soften and wash the fiber, and prevent the latter from lapping upon the roll. A valve, d^{12} , held stationery in the roll as the latter rotates, prevents the liquid or gas from escaping only in the direction of the fiber, the valve in Figs. 8, 10 being arranged as for the upper roll, D . In the lower roll, D' , (not shown,) the valve would appear turned downward.

The brushes E E' are carried around rolls e e e , journaled at e' e' e' . The roll-shaft at the forward ends of the brushes are provided with sprocket-wheels e^2 e^2 . The brushes move faster than the decorticating-rolls, and the latter in turn much faster than the breaking-rolls. By extending the brush-surface, as shown, in place of having cylindrical brushes, the fiber is prevented from winding upon the brushes. The brushes diverge toward the discharging end a' of the machine, providing thereby more clearance for the pith and refuse.

Motion is imparted to the machine by means of the pulley G . The latter is upon the shaft g , that is journaled at g' , and furnished with the sprocket-wheel H and the gear I . The latter engages with a gear, J , that is attached to a shaft, K . The gear, however, is loose upon the shaft K . The chain L transmits the motion of the sprocket-wheel H to a sprocket-wheel, M , that is loose upon the shaft K . A chain, N , transmits motion from a sprocket-wheel, O , (that is attached to and moves the gear J ,) to a sprocket-wheel, P , upon the decorticating-roll shaft d' . The pulley G , gear I , and wheel H constantly revolve in the same direction. The gear J and the wheel M also constantly revolve, but in opposite directions. The decorticating-rolls and the brushes (the latter being driven by the chains Q Q , Figs. 1, 3) also constantly revolve in the same direction; but as it is customary to disintegrate the fiber from one-half the length of the stalk, and then withdraw the stalk, and afterward disintegrate the fiber from the other half of the stalk, provision is here made for similarly treating the stalks. Accordingly, the flattening and breaking rolls must be made to rotate in one direction or the other, as desired. To this end provision is made for connecting the shaft K with either the gear J or the wheel M . To feed the stalks into the machine a clutch, R , is slipped to the left, as seen, to

connect the gear J and shaft K. The latter then rotates with the former, and by means of the gears S T b^4 c' the desired movement of the rolls B B' C C' is obtained. To reverse the motion of these rolls, as when the stalk or fiber is being withdrawn from the machine, the clutch R is slipped in the opposite direction on the shaft K, and to connect the wheel M and the shaft K. The latter now rotates in the opposite direction, and the rolls B B' C C' turn backward, allowing the stalks or fiber to be withdrawn from the machine at the forward end thereof.

In Figs. 13, 14 a device is shown for feeding the stalks to the flattening-rolls. U represents an endless apron carried around rolls u u , the roll-shaft u' u' being provided with the gears u^2 u^{22} , and being held in a frame, w^3 . The latter is provided with rollers u^4 u^4 , to enable it to be turned around on a platform, V. The latter is furnished with rollers v v , to enable it to be rolled forward and backward upon a trackway, W.

The operation is as follows: The trackway W is arranged in front of the machine A. The platform V is moved upon the trackway to bring the gear u^2 of the apron U into engagement with the gear b^2 of the machine A. This causes the apron to move, as indicated by the arrows in Fig. 13, and the fiber material, which is laid upon the apron, is fed into the flattening-rolls and worked thence through the machine to disintegrate the fiber from half the length or more of the stalks. On reversing the motion of the flattening and breaking rolls, as above described, the apron is caused to move in the opposite direction and to withdraw the partly-decorticated fiber from the machine. The platform V is then moved upon the trackway to disengage the gears u^2 b^2 . The apron U is then turned around upon the platform V, and so as to present the gear u^{22} to the gear b^2 . The platform is then moved upon the trackway to bring the gears u^{22} b^2 into engagement, whereupon the other ends of the stalks are run into the machine and the fiber decorticated therefrom, and so on, moving the platform upon the trackway and reversing the apron upon the platform, as occasion may require.

I claim—

1. In a fiber-decortivating machine, the combination of the flattening-rolls B B', the sectional breaking-rolls C C', and the decortivating-rolls D D', substantially as described. 55
2. In a fiber-decortivating machine, the pair of rolls D D', having the spirally-arranged yielding knives d^5 d^5 , substantially as described.
3. In a fiber-decortivating machine, the rolls D D', having the spirally-arranged knives d^5 d^5 and the spirally-arranged combs d^8 d^8 , substantially as described. 60
4. In a fiber-decortivating machine, the roll D, having the chamber d^{11} , the perforated shell d^4 , and the knives d^5 d^5 , substantially as described. 65
5. In a fiber-decortivating machine, the roll D, having the chamber d^{11} , the perforated shell d^4 , and the valve d^{12} , substantially as described. 70
6. In a fiber-decortivating machine, the combination of the flattening-rolls B B', the breaking-rolls C C', the decortivating-rolls D D', and the endless brush-belts E E', substantially as described. 75
7. In a fiber-decortivating machine, the combination of the decortivating-rolls D D' and the brush-belts E E', substantially as described.
8. A fiber-decortivating machine having the endless brush-belts E E', for the purpose described. 80
9. In a fiber-decortivating-machine, the diverging brush-belts E E', substantially as described. 85
10. In a fiber-decortivating machine, the combination of the apron U and the platform V, substantially as described.
11. In a fiber-decortivating machine, the combination of the apron U, the platform V, and the trackway W, substantially as described. 90
12. In a fiber-decortivating-machine, a pair of decortivating-rolls, both of said rolls having a series of spirally-arranged knives, d^5 d^5 , substantially as described. 95

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Witnesses:

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SAML. S. BOYD.