(No Model.) 2 Sheets—Sheet 1.

C. L. GODDARD.

PICKER OR OPENER FOR FIBROUS MATERIALS.

No. 288,327. Patented Nov. 13, 1883.

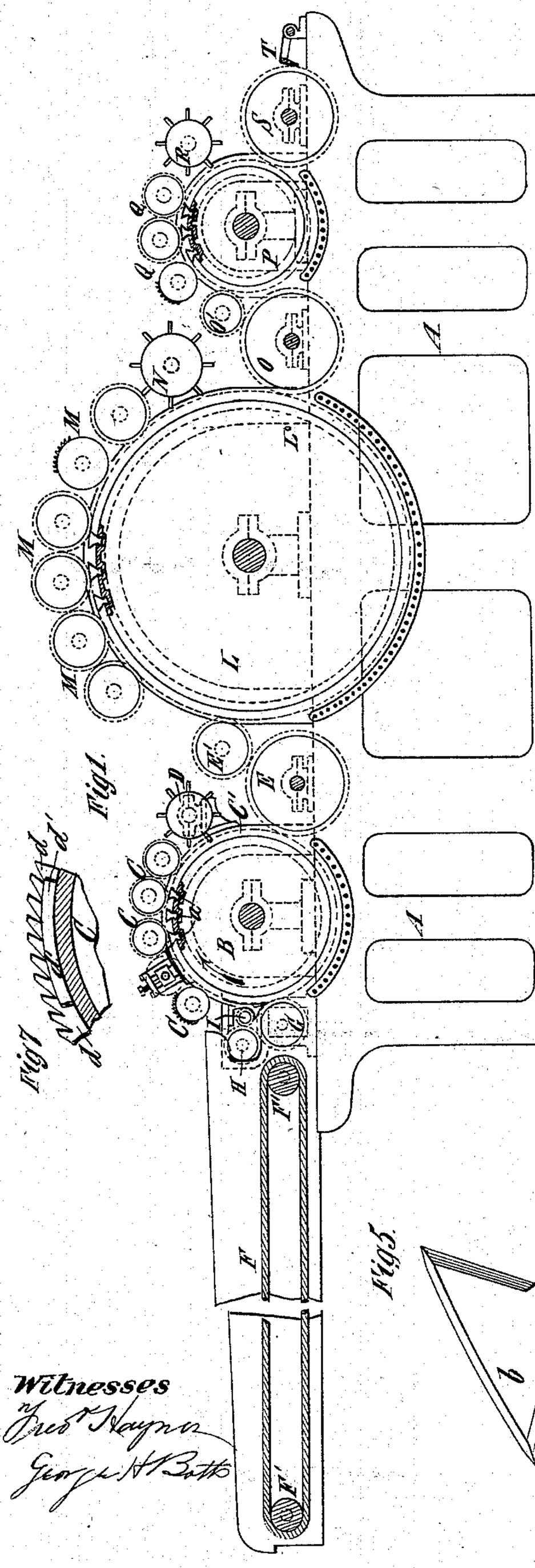

Fig 1.

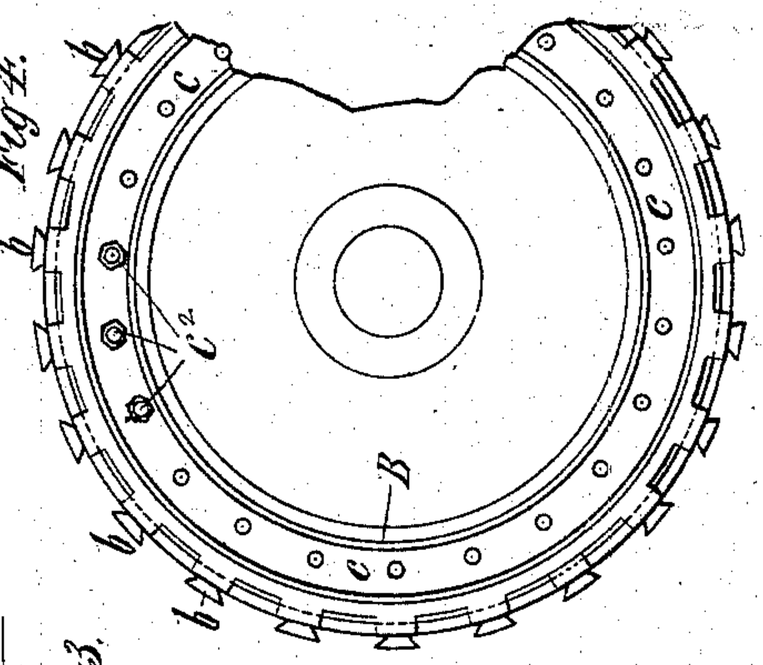

Fig 4.

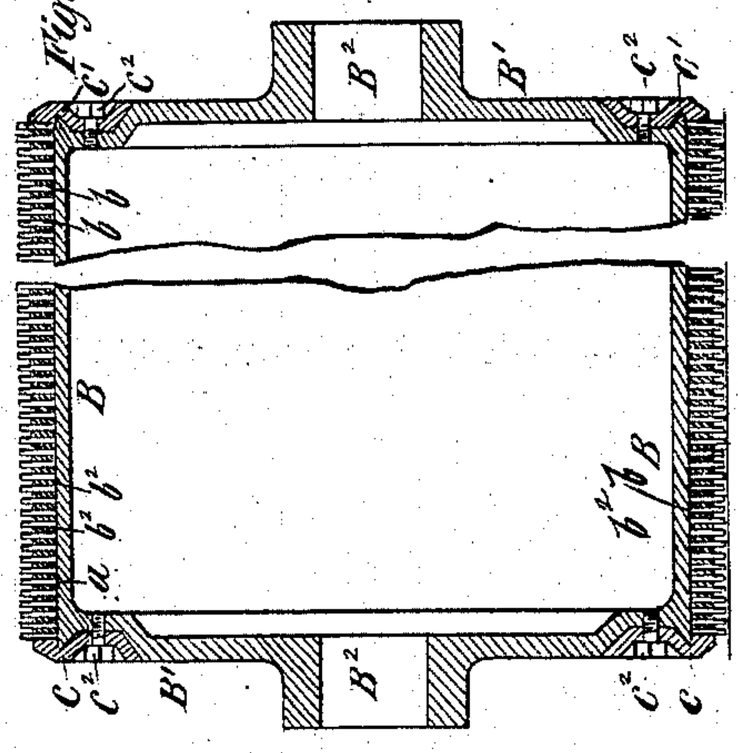

Fig 3.

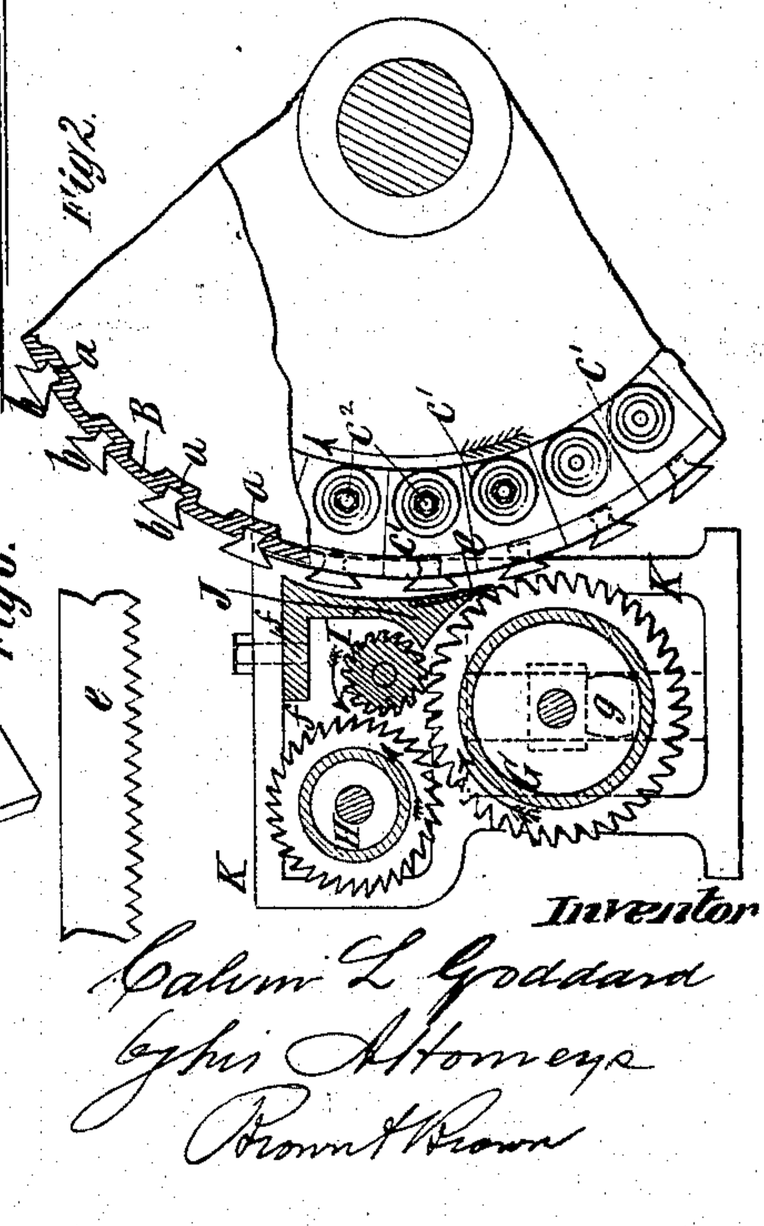

Fig 2.

Fig 5.

Fig 6.

Witnesses
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George H. Batts

Inventor
Calvin L. Goddard
by his Attorneys
Brown & Brown

(No Model.) 2 Sheets—Sheet 2.

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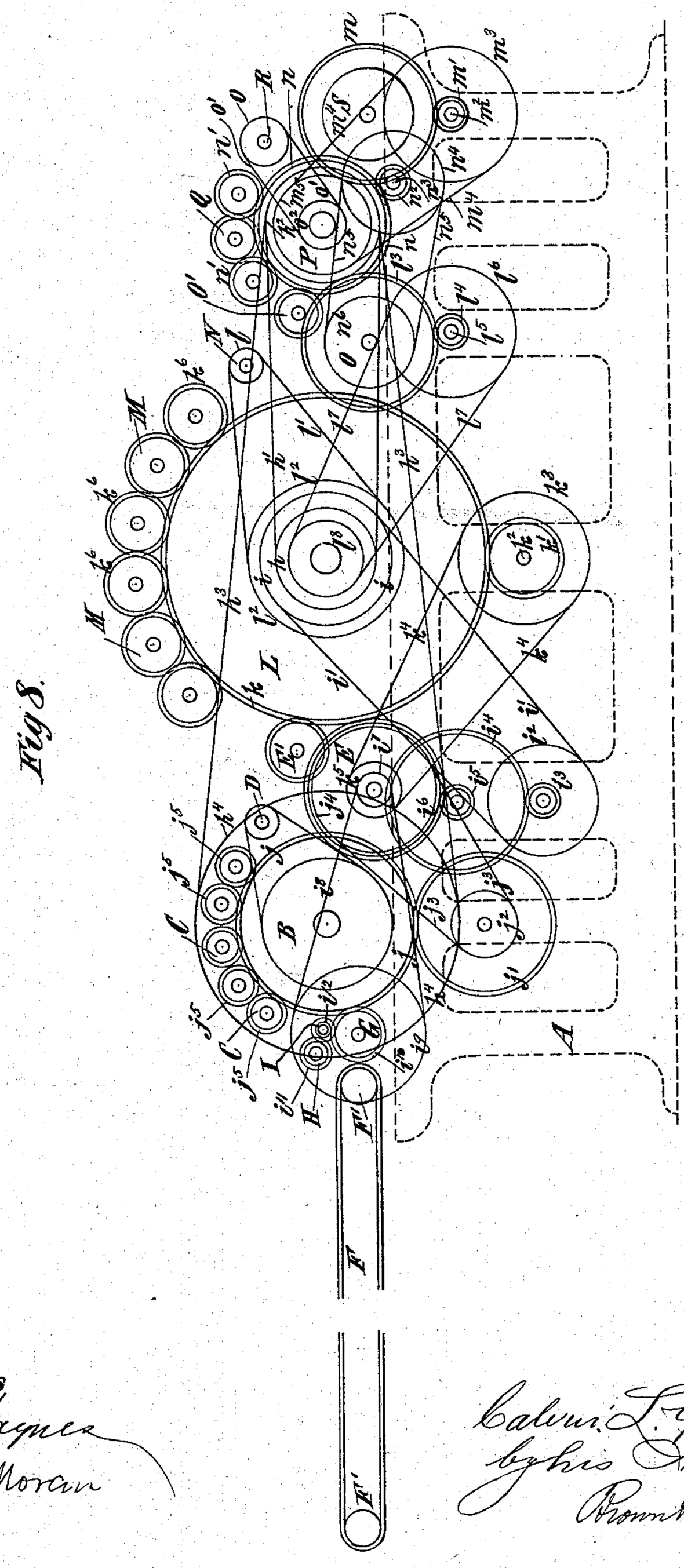

Fig 8.

Witnesses
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UNITED STATES PATENT OFFICE.

CALVIN L. GODDARD, OF NEW YORK, N. Y.

PICKER OR OPENER FOR FIBROUS MATERIALS.

SPECIFICATION forming part of Letters Patent No. 288,327, dated November 13, 1883.

Application filed November 29, 1881. (No model.)

To all whom it may concern:

Be it known that I, CALVIN L. GODDARD, of the city and county of New York, in the State of New York, have invented certain new and useful Improvements in Pickers or Openers for Fibrous Materials, of which the following is a specification.

An important object of my invention is to provide a more effective and desirable machine for opening yarn waste to bring it to its original fiber without breaking the fibers into shoddy, and thus prepare such material for working up into fine yarn either alone or with new stock; but my improvements are wholly or in part applicable to pickers or openers for working other materials.

My invention consists in the combination, with toothed opening or picking cylinders, of a novel feed apparatus, hereinafter particularly described, and comprising feed-rolls between which the stock passes, and which are provided with teeth inclined rearward or backward relatively to the direction in which the stock moves, and a comb-plate or toothed plate, whereby the feed-rolls have a firm hold upon the material being worked and prevent the material from being drawn forward too rapidly by the opening or picking cylinder.

The invention also consists in a novel construction of the hooked teeth of the opening or picking cylinder, whereby their points may be repeatedly renewed by simple grinding of the outer edges, such teeth being preferably formed with two points at their opposite edges, and adapted to be secured in the cylinder so that either point will be operative.

In the accompanying drawings, Figure 1 represents a longitudinal vertical section of a machine embodying my invention. Fig. 2 represents a similar section, on a larger scale, of the feed apparatus and a part of the adjacent opening or picking cylinder. Fig. 3 represents a longitudinal section of the two end portions of said cylinder, part thereof being broken away to economize space. Fig. 4 represents an end view of the cylinder having a portion broken away. Fig. 5 represents a perspective view of one of my improved teeth. Fig. 6 represents a face view of a portion of a comb-plate employed in the feed apparatus. Fig. 7 represents a detail section of a portion of one of the workers of the first opening-cylinder; and Fig. 8 is a diagram of one side of the machine, showing in outline the mechanism for operating the several parts thereof.

Similar letters of reference designate corresponding parts in all the figures.

A designates the frame of the machine, and B designates the opener or picker cylinder, the construction of which I will first describe. The cylinder here represented is composed of a single casting having heads B′ cast integral with it, and provided with hubs B^2, in which the shaft of the cylinder is fixed. In the periphery of the cylinder are a number of longitudinal grooves, *a*, which are undercut or dovetailed, and which may be formed by planing the cylinder from end to end. In the grooves *a* are inserted the teeth *b*, whereby the opening of the yarn or other material is effected, and the form of which is shown most clearly in Fig. 5. These teeth are cut from sheet-steel of suitable thickness—say about sixteen gage—and are formed with dovetailed shanks *b′*, adapted to fit snugly in the grooves *a* in the cylinder. The teeth have arc-formed tops and V-shaped or sharpened edges, which extend from their shanks outward, the opposite edges being divergent from their shanks outward. The teeth are of uniform thickness within the bevel of their edges. The sharpened edges of the teeth form acute angles with their outer edges, and, though the double-pointed teeth are desirable, teeth having only one edge sharpened might be used, the back edges of the teeth being of any desired form. The teeth *b* are inserted in the dovetail grooves *a* in the cylinder, at the ends thereof, and packing-pieces b^2 are placed between the teeth, as seen in Fig. 3, so that there will be about eight teeth to the inch. The teeth are retained in the grooves *a* by means of a solid ring, *c*, securely bolted to one end of the cylinder, and segmental sections or clamps *c′* bolted to the other end of the cylinder. The several segmental sections or clamps *c′* are shown clearly in Fig. 2, they being equal in number to the number of grooves in the cylinder, and they together form a ring and mutually support each other laterally. Whenever it is desired to remove the teeth in any groove, for renewing any of them in case of breakage, or for any

other purpose, all that is necessary is to remove the clamp c' opposite that groove, which may be done without disturbing the teeth in any of the other grooves. The use of separate packing-pieces between the teeth in the several grooves is also very much more desirable than a packing-ring would be, because when separate packing-pieces are used the teeth in adjacent rows may be placed in staggered relation to each other, so that the teeth in one row will be opposite the spaces between the teeth in adjacent rows. This may be done by inserting at the beginning of any row a packing-piece which is thinner than the others. The solid ring c and the clamps c' are secured to the cylinder by means of bolts c^2, and both the ring and clamp are fitted into annular grooves or seats in the ends of the cylinder, and are themselves recessed for the bolt-heads on the outer side, so that when put together the ends of the cylinder are flush, as clearly seen in Fig. 3. The fan-shaped form of the teeth b and the sharpening them on both edges are very advantageous, because after one point of the teeth gets dull the cylinder B may be reversed end for end, or the teeth reversed in the several grooves, so as to bring the other points into action, thus giving the teeth a double life, and after both points have been worn dull they may be renewed by grinding off the outer edges or tops of the teeth while they are in the cylinder. Thus it will be seen that, as the opposite edges of the teeth are sharp clear down to their shanks b', a slight grinding of the outer edges will renew the points, and this grinding may be repeated until the teeth are worn almost down to their shanks b'. The first opening-cylinder, B, rotates upward, as indicated by the arrow in Figs. 1 and 2, and has five workers, C, which are supported in bearings upon an arch, C', in the usual way, as seen clearly in Fig. 1. The teeth of the several workers are preferably formed of toothed steel rings d, as seen in Fig. 7, having packing-rings d' inserted between them. The toothed rings d of the first worker may be made of sixteen-gage steel and set ten rings to the inch, the rings of the second worker of twenty-gage steel set twelve rings to the inch, and the rings of the other worker of twenty-two gage steel set fourteen rings to the inch. These dimensions may of course be departed from for working different materials.

D designates a fancy, which loosens the stock from the teeth of the opener-cylinder and insures its easy delivery to the doffer E. The fancy and doffer may be of any ordinary construction; but I prefer to make the toothed rings of the latter of twenty-two gage steel set eleven rings to the inch.

I have shown only one construction of the opener-cylinder B; but the construction and arrangement of the teeth here represented are very desirable, and may be used with a skeleton cylinder having longitudinal grooved bars, or a cylinder of any other suitable construction.

I will now describe the feeding apparatus for feeding material to the cylinder B and holding it back while the teeth of the cylinder act upon it.

F designates the feeding-apron by which the material or stock is carried forward, and which is carried by rollers F'. The feed (represented most clearly in Fig. 2) comprises a large feed-roll, G, an intermediate roll, H, and a small roll, I, a comb-plate casting or stock, J, and a comb-plate, e. (Shown in face view in Fig. 6.) The face of the comb-plate casting or stock J is curved correspondingly to the tooth-periphery of the cylinder B, and the teeth of the latter travel in close proximity thereto, while the bottom face of the casting is curved correspondingly to the tooth-periphery of the large feed-roll G. The comb-plate e is secured to the front face of the casting J, and projects below its lower edge. The several rolls G, H, and I are supported in bearings in suitable standards, K, and are connected by gearing, so that their relative speed of rotation will be unvarying. The intermediate roll, H, and the small roll I both rotate at the same peripherical velocity as the large feed-roll G, and the direction of their rotation is indicated by arrows in Fig. 2. The large roll G and the intermediate roll, H, comprise toothed rings and interposed packing-rings, like the several workers C. The rings of the roll G may be of sixteen-gage steel set eight rings to the inch, lengthwise of the roll, and the rings of the roll H may be of sixteen gage set about six to the inch. The small roll I consists of a longitudinal grooved shaft, and it is set as near the comb-plate e as possible, the lower portion of the comb-plate casting being as thin as is consistent with necessary strength. The chief requisites in a feed for a machine of this class are to secure such a firm hold on the yarn or other stock that it shall not be drawn through faster than the surface speed of the rolls, so as to insure its thorough opening and to hold the stock as near as possible to the teeth of the opener-cylinder, so that it shall be well opened at that point. The three rolls have their teeth hooked or standing backward in a direction opposite to that in which they rotate and to the direction in which the stock moves, so as to hold back upon the stock. The stock enters between the large roll G and the intermediate roll, H, and these rolls, in conjunction with the small roll I, carry the stock forward between them until it comes between the comb-plate e and the large roll G. Both the rolls H and I tend to fasten the stock to the teeth of the roll G, and the latter carries the stock to the comb-plate e, across the toothed edge of which it is opened by the teeth of the opener-cylinder B. The teeth of the opener-cylinder B strip the stock from the feed-roll G, which is facilitated by the backward inclination of the teeth of said roll, and

operate on the stock held against the comb-plate *e*. The comb-plate casting J falls back at the top of the comb-plate *e* about three-sixteenths of an inch from the teeth of the cylinder B, and follows the cylinder upward, nearing it, till at the top it is close to the cylinder. This enables the cylinder to catch hold of any thread of yarn which the teeth may not have caught at their intersection with the comb-plate. At the top of the casting J are flanges or offsets *f*, which are bolted to the top of the feed-roller standards K. The standards K are so constructed as to have the intermediate and small rolls H and I and the comb-plate casting J firm and unyielding; and there is a spring at the bottom of the box of the large roll G, so that it will accommodate itself to the thickness of the feed of the stock. The spring may consist of a rubber block, *g*. (Shown dotted in Fig. 2.)

Although I prefer to use feed-rolls having toothed rings and interposed packing-rings for cotton and yarn waste, feed-rolls having other kinds of teeth may be used for wool and other materials. The feed would work if the intermediate roll, H, were dispensed with, but not as well, for two small rolls and one large roll are equivalent to two pairs of feeds. One upper roll instead of two would require to be much larger than the roll I now is, and there would be a longer distance to the bite of the rolls for the stock to be held against the comb-plate casting by the larger roll. If the opener-cylinder B were rotated in the opposite direction, or downward, the whole feed should be reversed, the large roll G being above and the two rolls H I and the comb-plate *e* below. For some materials only one opener-cylinder is necessary, and when so the machine as above described is complete; but for other materials it is desirable to employ a second opener-cylinder and a finishing-cylinder.

L designates a second opener-cylinder, which is represented as made like the first, but is larger, and has forty rows of teeth, or thereabout, while the first only has about sixteen. The teeth of the second cylinder are less in size than those of the first, and finer, they being made of about twenty-gage steel and set about fourteen to the inch. The stock is stripped from the doffer E and delivered to the second cylinder by a doffer, E′, and above the second cylinder, L, are six workers, M, and a fancy, N, the workers having about sixteen rings to the inch. The stock is stripped from the second cylinder, L, by a doffer, O, which may have about fourteen rings to the inch, and by a second doffer, O′, having about fourteen rings to the inch, the stock is delivered to a finishing-cylinder, P. The finishing-cylinder has toothed steel rings, about twenty to the inch, and is surmounted by three workers, Q, having also about twenty rings to the inch, and a small fancy, R. The stock is stripped from the finishing-cylinder P by a doffer, S, having about fourteen rings to the inch, and from the doffer it is removed by a doffer-comb, T, or by a brush, if preferred.

I will now describe, briefly, the driving mechanism which is employed, and which may be understood from the outline view, Fig. 8.

Upon the second opener-cylinder, L, are fast and loose pulleys, which are driven by a belt from any suitably-arranged counter-shaft. The said second opener-cylinder also carries a pulley, *h*, from which motion is transmitted by a belt, *h′*, to a pulley, h^2, on the finishing-cylinder P′, and over this belt *h′* is placed a second belt, h^3, which drives onto a pulley, h^4, on the first opener-cylinder, B. To drive the doffer E of the first opener-cylinder, motion is transmitted from a pulley, *i*, on the second opener-cylinder, L, by a belt, *i′*, to a pulley, i^2, having secured to it a pinion, i^3, which gears into a wheel, i^4. Secured to the wheel i^4 is a pinion, i^5, which gears with a wheel, i^6, on the shaft of the doffer E. The feed-roll G is driven from a pulley, i^7, on the doffer E by a belt, i^8, passing over a pulley, i^9, on the shaft of the feed-roll G. On the same shaft is a gear-wheel, i^{10}, engaging with gear-wheels i^{11} i^{12} on the feed-rolls H I. On the box of the first opener-cylinder, B, is a gear-wheel, *j*, which is driven by a gear-wheel *j′* the pulley j^2 of which is driven by a belt, j^3, from a pulley, j^4, on the shaft of the doffer E. The workers C of the first opener-cylinder, B, are driven from the large gear-wheel *j* by pinions j^5. On the box of the second opener-cylinder, L, is a large gear-wheel, *k*, which receives motion from a pinion, *k′*, mounted on a stud, k^2, and secured to a pulley, k^3, which derives motion by a belt, k^4, from a pulley, k^5, on the shaft of the doffer E. The workers M of the second opener-cylinder, L, are driven from the large gear-wheel *k* by pinions k^6. The fancy N of the second opener-cylinder, L, is provided with a pulley, *l*, and receives motion by a belt, *l′*, from a pulley, l^2, on the shaft of the second opener-cylinder, L. The shaft of the doffer O of the second opener-cylinder, L, is provided with a gear-wheel, l^3, which receives motion from a pinion, l^4, on a stud, l^5. The pinion l^4 rotates with a pulley, l^6, which receives motion by a belt, l^7, from a pulley, l^8, on the shaft of the second opener-cylinder, L. The finisher-doffer S is provided with a gear-wheel, *m*, which is driven by a pinion, *m′*, on a stud, m^2, and on said stud is a pulley, m^3, which receives motion by a belt, m^4, from a pulley, m^5, on the shaft of the finishing-cylinder P. On the box of the finishing-cylinder P is a large wheel, *n*, which drives the workers Q through pinions *n′*, and itself receives motion from a pinion, n^2, mounted on a stud, n^3, on which is also mounted a pulley, n^4. The pulley n^4 receives motion by a belt, n^5, from a pulley, n^6, on the doffer O of the second opener-cylinder, L. On the finisher-fancy R is a pulley, *o*, which receives motion by a belt, *o′*, from a pulley, o^2, on the shaft of the finishing-cylinder P.

Referring now to the sizes and speeds of the

principal parts of my machine, the three feed-rollers G, H, and I may be four and three-fourths, two and three-fourths, and one and three-fourths inches diameter, respectively, and the large roll G may make about five revolutions a minute, while the others travel at the same peripherical velocity. The first opener-cylinder, B, may be about sixteen inches diameter and make about five hundred revolutions per minute. The second opener-cylinder, L, may be about thirty inches in diameter and make about two hundred and twenty-five revolutions per minute; and the finishing-cylinder may be about thirteen inches in diameter and make about two hundred and fifty revolutions per minute. The several workers, fancys, and doffers should be run at speeds proportionate to those above stated.

Although the sizes and speeds of revolution above stated for the several feed-rolls and opener and finishing cylinders are very desirable for working certain kinds of stock, they may not be the best adapted for other kinds, and they may be departed from as much as may be found desirable or necessary.

I am aware that a picker-cylinder has been made in which the teeth are inserted in longitudinal grooves in the cylinder, and are separated by packing-rings which entirely surround the cylinder, and I do not claim such construction as my invention.

What I claim as my invention, and desire to secure by Letters Patent, is—

1. The combination, with a picker or opener cylinder, of a feed comprising rolls between which the stock passes, and which are provided with teeth inclined backward or rearward relatively to the direction in which the stock moves, and a comb-plate over the toothed edge of which the stock is drawn by the cylinder, substantially as and for the purpose specified.

2. A tooth for an opener-cylinder, having an arc-formed top and a V-shaped or sharpened front edge, and being of uniform thickness behind the bevel of the edge, substantially as specified.

3. The combination, with an opener-cylinder, of double-pointed reversible teeth secured therein, substantially as specified.

4. The teeth *b* for an opener-cylinder, having their opposite edges divergent and sharpened, substantially as specified.

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