

No. 655,168.

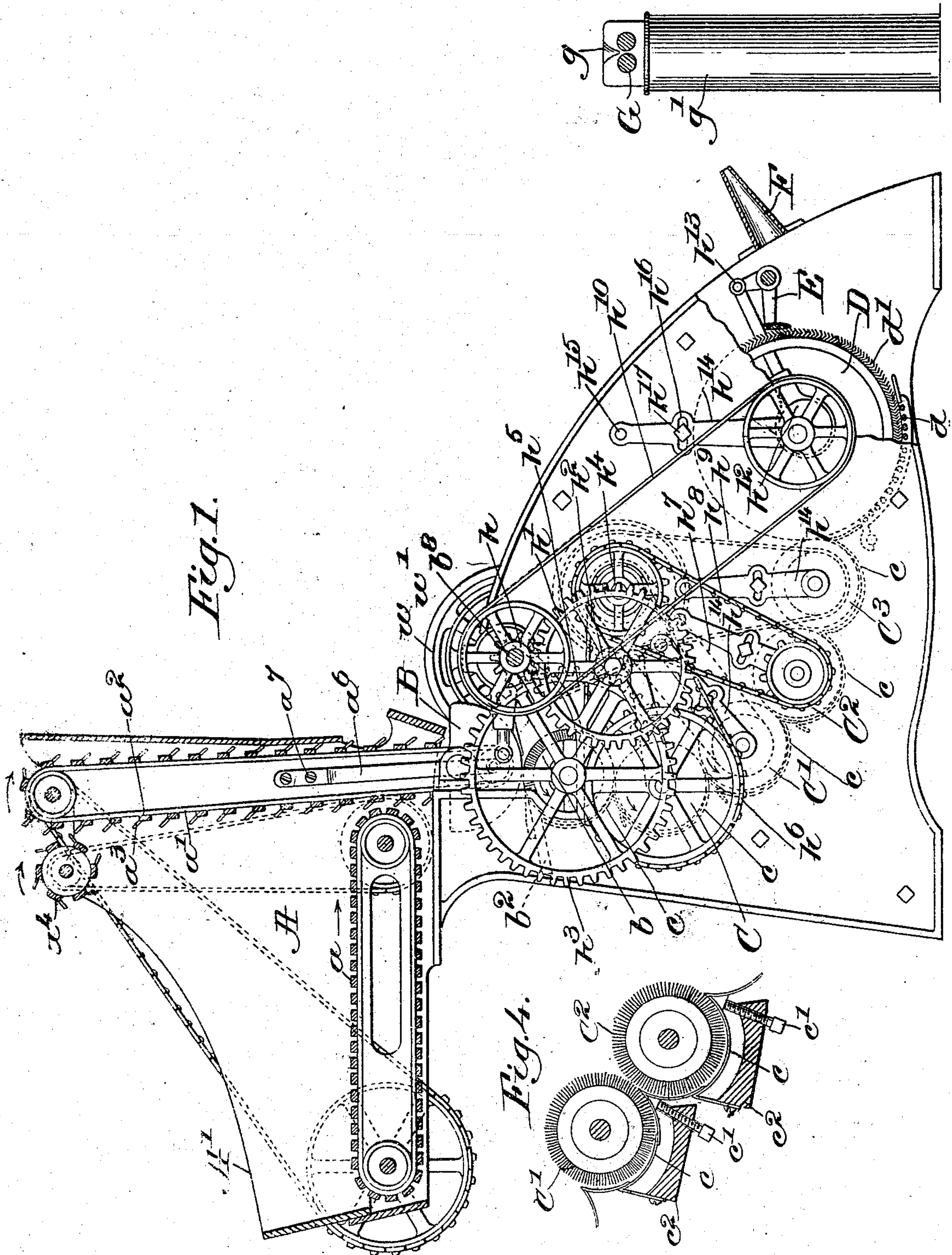
Patented July 31, 1900.

M. PRIOR.
ROLLER OR BRUSH CARD.

(Application filed Mar. 2, 1897.)

(No Model.)

2 Sheets--Sheet 1.



Witnesses:

A. C. Harmon
Thomas Drummond

Inventor:

Matthew Prior
by Crosby & Gregory
attys

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2 Sheets—Sheet 2.

Fig. 2.

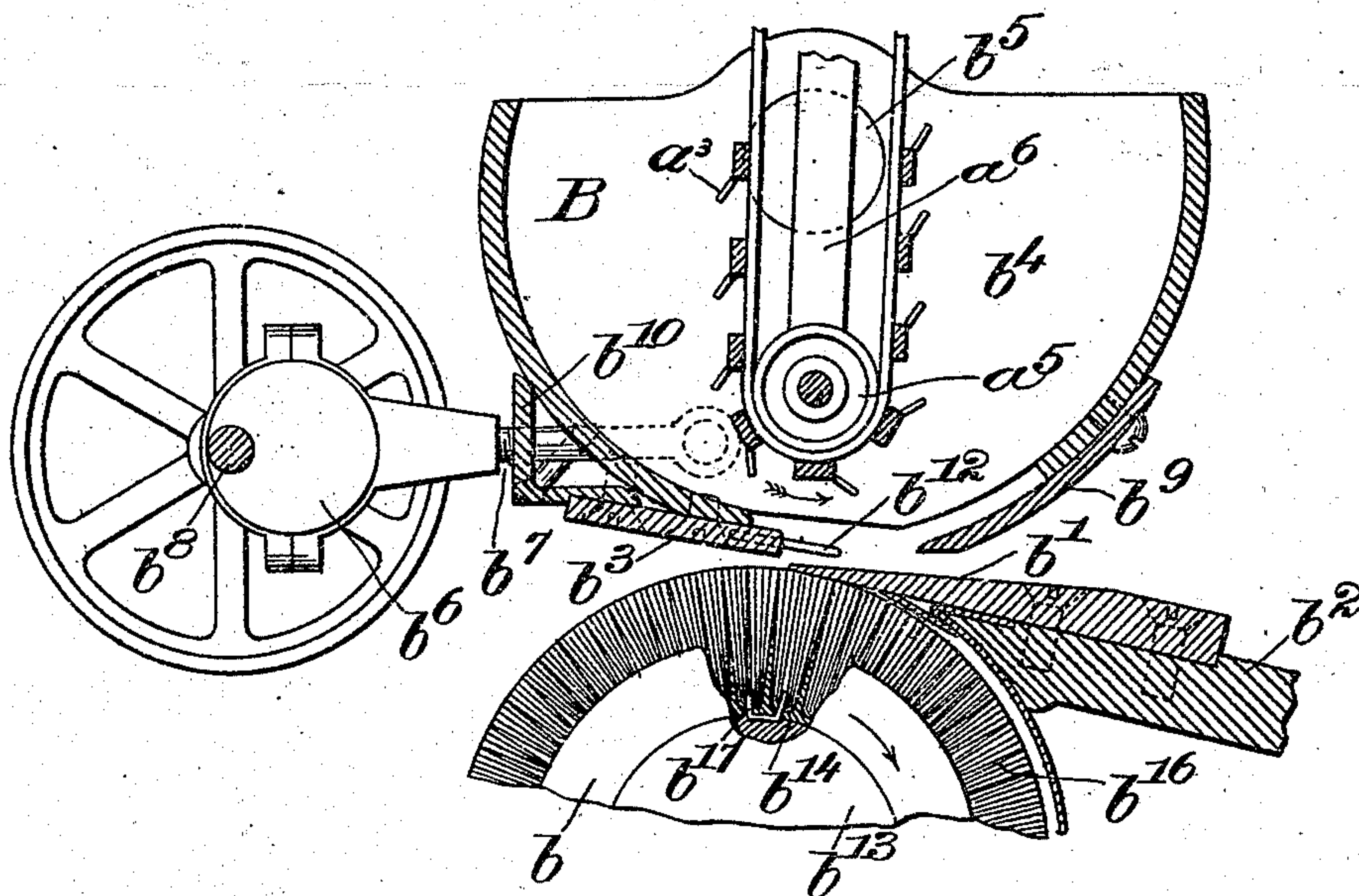
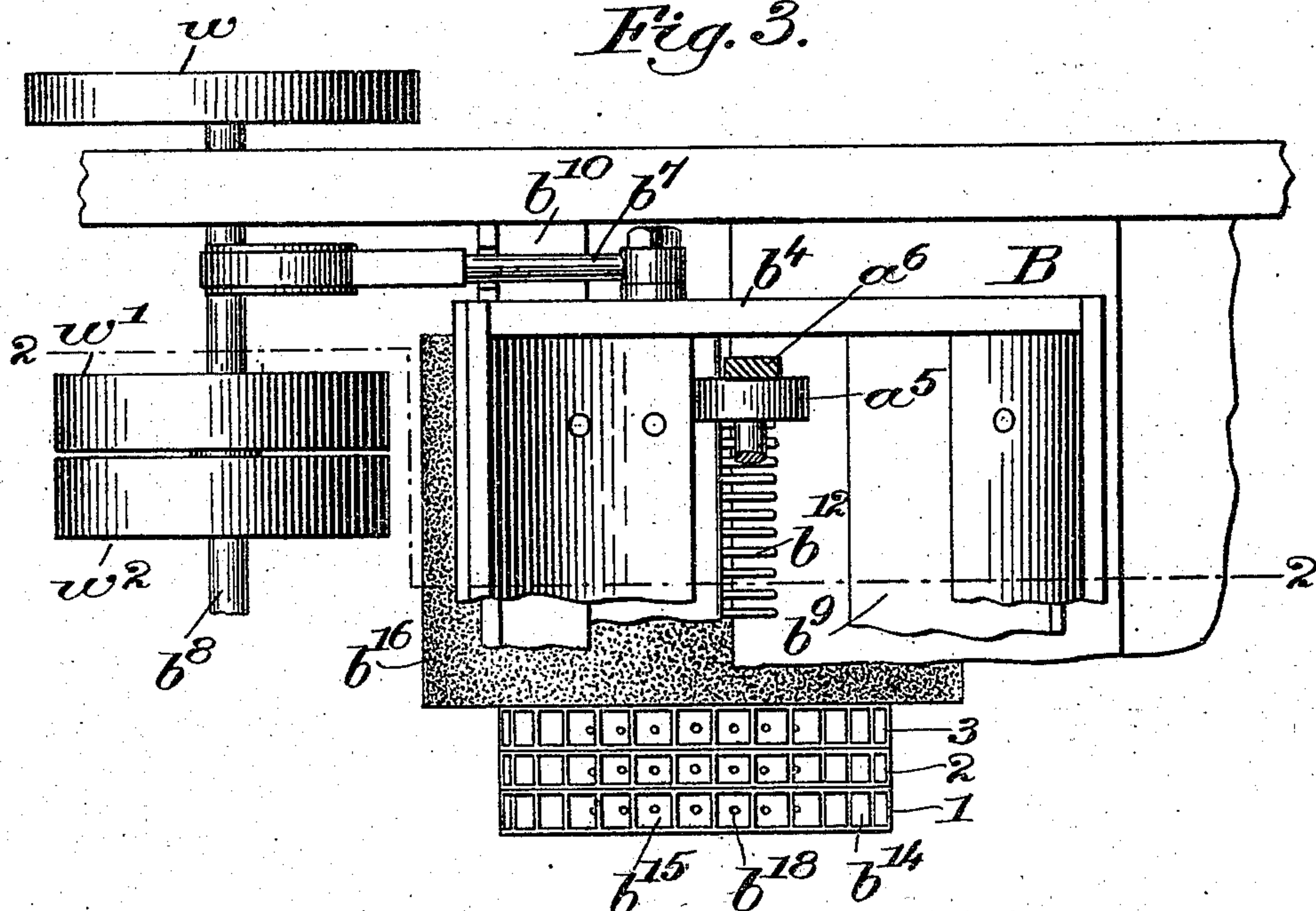


Fig. 3.



Witnesses:

A.C. Harmon,
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attys.

UNITED STATES PATENT OFFICE.

MATTHEW PRIOR, OF WATERTOWN, MASSACHUSETTS.

ROLLER OR BRUSH CARD.

SPECIFICATION forming part of Letters Patent No. 655,168, dated July 31, 1900.

Application filed March 2, 1897. Serial No. 625,717. (No model.)

To all whom it may concern:

Be it known that I, MATTHEW PRIOR, of Watertown, county of Middlesex, State of Massachusetts, have invented an Improvement in Roller or Brush Cards, of which the following description, in connection with the accompanying drawings, is a specification, like characters on the drawings representing like parts.

10 My invention relates to improvements in machinery for and methods of preparing cotton, being intended to take the place of the usual cotton-gin, baling and breaking machines, openers and pickers, and also the customary
15 lap and carding machines, the work of all these machines being condensed into one machine and the cotton being brought to a finished condition by one continuous operation without the usual great waste and loss of
20 value resulting from the breaking and ruining of the cotton fibers by the methods at present pursued. In brief, cotton is at present principally prepared by first ginning it on a saw-gin, which handles the cotton rapidly and at the same time produces a large
25 percentage of motes and waste cotton. At the initial stage of the process it is necessary to handle the cotton with despatch, and as the present roller-gins are incapable of large
30 output it has been considered necessary to employ the saw-gin, although the latter has been well known to be very destructive of the cotton, frequently catching and drawing
35 leaves, bunched cotton, or imperfections, all of which are popularly called "motes," which, together with more or less good cotton, are screened out as best they may be and discarded as waste, frequently amounting to
40 about two per cent. of the entire output. The cotton as it comes in a tangled mass from the saw-gin is baled, and the bales are put in a compressor and rebaled, this process matting solidly together the tangled cotton and breaking
45 the fibers to a considerable extent. The bales are shipped to the manufacturer and put in a bale-breaker to open and tear apart the matted cotton, its fibers being further broken thereby, it being usually necessary
50 to run the cotton through another breaker or a Bramwell opener before it is ready for the

picker-machine. Next the cotton is run through a picker-machine, whose spikes and screens further ruin a large percentage of the cotton fibers, making a lost product called
55 "picker-waste," the remaining cotton being formed roughly into a lap or roll and run through another picker-machine, after which several laps or rolls are condensed into one lap or roll and passed through a lap-machine
60 which dusts out and evens the lap of cotton. Up to this point the main tendency of the operations is to mangle and break the cotton fibers, the cotton being blown and tumbled over and over indiscriminately without any
65 particular effort to keep the fibers from being doubled and interlaced, so that it results that at each operation much cotton is ruined and wasted or at least shortened in length of fiber and otherwise deteriorated. The condensed
70 laps of cotton from the lap-machine are next taken to a breaker-carding machine, which straightens out the fibers to some extent; but inasmuch as the cotton reaches this machine in a confused mass the machine breaks more
75 or less of the fibers in untangling them and gathers together the short and broken fibers in the form of card-waste, the partially-straightened cotton from a number of breaker-cards being run together in one fleece to a
80 finishing-card or carding-machine, which lays all the fibers parallel and produces the finished sliver ready for the drawing-rolls.

My invention has for its object the bringing of the cotton to this point—i. e., ready for
85 the drawing-rolls—at one operation through a single machine, my new method of handling the cotton avoiding the mangling and tumbling of the cotton, saving the motes, the picker-waste, and card-waste, and the
90 destruction and shortening of the fiber.

My improved machine comprises a feeding mechanism, a ginning-comb or vibrating clearer operating in conjunction with a knife and gin-roll, a plurality of carding-rolls each
95 having a card-case or nipping device and each rotating at slightly higher speed than the preceding carding-roll, and a fleece-roll, the latter delivering a finished sliver of cotton directly to the sliver-rolls for the usual drawing-rolls, the cotton being taken in its original condition from the field and fed directly

into my machine, by which it is completely cleaned and prepared without having its fibers broken or tangled, the cotton never being blown or tossed in confusion, but being unremittingly straightened and gathered together into a clean evenly-laid finished sliver. The comb combs the fibers out straight, removing the seeds, &c., and never doubles the cotton. The gin-roll draws the cotton in straight under the knife. Each supplemental or carding roll receives the cotton straight, divides and thins it down straight until the fibers are all laid lengthwise and separated straight and parallel, to be gathered into a final fleece and thence into a sliver.

Besides the above general features which constitute my new method and machine, certain details of the latter are new and constitute parts of my invention, as hereinafter pointed out and separately claimed.

In my efforts to devise a gin which would utilize and reclaim the waste cotton filled with motes above referred to, I found that by providing the vibrating clearer of a roller-gin with a comb-like-acting edge and pivoting this clearer to vibrate in an arc about an axis that the teeth of this comb-like edge when turned at substantially right angles to a radius drawn from said teeth to the said axis act upon the motes and the cotton carried thereby to comb out the latter and free it from the pieces of seed, shell, or other lumps to which it may adhere and permit it to be drawn off by the roller much better than can be done with a clearer having a continuous straight-acting edge or even with a serrated edge, as now commonly constructed.

One part of this invention, therefore, consists in providing a roller and a knife combined with a cooperating comb-like clearer pivoted to vibrate about an axis arranged parallel with the axis of said roller, the teeth of said clearer standing at substantially right angles to the radius drawn therefrom through the said axis, whereby said teeth during vibrations of said clearer enter the cloth tangentially to the exposed surface of the roller and, moving in the arc of a circle, tend to lift said cotton bodily away from said roller-surface to thereby comb all the seeds, motes, &c., from the cotton as the latter is pulled through and away from the moving teeth by means of the roller and knife, substantially as will be described.

The invention also comprehends various details of construction to be hereinafter described, and pointed out in the claims.

In the accompanying drawings, illustrative of one embodiment of my invention, Figure 1 represents, mainly in side elevation and partly in central vertical section, one form of my improved roller or brush card. Fig. 2 is an enlarged vertical section of the ginning mechanism, parts being broken away, the section being taken on line 2 2, Fig. 3. Fig. 3 is

an enlarged horizontal section, parts being broken away, showing the ginning mechanism in top plan view and also showing details of construction of my improved roller. Fig. 4 is a sectional detail showing the card-case.

Referring to Fig. 1, A designates the feeding mechanism, comprising an endless-belt apron a , a carrier a' , made up of cross-slats a^2 , having one or more pins a^3 projecting therefrom obliquely forward in the direction of movement of the carrier, and a doffer a^4 , moving in the direction of the arrow, all being mounted to operate within a fixed hopper A.

B designates the ginning mechanism, shown in enlarged detail in Figs. 2 and 3 and comprising in general a ginning-roll b , a knife-plate b' , fixed on a frame b^2 , a vibrating clearer b^3 , preferably mounted on a vibrating hopper b^4 , (shown and claimed in my Patent No. 511,711,) the latter being pivoted on a hub b^5 and vibrated by means of an eccentric b^6 , adjustably connected thereto by an arm b^7 and driven by the main shaft b^8 . Cooperating with the mechanism already referred to is a series of card-rolls $C C' C^2 C^3$, a fleece-roll D, and a doffer E, each of the card-rolls being provided with a nipping device, not herein claimed *per se*, as it and the card-rolls form the basis of claims in my application, Serial No. 600,205, filed July 23, 1896, herein shown as in the form of a card-case c , preferably flexible and adapted to nip at its lower edge the adjacent portion of the roll and formed to encircle that portion of the roll extending from the previous roll around to the next roll, thereby to guide and hold the cotton up against the roll as the latter draws the cotton around from one roll to pass it onto the next, the card-case c being adjusted by a screw c' , working in a support c^2 , Fig. 4, the fleece-roll being provided with any retaining means, a grid d being herein shown at its lower side. The cotton is delivered from the fleece-roll and doffer to a funnel F, which gathers in and condenses the fleece or lap of cotton and presents the same in the form of a sliver to the condensing-rolls G, through the usual trumpet g , to be deposited in a can g' .

The above-designated apparatus is driven by any suitable mechanism, herein shown in the form of gear-wheels and sprocket-chains connected to the main shaft b^8 , provided with a balance-wheel w , and fast and loose pulleys $w' w^2$. The pinion h meshes with a larger gear h' to drive the ginning-roll b through the pinions $h^2 h^3$. The card-rolls are driven from a shaft h^4 , geared to the main shaft by a sprocket-chain h^5 , the respective card-rolls being connected to the shaft h^4 by sprocket-chains $h^6 h^7 h^8 h^9$. Each succeeding sprocket-chain is geared to rotate its roll faster than the preceding one.

The fleece-roll is shown as operated by a belt h^{10} from the main shaft, the doffer being vibrated by an eccentric h^{12} and crank-arm h^{13} .

The respective card-rolls and fleece-roll are mounted in hangers h^{14} , pivoted at h^{15} to the frame of the machine in order that they may be adjusted by suitable means, as by the slots h^{16} and clamping-bolt h^{17} , to compensate for wear and to accommodate the roll to the requirements of various grades of cotton which they are required to handle.

The general operation of my improved mechanism, as above described, is as follows: The raw cotton from the field is dumped into the fixed feed-hopper A' and is transferred with an even feed by the apron a to the endless carrier a' , which carries the cotton upwardly, the latter being doffed and rendered even and uniform in its feed by the doffer a^4 . The cotton is delivered by the carrier a' to the vibrating hopper b^4 , and the vibrating clearer of the latter fluffs up the cotton as it is gradually drawn in under the knife b' by the ginning-roll b . The ginning-roll carries the cotton around in the direction of the arrow under the retarding influence of the adjacent card-case, the cotton being caught by the first card-roll C and simultaneously drawn around under its card-case to be again caught and transferred to the next card-roll C' , and so on, until finally it is caught by the fleece-roll and carried around by the card-clothing d' of the latter to be doffed in the form of a fleece by the doffer E and delivered ultimately into the coiling-can g' .

Before proceeding to fully set forth the details of my improved method and the special features of the apparatus it will be advisable to refer to the details of construction of the ginning apparatus, as shown in Figs. 2 and 3, it being understood that this apparatus is not restricted to the roller-card machine as above described in general terms, but is applicable for regular ginning purposes, being especially serviceable in ginning waste cotton and cotton full of motes, as will be more fully described later on.

Referring to Figs. 1 and 2, it will be noticed that the endless carrier a' is mounted at its lower end on pulleys a^5 , closely adjacent to the outlet-opening of the vibrating hopper, the pulleys a^5 being carried on the lower ends of supporting-brackets a^6 , fixedly mounted at a^7 on the fixed hopper or main frame of the machine. The opening in the vibrating hopper b^4 is formed between an adjustable gate b^9 on the hopper and the vibrating clearer b^3 , also shown on and movable with the hopper. The latter constitutes an important feature of my invention, being of special service in untangling matted cotton and producing a soft delicate product with a minimum breaking of the fibers, this clearer being shown as supported at its rear end by an angle-iron b^{10} , bolted to the hopper and serving also to strengthen the hopper. The clearer b^3 has its edge adjacent the opening in the bottom of the hopper formed to present a series of fine and preferably-blunt comb-like teeth or points b^{12} , (best shown in

Fig. 3,) these teeth being separated from each other by a clear space, so that the pins or teeth are independent and disconnected in parallel or approximately-parallel lines. I prefer to make the teeth from wire set into the edge of the plate, forming the back support of the clearer, as shown in dotted lines in Fig. 2.

A further important feature of my present invention resides in the improved roll, by means of which a more even and certain pulling effect is maintained on the cotton. This roll is shown in its detail of construction in Figs. 2 and 3, in which b^{13} designates a core of iron or any other suitable material, on which is mounted a pocket-holder or bristle-support b^{14} (shown in plan in Fig. 3) and preferably made of white metal, aluminium, or other light metal capable of being worked into exceedingly thin and strong supporting-pockets b^{15} , preferably tapered, as shown. I prefer to make the pockets in single rings or sections, as indicated at 1 2 3, Fig. 3, each circular set or series of pockets about the roll constituting a separate and distinct ring from the remaining ones. One important feature of this part of my invention resides in making these pockets square, the bristles being drawn thereinto compactly and firmly and secured by any suitable means, staples or wire loops b^{17} being shown as passed through the bottom openings b^{18} of the pockets and fastened around the inserted bristles b^{16} . It is essential that these bristles should be inserted as solidly and compactly as possible in order that the working surface of the roll shall be comparatively unyielding, and the square arrangement of the pockets permits the bristles to be wedged in solidly in mass to an extent not possible by any other arrangement known to me. Preferably after the bristles are in place a solution of rubber or other suitable material will be poured over the roll and worked thoroughly into the mass of "bristles," (and by the latter term I mean to include not only bristles proper, but all fibrous and other similar substances used for or equivalent to regular bristles,) and this is subsequently vulcanized, preferably as set forth in my Patent No. 511,711, as indicated in Fig. 2.

The process or method of preparing cotton has heretofore consisted, in general terms, of handling the cotton through a machine, fluffing it up into a tangled mass, and then compressing it; further handling it or, that is, putting it through another machine, and then again compacting the loose tangled mass of cotton; again passing it through a machine, and then still again further distorting and tangling the fibers into another confused mass, and, finally, after this process of tangling and distorting of the cotton bending and twisting it without care into hopeless confusion. With numerous repetitions of the confusion the cotton is finally carded, or, in other words, each one of the numerous machines heretofore deemed necessary in order for the

successful preparation of the cotton has left the cotton in a tangled mass, simply dumping the fibers promiscuously in a heap without any attempt at laying them or maintaining them in any order, and this heap of bent and broken fibers has been packed down for conveyance to the next machine, thereby aggravating the tangling and breaking of the fibers, so that as a result the staple has been commercially deteriorated and an enormous absolute waste has invariably resulted.

My method starts out with an entirely different and new end in view—viz., to absolutely prevent all tumbling of the cotton and to insure that the cotton shall have its fibers invariably laid in one and the same direction, so that by the time the cotton reaches the end of the process the fibers are all laid lengthwise without having been broken, shortened, or deteriorated to any extent.

Almost all the waste is saved or prevented by my method, and yet all the notes—such as seeds, shells, dirt, leaves, &c.—are cleaned out just as perfectly as they have been heretofore by the longer and destructive methods.

The cotton is fed evenly into the hopper b^4 , as heretofore stated, the pins of the carrier extending down into and near the bottom of the hopper and traveling near and adjacent the delivery-opening thereof in a plane tangent to the exposed roller-surface in the direction of the arrow, Fig. 2. The cotton is caught by the brush-ginning roll b and drawn under the knife, the blunt teeth b^{12} of the clearer and the hopper being vibrated rapidly and with a very short stroke by the eccentrics b^6 , so that the cotton is combed out evenly and gently, all notes, lumps, or other imperfections being rolled and brushed out without tearing or injuring the fibers of the cotton. The clearer being on the hopper vibrates therewith parallel with the axis of the roll, the teeth of the clearer standing at substantially right angles to a radial line drawn therefrom through the said axis, so that during the vibrating movements of the clearer the teeth of the same pass through the vibrating opening through which the roller-surface is exposed in a plane approximately the plane of the surface of the roller, not in a straight line, however, but in the arc of a circle following the movement of the vibrating hopper, the effect being that they catch the cotton fibers and not only comb them out, but raise them up slightly and draw them away from the roller-surface. In practice I have found that this motion most effectually loosens the seeds and notes and foreign substances in and about which the cotton is matted and permits the cotton fibers to be more readily and perfectly drawn off by the cotton fibers on the roller, the roller-surface pulling the fibers and at the same time the teeth penetrating the mass of cotton and drawing the fibers away from the roller-surface with a gently-lifting movement. Furthermore, it

endless carrier a' is such that it delivers the cotton taken from it by the apron a and the fixed hopper down into the bottom of the vibrating hopper b , close to the opening therein, beneath which the roller revolves, thereby causing the cotton to more or less hug the clearer and the roller and aiding the latter to more effectually remove the cotton from the carrier and to draw the same beneath the knife, this arrangement of the carrier also operating to prevent overfilling of the hopper and serving to push the combed-out notes, &c., to the right, Fig. 2, as the cotton is pulled in the opposite direction, permitting them to fall down and be discharged over the knife b' .

The carrier formed as shown cooperates with the jarring vibration of the hopper and the weight of the cotton to regulate the feed, leaving only the exact quantity of cotton needed for the ginning and carrying up all surplus, to be again delivered as the carrier progresses, this being due to placing the carrier, as shown, close to the bottom of the hopper, for should it be terminated above the hopper it would simply discharge the cotton into the latter and would not have the power to agitate or remove any cotton in the case of overfilling.

The roller b receives the cotton, and the vulcanized rubber or solidifying material employed in the bristles, as before explained, being softer wears away, leaving the points of the bristles exposed, similarly, for instance, as the steel nails in a shoe always protrude somewhat beyond the leather for the reason that the leather wears away faster than the nails. So the bristles project slightly and give precisely the desired gripping-surface to seize the cotton and pull it along under the card-case, the latter serving to retard the fiber and straighten it out until it comes to the lower or nipping edge of the card-case, when the next card-roll, rotating at a slightly-faster rate, seizes the projecting ends of the nipped cotton and carries it around under the second card-case, the lower edge of which again nips the cotton and pulls it to be whipped along by the second card-roll revolving at still greater speed, and so on with the successive card-rolls, according to the number required for the particular grade and class of cotton being treated. The last card-roll delivers the cotton to the card-cloth-
ing d' on the fleece-roll, the cotton being held firmly thereby in a compact straightened-out fleece or lap and being gently doffed by the doffer d' without disturbing the drawn-out layers of fibers.

While I have herein described my improved machine as a whole, yet I wish it understood that the ginning apparatus can be used separately and that various parts thereof are capable of separate use in other machines and, in fact, that the whole machine may be used for treating other substances than cotton.

Various changes in details and arrangement of parts may be resorted to without de-

parting from the spirit and scope of my invention.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The herein-described machine for handling cotton, comprising a feeding mechanism, a ginning mechanism, a plurality of carding-rolls, operating means therefor, and a nipping device for each roll, all of said parts being arranged together to pass the cotton directly from one moving part to the next without distorting relaxation of the fibers thereof, and means for rotating each of said rolls at higher speed than the next preceding roll, substantially as described.

2. The herein-described machine for handling cotton, comprising a feeding mechanism, a ginning mechanism, a plurality of carding-rolls, a nipping device for each roll, a fleece-roll, and a doffer therefor, all of said parts being arranged together to pass the cotton directly from one moving part to the next without distorting relaxation of the fibers thereof, and means to rotate each of the said rolls at higher speed than the next preceding roll, substantially as described.

3. In a cotton-handling machine, the combination with a roller and a knife, of a cooperating comb-like clearer having teeth of the shape described, said clearer being pivoted and provided with means to vibrate the same about an axis arranged parallel with the axis of said roller and with its teeth standing at substantially right angles to a radius drawn therefrom through said axis, the said teeth moving back and forth slightly away from the surface of said roller in the arc of a circle and thereby acting under the cotton to lift the same bodily away from said roller-surface, and to shake or sift the seeds therefrom without tearing the cotton fiber, substantially as described.

4. In a cotton-handling machine, the combination with a roller, a hopper, means to vibrate the same, said hopper having its outlet adjacent the said roller, a knife, and a clearer connected to vibrate in unison with said hopper, formed to present a series of separated and disconnected fine comb-like teeth having their sides extending parallel from their extreme free ends, to act upon and comb out and lift the cotton, thereby avoiding all tendency to wedge and clog the same, substantially as described.

5. In a cotton-handling machine, the combination with a roller, and a knife bearing thereupon, of a clearer provided with independent, separated pin-like teeth arranged parallel to each other, each tooth having its sides parallel and terminating in a square blunt end, and means to swing said clearer

in an arc tangential to said roller, substantially as described.

6. In a cotton-handling machine, the combination with a roller, a knife, a vibrating clearer and means to vibrate said clearer, of the feed-hoppers A' and B, the apron α , an endless carrier α' , the latter extended down into and near the bottom of the hopper B, substantially as described.

7. In a cotton-handling machine, the combination with a roller, of a clearer provided at its edge adjacent to said roller with a series of pin-like teeth, said teeth being separated from each other by an intervening clear space with its adjacent sides parallel and means to vibrate said clearer and each tooth having its sides parallel, substantially as described.

8. In a cotton-handling machine, the combination with a roller, of a vibrating hopper means to vibrate it, said hopper being provided at its bottom with a delivery-opening arranged in close proximity to said roller and parallel therewith, and an endless carrier arranged to travel within said hopper near said opening, and provided with carrier-pins, whereby the feed of the cotton to said roller is automatically regulated and rendered uniform, substantially as described.

9. In a cotton-handling machine, the combination with a roller, of a vibrating hopper, means to vibrate said hopper, and an endless carrier arranged to travel within said hopper and provided with a series of pins projecting forwardly therefrom in the direction of travel obliquely to said direction of travel, substantially as described.

10. A roller, composed of a core, a bristle support thereon, and bristles, said support having a plurality of rectangular pockets having rectangular cavities, set radially about the core over the entire area thereof, said cavities having thin walls, and said bristles being packed endwise into said pockets together constitute a compact roller-surface, substantially as described.

11. The herein-described machine for handling cotton, comprising a feeding mechanism, a ginning mechanism, a plurality of carding-rolls, operating means therefor, a nipping device for each roll, arranged to pass the cotton or other fiber directly from one to the next, and means for adjusting said rolls relatively to each other, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MATTHEW PRIOR.

Witnesses:

GEO. W. GREGORY,
GEO. H. MAXWELL.

It is hereby certified that in Letters Patent No. 655,168, granted July 31, 1900, upon the application of Matthew Prior, of Watertown, Massachusetts, for an improvement in "Roller or Brush Cards," an error appears in the printed specification requiring correction, as follows: On page 5, lines 77-78, the clause "and means to vibrate said clearers," should be stricken out and inserted before the word "substantially," line 79, as now numbered, same page; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed, countersigned, and sealed this 14th day of August, A. D., 1900.

[SEAL.]

F. L. CAMPBELL,
Assistant Secretary of the Interior.

Countersigned:

WALTER H. CHAMBERLIN,
Acting Commissioner of Patents.