(No Model.) 3 Sheets—Sheet 1.

# W. P. GROOM.

## MACHINE FOR OPENING AND CLEANING COTTON.

No. 485,272. Patented Nov. 1, 1892.

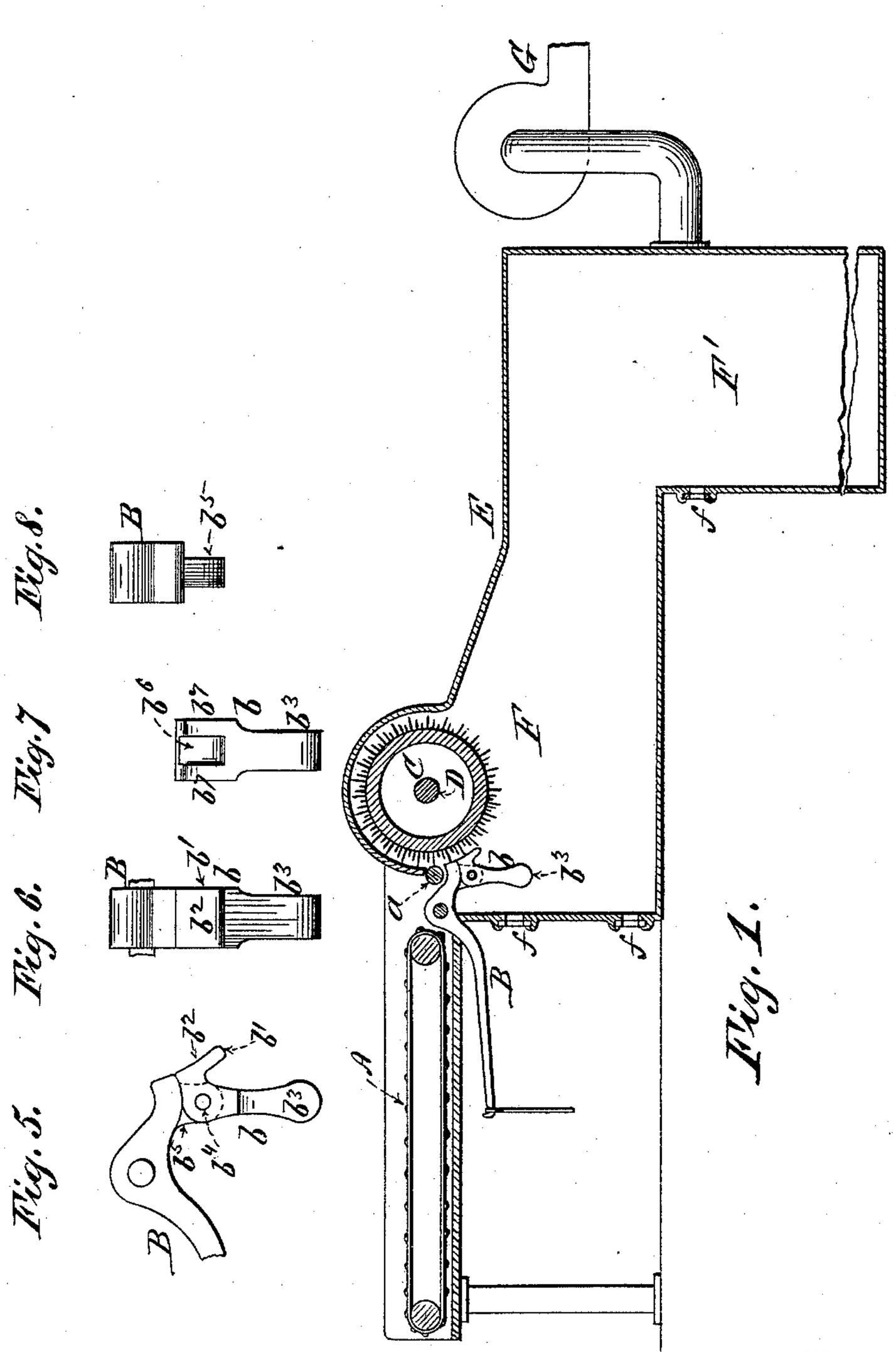


Fig. 1.




Fig. 8.




Fig. 7.




Fig. 6.




Fig. 5.

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*Fig. 2.*

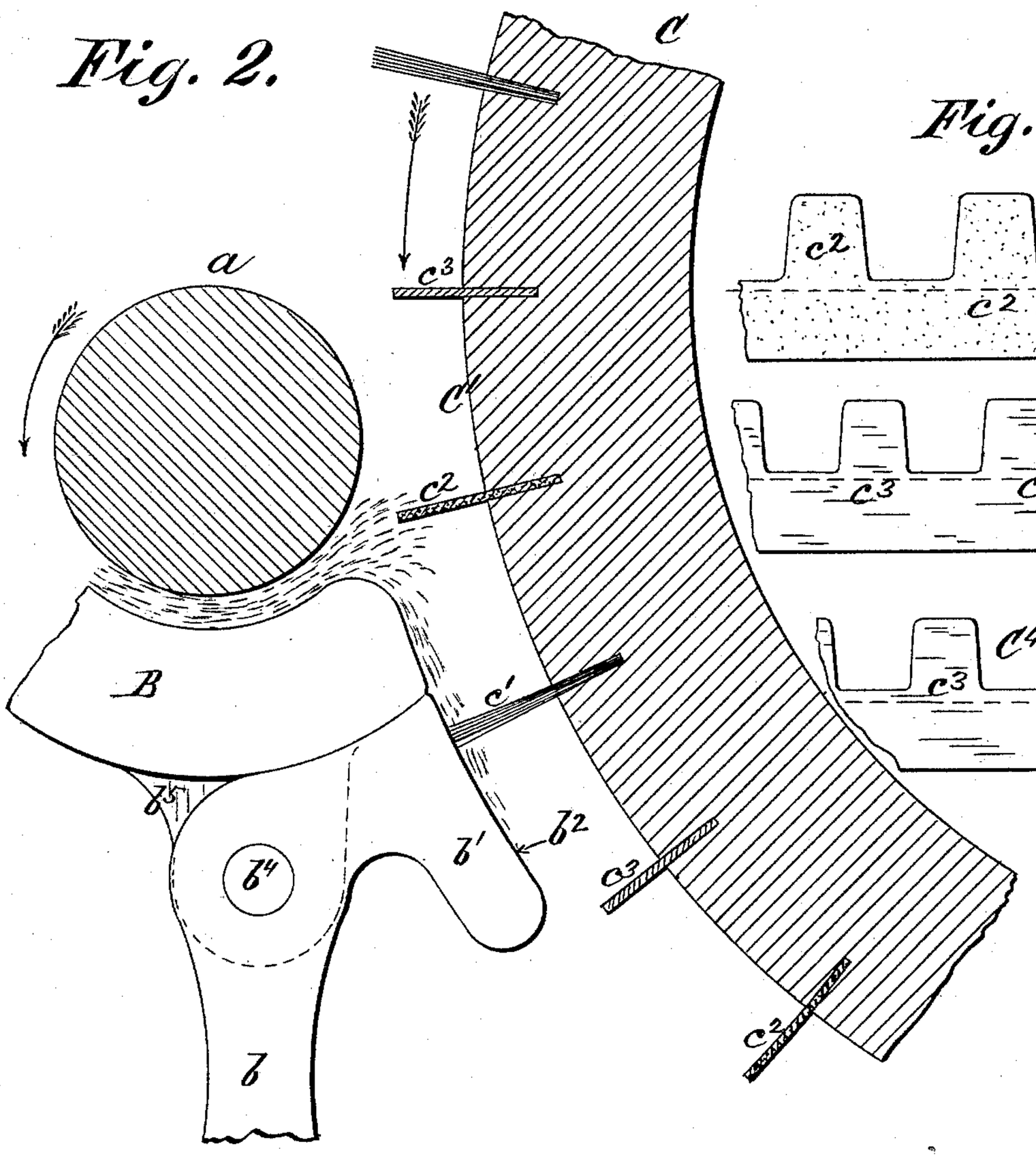


*Fig. 3.*




*Fig. 4.*

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## MACHINE FOR OPENING AND CLEANING COTTON.

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*Fig. 11.*

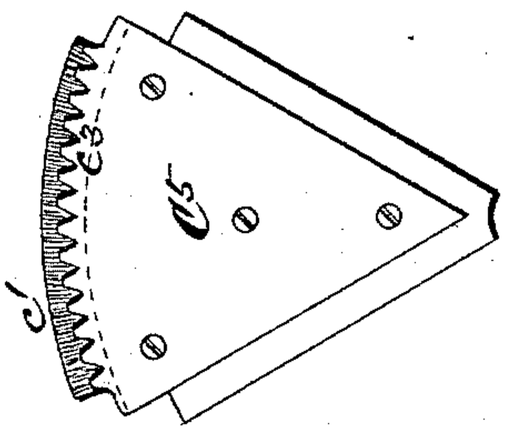



*Fig. 12.*

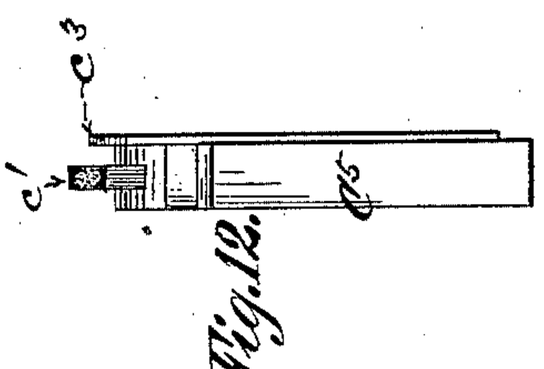



*Fig. 10.*

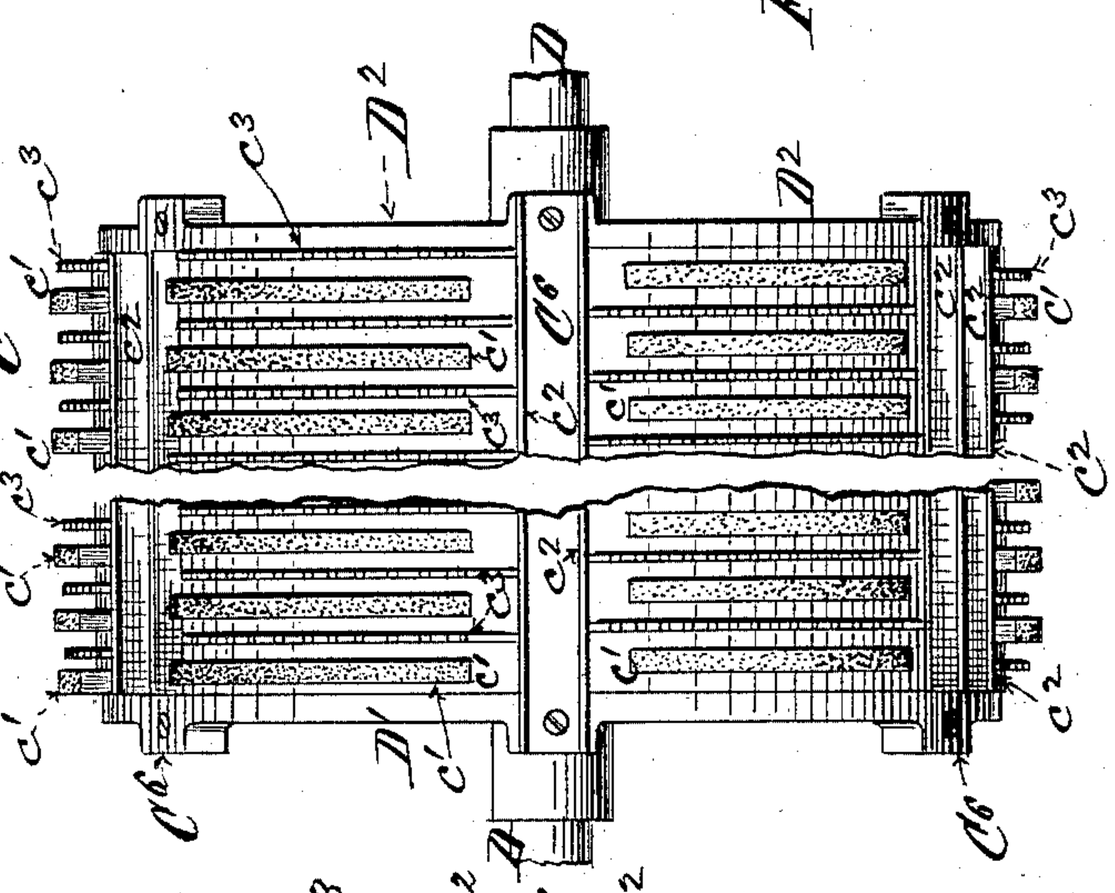
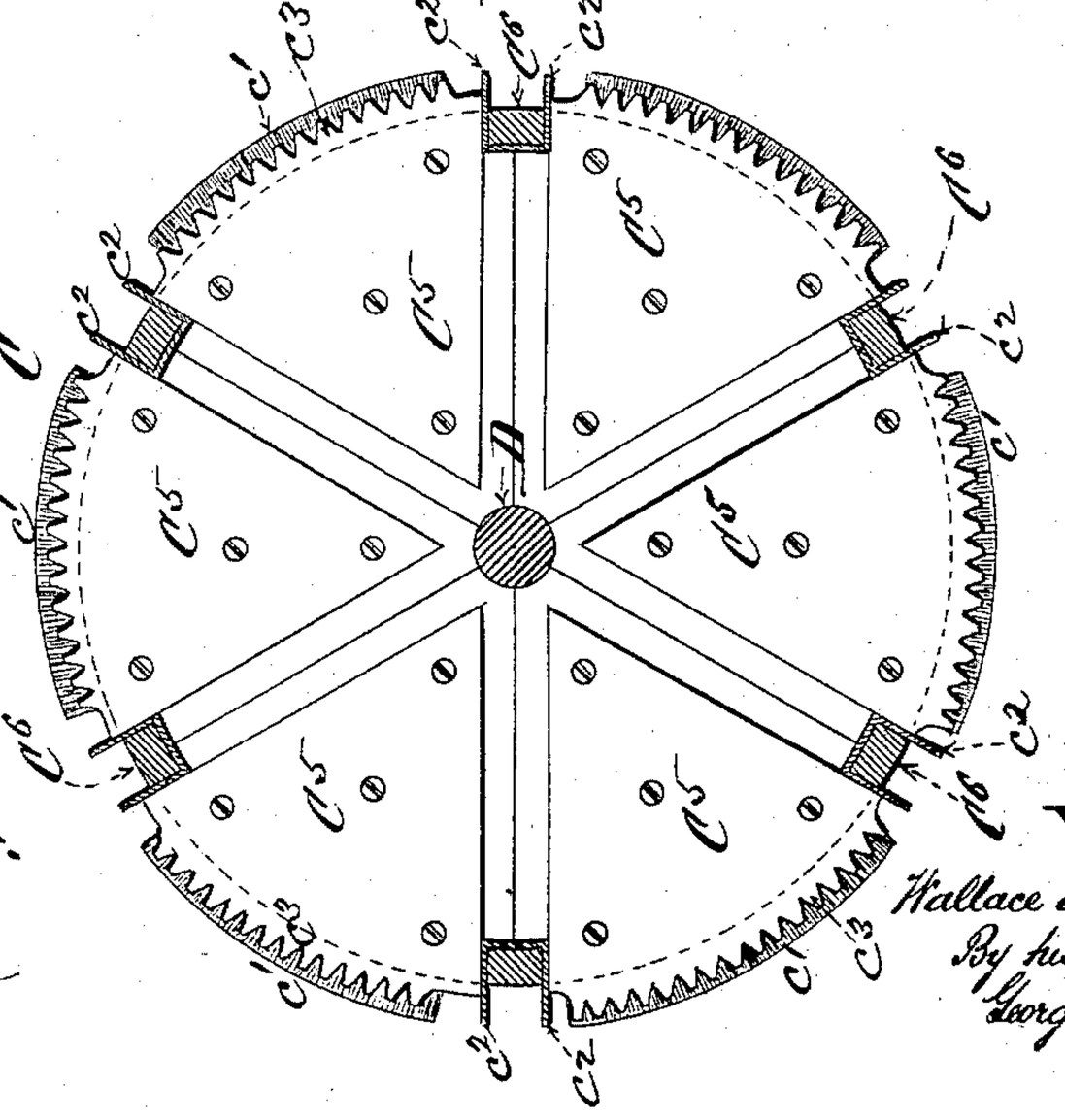



*Fig. 9.*

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# UNITED STATES PATENT OFFICE.

WALLACE P. GROOM, OF BROOKLYN, NEW YORK.

## MACHINE FOR OPENING AND CLEANING COTTON.

SPECIFICATION forming part of Letters Patent No. 485,272, dated November 1, 1892.

Application filed February 29, 1892. Serial No. 423,185. (No model.)

*To all whom it may concern:*

Be it known that I, WALLACE P. GROOM, a citizen of the United States, residing in the city of Brooklyn, in the county of Kings and State of New York, have invented certain new and useful Improvements in Machines for Opening and Cleaning Cotton, of which the following is a description sufficient to enable others skilled in the art to which the invention appertains to make and use the same.

My invention relates to apparatus the chief purpose of which is to open or loosen up and clean cotton fiber preparatory to carding and other processes to which cotton is subjected in the ordinary course of manufacture. The operation of opening or loosening up of matted cotton fibers at the cotton-spinning mills is for the double purpose of separating from cotton sand, dust, and other extraneous matter commingled with it and to bring it into condition for further manipulation.

In consequence of the severe compression to which cotton is subjected for purpose of shipment the fiber, together with the extraneous matter with which it is commingled, becomes more or less firmly matted. In order to loosen or open up cotton for purposes of manufacture, resort was formerly had to a process of whipping with willow whips, called "willowing," and latterly to much harsher treatment in machines called "willows" or "beaters," in which the whipping or beating is done by rapidly-rotating metal beaters, which pound or thrash the fiber as it protrudes from between feed mechanism. The mechanical devices heretofore employed, however, fail to fully accomplish the result desired. Not only is the loosening up of the cotton incomplete and the elimination of the extraneous substances imperfect, but the treatment of the staple is so harsh and severe as to greatly injure it, the same being lacerated and broken by the fierce blows of the rapidly-revolving metallic beaters.

It is the purpose of my invention to attain a much more nearly-perfect elimination from the lint-cotton of all extraneous substances—such as cotton-seed, (whether whole, broken, or immature,) sand, dust, leaf, "motes," &c.—without injury to the staple. My method of opening or loosening up the fiber is a process which may, perhaps, be appropriately designated as "re-ginning." By this process the lint-cotton is freed from the larger part of the extraneous matter with which it is commingled, as aforementioned, the same having passed through the gin with the cotton in a former process called "ginning." It is also loosened up much more thoroughly, notwithstanding the treatment it receives, which treatment is comparatively gentle, though finally positive.

The main feature of my invention consists, essentially, in a rotating whipper or opener in which the parts coming in actual contact with the fiber are flexible or elastic or in which flexible or elastic openers are used in conjunction with rigid openers, the result being in either case that the matted cotton is subdued and loosened up without injury to the fiber.

An important feature of my invention in this connection consists in making the openers of different lengths or degrees of radial projection and in arranging them in such relation to each other that the fiber as presented by feed mechanism is treated successively to different degrees of force, strain, or "pull" in such manner that the cotton is first acted upon by comparatively long elastic resilient brushes or openers, which project the full width of the space between the feed mechanism and the periphery of the rotating whippers, and then to others less elastic and of less degree of radial projection. The result of this is that where the cotton is matted the fibers are gradually loosened and separated without breaking, straining, or otherwise injuring them, since if the first brush-openers encounter a matted portion of cotton they yield before it, while loosening the fiber slightly, and the succeeding more rigid openers effectually subdue and open up the matted cotton without lacerating or breaking the fiber.

An incidental feature of my invention consists in the combination, with a rotating whipper, substantially such as herein designated, of a series of levers similar to those used in what is known as the "piano-feed arrangement," formed with auxiliary yielding sections or extensions, which, while presenting any overhanging cotton to the rotating whipper, readily adapt themselves to any excess of passing material.

Finally, my invention consists in the special construction and arrangement of parts herein shown and described, by which my invention may be rendered available in practice.

In the accompanying drawings I illustrate means for practically carrying out my improvements, although I do not confine myself to the identical form and construction of parts shown, since it is obvious that various modifications may be made in arrangement and detail without departing from the essential features of my invention.

Figure 1 is a diagrammatic representation of the several parts of apparatus which may be employed in connection with my improved "opening" mechanism. Fig. 2 is an enlarged diagram of the feed-roller and a lever with the adjoining portion of the "whipper," illustrating the treatment to which the cotton fibers are subjected. Fig. 3 represents projections of whippers or openers shown in Fig. 2; Fig. 4, a longitudinal section of a portion of the periphery of the whipper-cylinder shown in Fig. 2, illustrating the arrangement of the "openers" in different lateral planes with relation to each other. Fig. 5 is an elevation of the inner end of one of the feed-levers; Fig. 6, a face view of the same; Fig. 7, a rear view of one of the auxiliary extension-pieces detached from its lever; Fig. 8, a front view of the end of a feed-lever without its auxiliary extension-piece. Fig. 9 is a transverse section of a preferred form of whipper; and Fig. 10 an elevation of the same, the central portion being broken away. Fig. 11 is an elevation, and Fig. 12 an edge view, of one of the segments of which the whipper shown in Figs. 9 and 10 is built up.

An endless apron or "lattice-creeper" A conveys the cotton loosely spread thereon to a feed-roller $a$ and to a series of levers B, similar to those heretofore employed in cotton-opening apparatus of this class. The levers B are of ordinary construction and arrangement, excepting that each is formed at its inner end with a pivotally-connected extension-piece $b$. This extension-piece $b$ consists of a finger $b'$, the upper surface $b^2$ of which when the extension-piece $b$ is in its normal position forms an additional feed-surface to hold up overhanging cotton, for which heretofore no provision has been made. These devices $b'$ are held in their normal positions by counter-weights $b^3$ or equivalent means, which will permit the fingers $b'$ to yield and adapt themselves to an excess of pressure upon their upper surfaces $b^2$.

The frame or cylinder of the rotating whipper C may be constructed or built up in various ways, the essential feature in this respect consisting in providing suitable supports for the various openers used. Taken as a whole the whipper C is practically a cylinder having a series of radial openers of prescribed forms. These series of openers are also preferably of different degress of radial projection, as illustrated more clearly in Fig. 2. The distinguishing feature of my invention in this connection consists in the use of flexible material in the formation of these radial openers, either alone or in conjunction with openers formed of rigid material. Thus in Fig. 2 the longer openers $c'$ are not only flexible, but are also elastic and resilient, being formed of bristles, elastic wire, or equivalent material. These are preferably arranged in the form of and largely perform the function of brushes, combing or opening out the lighter and less matted fibers, while yielding and bending when closely or firmly matted portions of the cotton are encountered without cutting, tearing, or damaging the fibers. Next in order in Fig. 2 is a series of openers $c^2$, formed of leather or other slightly-flexible material. These openers $c^2$ do not project out quite so far radially as the brushes $c'$, the difference of projection, however, being comparatively slight in practice, amounting in some cases to not more than one-eighth of an inch. The shorter length of the openers $c^2$ is designed to prevent their striking too harshly against matted portions of the cotton as yet unopened by the brush-beater $c'$, the object being to subdue and loosen such matted portions by a comparatively stiff but yielding blow, which will not endanger the integrity of the individual fibers, while loosening them and opening them for the action of the brush-beaters $c'$.

Should the matted portions be so firm as to resist the reducing action of both the brush-openers $c'$ and the flexible openers $c^2$, provision may be made for positively loosening such portions to a degree sufficient for reduction by the brush-beaters $c'$ by means of rigid openers $c^3$ of slightly-less-radial projection than the flexible openers $c^2$. Portions of the cotton passing through the feed mechanism of sufficient firmness to resist the impact of the openers at the point of protrusion into the path of the said openers may hang over the front edges of the feed-levers B. Such overhanging cotton is sustained and presented to the further action of the rotating openers by the auxiliary extension-piece fingers $b'$, which, however, yield sufficiently to compensate for variations in quantity of material passing over them, so as to protect the latter against injury.

The pivotal connection $b^4$ between the ends of the levers B and the auxiliary extension-pieces $b$ may be effected in any desired way. As shown in the drawings, the lower side of the lever B is formed with a lug $b^5$, which fits in a recess $b^6$ of the extension-piece $b$, and the pivot $b^4$ passes through the said lug $b^5$ and the sides $b^7$ of the recess $b^6$.

In Fig. 2 the openers $c'$ $c^2$ $c^3$ are supposed for the sake of convenience in illustrating their action upon the cotton fibers to be arranged longitudinally in series upon the face C′ of a cylinder. The adjoining projections $C^2$ $C^3$ $C^4$ represent the arrangement of the

beaters $c'$ $c^2$ $c^3$ as related to each other transversely of the cylinder, the several series being placed so as to break joints or intervene with each other in transverse planes. This is also illustrated in Fig. 4, in which the opener-brush $c'$ is also shown. The same result may be accomplished in practice by the construction illustrated in Figs. 9, 10, 11, and 12, in which the whipper C is made up of segments $C^5$, each formed with a brush-opener $c'$ and a rigid opener $c^3$, which is in the form of a segment of rigid inverted truncated V-shaped or saw teeth. These segments $C^5$ are held in place by longitudinal bars $C^6$, to which are attached the flexible leather openers $c^2$. The relative degrees of radial projection between the several series $c'$ $c^2$ $c^3$ of openers is substantially the same as that illustrated in Fig. 2, the only difference being one of form and arrangement, while the action upon the cotton fiber is essentially the same. This latter arrangement is susceptible of an important variation in arrangement, however, in that each series of rigid teeth may be placed in a position slightly eccentric to the shaft D, so as to act gradually and gently upon the more-firmly-matted portions of cotton. This feature is illustrated in Figs. 9 and 11.

The segments $C^5$ are successively arranged slightly one in advance of the other along the shaft D, (say one-quarter or one-eighth of an inch,) so as to break joints with each other, and practically constitute a spiral of low pitch extending around the shaft D from one head-piece D′ to the other $D^2$.

The rotating opener C is supported and inclosed by suitable framework E. It is preferably situated in a chamber F, in which a partial vacuum is maintained by an exhaust-fan G, currents of air being admitted at *f f*, which float the cotton away from the impurities, which latter may be gathered in a settling-compartment, such as indicated at F′.

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

1. In apparatus for treating cotton for the purpose set forth, the combination, with suitable feed mechanism, of a rotating whipper formed with series of elastic resilient brushes of a prescribed degree of radial projection and with series of flexible openers of a degree of radial projection less than that of the brushes, substantially in the manner and for the purpose described.

2. In apparatus for treating cotton for the purpose set forth, the combination, with suitable feed mechanism, of a rotating whipper formed with a series of elastic resilient brushes of a prescribed degree of radial projection, with series of flexible openers of a degree of radial projection less than that of the brushes, and with a series of rigid openers of a degree of radial projection less than that of the said flexible openers, for the purpose and substantially in the manner described.

3. In apparatus for treating cotton for the purpose set forth, the combination, with suitable feed mechanism, of a rotating whipper formed with openers consisting of a series of saw-teeth arranged eccentric to the shaft and a series of flexible resilient openers arranged concentric to the shaft, substantially in the manner and for the purpose described.

4. In apparatus for treating cotton for the purpose set forth, the combination, with suitable feed mechanism, of a rotating whipper formed with a series of segments provided with radial openers, said segments being arranged so that those adjoining break joints with each other, substantially in the manner and for the purpose set forth.

5. In apparatus for treating cotton for the purpose set forth, the combination, with a rotating whipper, of a feed-roller and a series of feed-levers formed with auxiliary pieces for presenting cotton to the whipper, said auxiliary extension-pieces being pivotally connected to the feed-levers and being adapted to yield under pressure and to return automatically to their normal positions, substantially in the manner and for the purpose set forth.

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