

No. 631,992.

Patented Aug. 29, 1899.

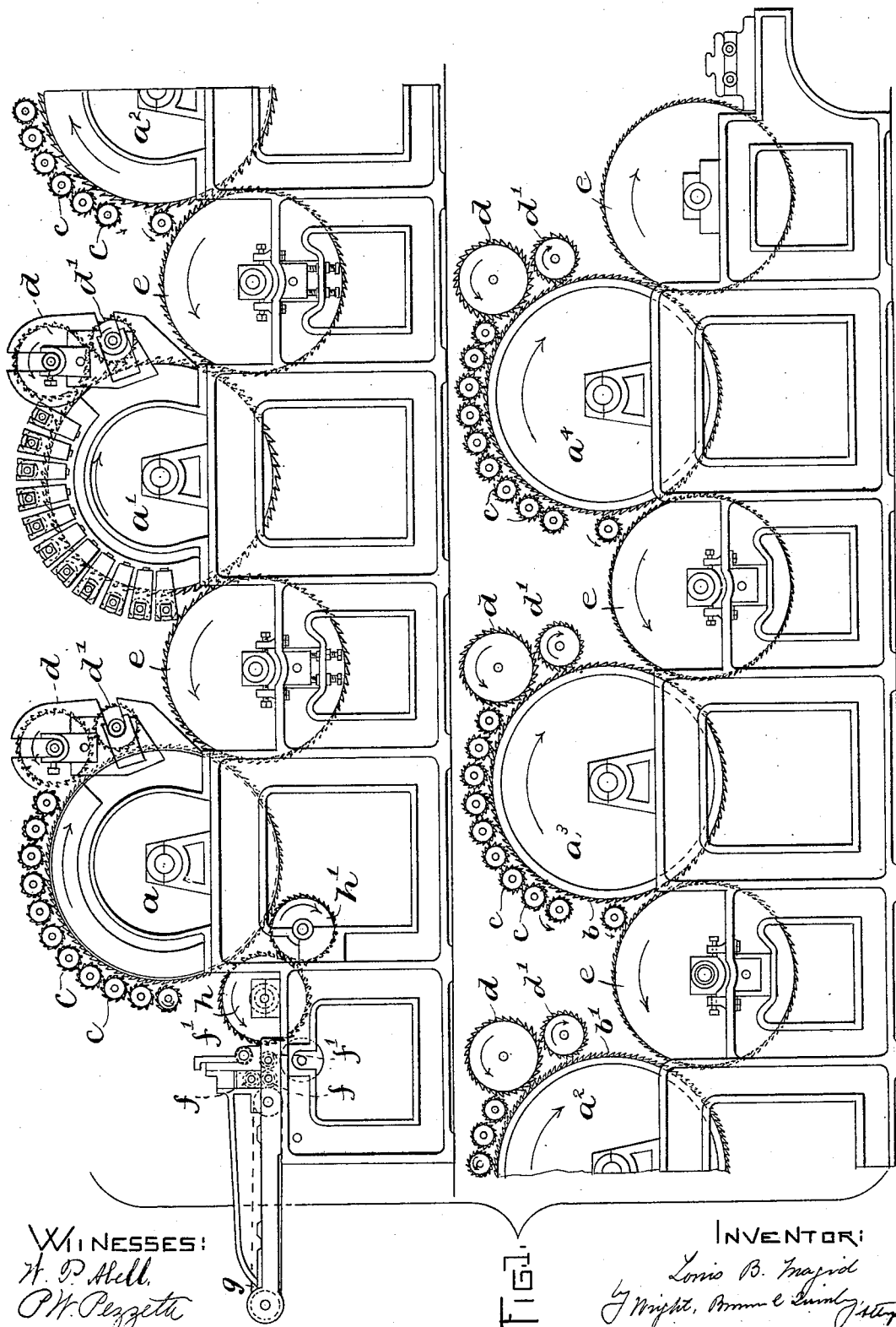
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APPARATUS FOR OPENING SILK FIBERS.

(Application filed Apr. 24, 1899.)

(No Model.)

2 Sheets—Sheet 1.



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2 Sheets—Sheet 2.

FIG. 2.

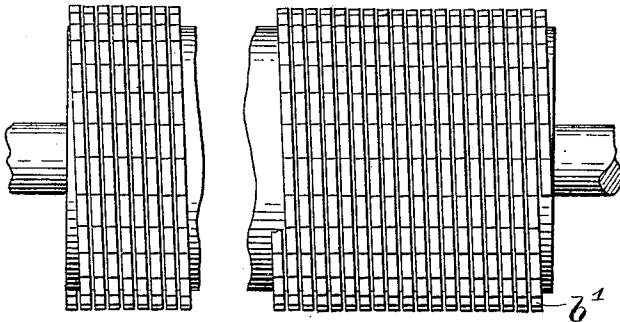


FIG. 3.

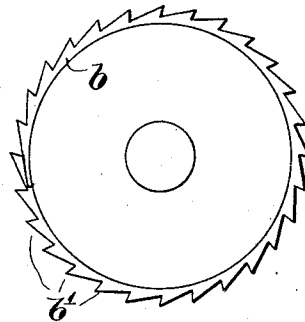
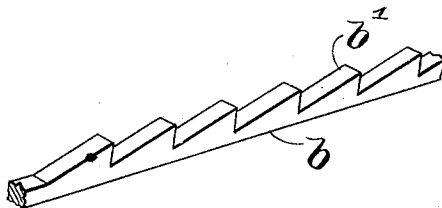


FIG. 4.



WITNESSES:

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UNITED STATES PATENT OFFICE.

LOUIS B. MAGID, OF BOSTON, MASSACHUSETTS, ASSIGNOR TO THE MAGID-HOPE SILK MANUFACTURING COMPANY, OF PORTLAND, MAINE.

APPARATUS FOR OPENING SILK FIBERS.

SPECIFICATION forming part of Letters Patent No. 631,992, dated August 29, 1899.

Application filed April 24, 1899. Serial No. 714,293. (No model.)

To all whom it may concern:

Be it known that I, LOUIS B. MAGID, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain new and useful Improvements in Processes of and Apparatus for Opening Silk Fibers, of which the following is a specification.

This invention has for its object to provide an improved apparatus or machine for treating silk-waste so as to transform and utilize in various arts the large amount of this valuable material which has heretofore been regarded as practically worthless owing to the crude methods and insufficient machinery hitherto employed. By the term "silk-waste" I mean especially the tangled and knotted as well as twisted odds and ends of unwoven silk-threads, the same being unfit for weaving or for any other like use and therefore practically useless in the market, but having full length and strength of staple, and hence much too valuable to be thrown aside as useless. The several silk-mills of the country accumulate from time to time large quantities of this material—namely, silk-waste in the form of twisted and knotted threads—which under my mode of treatment is converted again into fiber and adapted to be transformed into various useful forms by the usual operations of spinning, weaving, &c.

Heretofore it has been common to treat various kinds of fibrous material in carding-machines to separate and rearrange the fibers preparatory to other mechanical manipulations; but such machines are not adapted for my purpose—namely, to convert silk-waste back to a fiber adapted to be spun and woven—because they unnecessarily break up and injuriously shorten the fiber and do not leave it open and free from twisted and knotted imperfections, the product heretofore produced by such machines being incapable of proper use in the manufacture of yarn or thread. A machine of special construction is required owing to the peculiar nature of silk-waste, and such a machine I have devised after a long period of experiment and study, the said machine forming an essential feature of my present invention.

I employ a series of large drums, preferably five in number, having their peripheries pro-

vided with rigid teeth adapted to separate and open the fibers of silk-waste. These cylinders are driven by power and rotated at successively-increasing rates of speed, the last of the series running much faster than the first. Over each cylinder is a closely-set series of small toothed cylinders or workers also having rigid teeth adapted to cooperate with the teeth of the cylinder. Other toothed cylinders, corresponding to the so-called "fancy" cylinders or "fancies" of carding-machines, are also preferably employed in connection with the main cylinders, the said fancies also having rigid teeth, and the entire series—namely, the main cylinders, the workers, and the fancies—cooperating to progressively disintegrate or reduce the material under treatment to its original condition of disassociated fiber. These have a lateral clinging tendency somewhat akin to the felting of wool fibers, and they may be readily spread to form a uniform lap, divided into slivers, bleached, if desired, elongated and spun, and afterward woven or knitted into fabrics or garments of various kinds. Suitable means are employed for feeding the material to the first toothed cylinders, and doffing-cylinders are employed to transfer the material from one main cylinder to the next.

Of the accompanying drawings, forming a part of this specification, Figure 1 represents a side elevation of a silk-waste-opening machine embodying my invention. Fig. 2 represents a view in elevation, partly broken away, of one of the cylinders. Fig. 3 represents an end elevation of one of the cylinders. Fig. 4 represents a detail perspective view of a portion of one of the toothed strips hereinafter described.

The same letters of reference indicate the same parts in all the figures.

In the drawings, a , a' , a^2 , a^3 , a^4 represent a series of five toothed cylinders which are hereinafter referred to as the "main" cylinders. These are supported by shafts which are journaled in bearings in a suitable supporting-frame and are provided with rigid acute-angled teeth which are preferably formed by placing a plurality of strips b of sheet metal upon the peripheries of the cylinders, the outer edges of said strips being serrated to

form acute-angled teeth b' . The strips b may be in the form of rings strung together side by side on the cylinders, or a continuous strip b may be employed for each cylinder, the same being wound helically upon the cylinder. I prefer to make the teeth upon the first cylinder thicker than those upon the second, and so on, the preferred variation in the thickness of the teeth being expressed by the statement that the gage of the strips b on the first cylinder may be 12, while the gages of the strips on the succeeding cylinders a' , a^2 , a^3 , and a^4 may be respectively 16, 20, 24, and 28. The cylinders are rotated at successively-increasing rates of speed, the preferred rates being as follows: The first cylinder a one hundred and eighty revolutions per minute, the cylinder a' two hundred per minute, the cylinder a^2 two hundred and fifteen per minute, the cylinder a^3 two hundred and thirty per minute, and the cylinder a^4 two hundred and forty-five per minute. Therefore the teeth of each faster-rotating cylinder are of finer gage than those of the preceding or slower-rotating cylinder.

In connection with each of the main cylinders I employ a series or plurality of small toothed cylinders or workers c , the teeth of which have the same characteristics as those of the main cylinders. These workers are rotated at rates of speed corresponding to those of the cylinders which they accompany, the workers being, however, rotated slightly slower than the cylinders.

d and d' represent toothed cylinders corresponding in position and arrangement with the fancies of carding-machines and having teeth resembling those of the main cylinders and workers, these fancies being rotated at about the same speed as the cylinders with which they cooperate.

ee represent a series of doffer-cylinders arranged to transfer the material from each main cylinder to the next, each doffer-cylinder having teeth resembling those of the main cylinders and rotated at substantially the same rate as the main cylinder from which it receives the material.

The material to be treated is delivered by a feed-apron g to positively-rotated feed-rolls $fff'f'$, which deliver the material to a licker-in cylinder h , which in turn delivers the material to a second licker-in cylinder h' , the latter delivering the material to the first main cylinder a . The cylinders h h' have teeth resembling those of the other cylinders above described. The feed-rolls are positively rotated at a slower rate of speed than the first cylinder a and the licker-in cylinders, and they therefore exert a holding-back action on the material while feeding it, so that the first licker-in cylinder, which rotates more slowly than the first main cylinder a , effects an initial opening of the fibers, the pull exerted by the teeth of the first licker-in cylinder being gentle, so that there is no breakage of the fibers. The second licker-in cylinder,

rotating somewhat faster than the first and slower than the first main cylinder, continues the opening operation and presents the fibers partially open to the first cylinder a , which cooperates with the workers and fancies in continuing the progressive opening action. This action is continued throughout the entire machine, the successively-increasing speed of the parts successively encountered by the fibers causing their complete opening and the complete separation of the fibers by the time they reach the ends of the machine and without breakage or shortening of the fibers.

It will be seen that the plurality of main cylinders and the cooperating workers and fancies and the acceleration of speed successively imparted to them give the machine an effect in the complete recovery of fiber from silk-waste not attainable by any apparatus heretofore known. A long staple is obtained, suitable for yarn and goods made therefrom, the fibers being suitable for spinning and weaving without being mixed with any fibers of different material. Heretofore the means employed for opening silk-waste so shortened the fiber as to make it unfit for anything but battings or for mixture with wool or other long-staple fiber for spinning and weaving.

Each main cylinder and the toothed cylinders accompanying it may be considered a fiber opener or separator, so that the machine illustrated in the drawings comprises a series of fiber openers or separators the toothed surfaces of which are driven at successively-increasing rates of speed. Owing to the fact that the successive cylinders are driven at a slightly constantly increasing speed, a drawing action is obtained at the point where each cylinder takes the fibers from the doffer-cylinder preceding it, which drawing action is slight and not such as to tear or break the fiber, and owing to the fact that the teeth of each cylinder are of finer gage than those of the preceding or slower-rotating cylinder the fibers as they are gradually opened out or drawn are more individually treated than would be the case with teeth of uniform gage throughout the entire series of cylinders.

I claim—

1. A machine for opening silk-waste, comprising a series of fiber openers or separators, each including a toothed cylinder and a series of toothed workers cooperating therewith, the teeth of said series of fiber-openers, being of gradually-increasing fineness, and means for rotating the said openers at different rates of speed.

2. A machine for opening silk-waste, comprising a series of cylinders having rigid teeth, a plurality of series of workers having rigid teeth, each series cooperating with one of the cylinders, means for rotating the cylinders and workers at different rates of speed, and means for transferring the material from cylinder to cylinder, each cylinder and the accompanying series of workers after the

first rotating faster than the preceding cylinder and series of workers, the teeth of each of the faster-rotating cylinders being finer than the teeth of the preceding cylinder of the series.

5 3. A machine for opening silk-waste, comprising a series of cylinders having rigid teeth, a plurality of series of workers having also rigid teeth, means for rotating the cylinders and workers at different rates of speed, 10 means for transferring the material from cylinder to cylinder, feed-rolls rotated at a slower rate of speed than the first cylinder and lo-

cated adjacent thereto, and toothed transferring-cylinders located between the feed-rolls and first cylinder and rotated at substantially the same speed as the latter, the teeth of each of the faster-rotating cylinders being finer than the teeth of the preceding cylinder of the series. 15

In testimony whereof I have affixed my signature in presence of two witnesses. 20

LOUIS B. MAGID.

Witnesses:

C. F. BROWN,
H. BROWN.