T. ELY.

Cotton Gin.

No. 4,302. Patented Dec. 11, 1845.

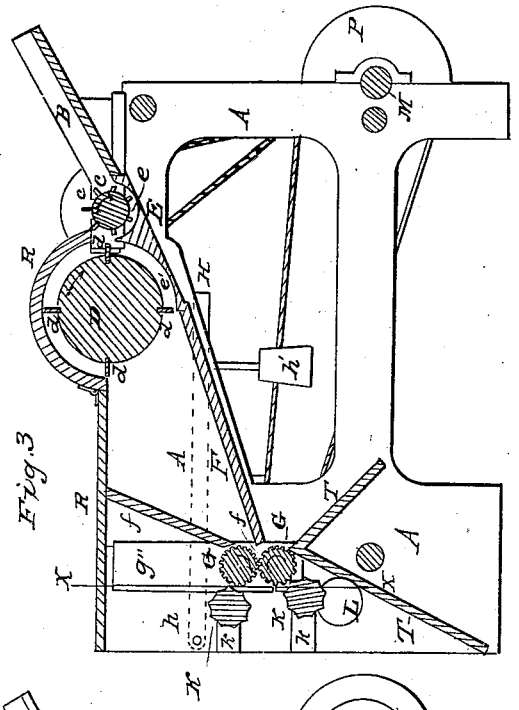

Fig. 3

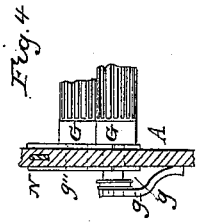

Fig. 4

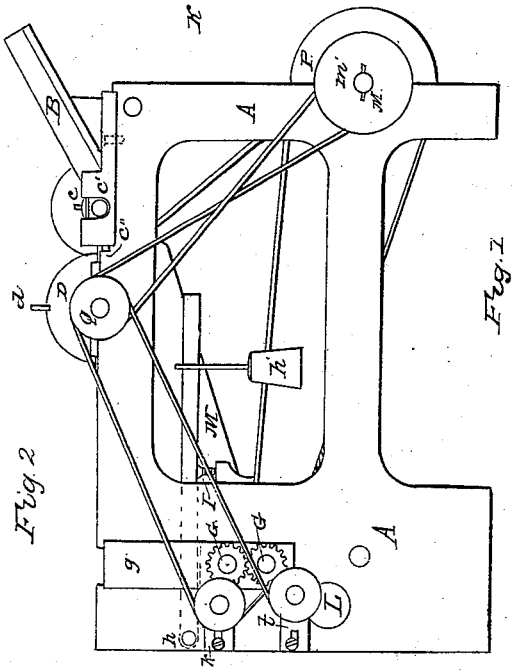

Fig. 2

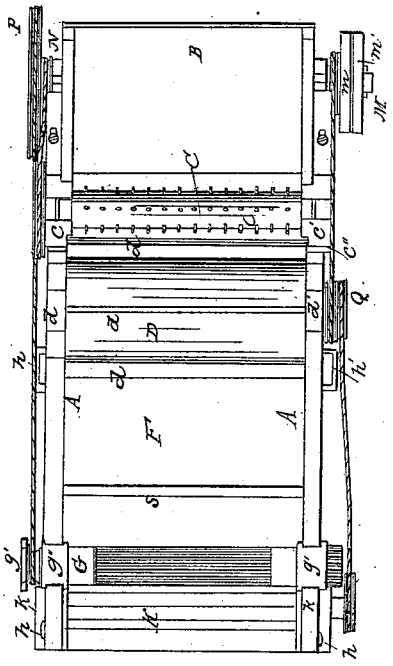

Fig. 1

UNITED STATES PATENT OFFICE.

THEODORE ELY, OF NEW YORK, N. Y.

IMPROVEMENT IN ROLLER COTTON-GINS.

Specification forming part of Letters Patent No. **4,302**, dated December 11, 1845.

To all whom it may concern:

Be it known that I, THEODORE ELY, of the city, county, and State of New York, have invented new and useful Improvements in Machines for Ginning Sea-Island, Black-Seed, or Long-Staple Cotton, and which may be applied to the cleaning of other fibrous substances; and I do hereby declare that the following is a full, clear, and exact description of the principle or character thereof which distinguishes them from all other things before known, and of the manner of making, constructing, and using the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figure 1 is a plan; Fig. 2, a longitudinal elevation; Fig. 3, a longitudinal vertical section; and Fig. 4, a transverse section of a part of the machine, taken at the line X X of Fig. 3.

The same letters indicate like parts in all the figures.

Much difficulty has been experienced in ginning the long-staple cotton, from the tendency of cutting or breaking and heating the fibers—results so injurious to the staple, the value of which depends on the length and entirely and perfectly natural condition of the fibers. The most general mode which has been resorted to for the effectual ginning of the long-staple cotton is the use of rollers, which draw the fibers and separate them from the seeds. These rollers have been made of various substances—such as metal, wood, cork, stone, &c.—with their surfaces smooth, fluted, indented, &c.; but all these, so far as I am informed, have failed in giving satisfactory results. Those made of wood have so far been the most successful; but in a very short time they become rough and injure the staple, and have therefore to be frequently renewed, and even these only succeed when the cotton is fed in by the hand of an attendant, who, with his fingers, properly loosens and distributes the pods. The metal rollers, in consequence of the smoothness of metal surfaces, have to be fluted or otherwise indented, that they may take sufficient hold of the fibers to draw them through, and as these thus formed tend at times to draw in too much cotton together with the seeds, the two rollers must be pressed together by extra force—such as weights or springs—which additional pressure tends to heat the rollers, and thus to injure the staple. Rollers made of other substances have, for like and other causes not necessary to enumerate, failed to produce the results anticipated and required. All the kinds of rollers which have been used tend to "lap the cotton," as it is termed—that is, the fibers adhere to and are wound around the rollers. These defects in the operation of roller-gins arise from the fact that the cotton is not properly loosened preparatory to being submitted to the action of the rollers, and because these (the rollers) have not been made so as to avoid heating and gripping the fibers, and from their arrangement and action on each other, the surfaces which act on the fibers are so brought together as necessarily to injure each other.

The object of my improvements is to avoid all these defects; and they consist in the following devices, viz: in the employment of a toothed roller which takes the cotton from a feeding board or apron, and carries it around, properly distributed, to the action of a rotary beater, which whips it, loosens the pods, and throws them in regular quantities down an inclined board to the height of the separating or ginning rollers, which are made slightly fluted or grooved in lines parallel with their axes, the better to catch and hold the fibers; but to prevent the bad tendency which has always been experienced in the use of fluted metallic rollers, the flutes or grooves do not extend their whole length, the ends being left perfectly smooth for a short distance, so that the edges of the flutes of the one shall not enter the recesses of the other or catch and cut the fibers, this being prevented by the smooth surfaces at the ends, which roll on each other; and the tendency to cut and tear from the causes enumerated, as well as to injure the fibers by the heating of the rollers, is also avoided by dispensing with the additional pressure heretofore used, so long as the proper quantity of cotton is presented to the action of the rollers and they do not draw in too much; but when this does take place, then their bearings, or the sliding boxes in which they work, are brought into contact with weighted levers, springs, or other analogous device properly gaged to bring them into action before the rollers shall have been sufficiently separated to permit the entrance of seeds. The roll-

ers are relieved of this additional pressure the moment the overcharge of cotton ceases, for then the weighted levers or springs are brought into contact with the gages; and the lapping of the cotton around the rollers is avoided by means of additional rollers placed in front of and in contact with the ginning-rollers, the surfaces of the two sets, where they come in contact with each other, moving in opposite directions, to strip the ginning-rollers of any fibers which may have a tendency to adhere to them.

These improvements I have effectually tested by a long series of experiments, and the cotton is not only ginned with greater rapidity, but the fibers are delivered in as perfect a condition as if separated by hand.

In the accompanying drawings, A is a frame upon which the rollers and various parts of the gin are supported.

B is a board or table, upon which the cotton is spread to be taken up by the feeding-roller. It is perfectly smooth, and placed at an inclination, so that the cotton may slide down by its own weight; but an endless cloth may be used instead, if desired.

C is a roller armed with rows of pins, (called the feeding-roller,) the office of which is to take up the cotton from the table or endless cloth and pass it to the beater. The pins *c* are set perpendicular to the axis of the roller, and are of such a length and placed at such distances apart that the seeds shall not get wedged between them nor be crushed between the surface of the roller and the shell or case beneath it.

c' represents bearings which receive the journals of the feeding-roller. The bearings are movable upon the frame of the gin in the direction of their length, to permit of the roller being adjusted at different distances from the beater, according to the state of the cotton to be ginned, and are regulated by wedges or screws *c''*.

D is a drum, (for distinction called the "beater and blower," the periphery of which is armed with projecting blades *d*, running from end to end of the drum and placed parallel to its axis. The beater is made to revolve with very great velocity, and the blades serve the double purpose of taking the cotton from the pins of the feeding-roller and creating a current of air which drives it between the ginning-rollers. Sometimes the edges of the blades are cut into teeth to pick the cotton off the pins.

d' represents bearings in which the journals of the drum-shaft work.

E is a partial shell or case beneath the feeding-roller and the beater. The hollows or flutes of the shell are segments of cylinders a little longer than the exterior of the roller or beater under which they are respectively placed. The space *e* beneath the roller is just sufficient to keep the pins from touching, and extends under the lower half thereof, while the space *e'* beneath the beater is large enough to let the seeds pass between the blades and shell without being broken, and extends from the termination of the space *e* to a vertical line passing down from the axis of the beater.

F is an inclined plane, extending from the shell E to the ginning-rollers. The upper surface of the plane is set on a line with the center of the lower roller, or a little above or below, and a space, *f*, is left between the roller and the plane for the seeds to fall through.

G G are the ginning-rollers, or rollers between which the cotton is passed to be separated from its seeds. They are channeled or grooved lengthwise except for a short distance from each end, which is left plain, and may be of a hair's-breadth greater diameter, so that if the rollers come together while revolving the plain parts receive the pressure and keep the channeled surfaces from wearing each other and from injuring the fiber or staple of the cotton; but it is obvious that if made of the same diameter a like effect will be produced, although not so perfect, and therefore I prefer to make the fluted part a little smaller. The upper roller rests in movable bearings, in order that it may rise and fall as the quantity of cotton passing through is greater or less; and its bearings run in sliding boxes *g'' g''*, provided with mortises through which levers H H pass. These levers have their fulcra at *h h*, and are provided with sliding weights *h' h'*; and the mortise in the sliding boxes *g'' g''*, through which the levers pass, are larger than the thickness of the levers, and each lever rests on a gage-screw, I, so that they do not bear on the roller except when it is carried up too high by the introduction of too great a charge of cotton, as the object is to act on the cotton by the weight of the roller alone, except when carried up too high by a surcharge of cotton, which without the weighted levers would permit the entrance of the seeds. The direction in which the rollers revolve is indicated by arrows. Motion is communicated to the lower roller from the main shaft, and the upper roller derives motion from the lower one by means of a pair of toothed wheels carried by the ends of the rollers and gearing into each other.

g represents bearings of the lower ginning-roller.

g' (see also section 4) is a brace which receives the end of the lower ginning-roller, outside of the pulley by which motion is communicated. The use of this brace is to assist in keeping the roller from being drawn out of its proper line by the strain of the cord or band that drives it.

g'' represents boxes in which the journals of the upper ginning-roller work. They are placed between guides on the frame of the gin, and are free to move vertically, as before stated.

H H are levers which control the motion of the upper ginning-roller. Their fulcra are at *h h*, and they pass through slots or openings

in the boxes g'', and are provided with weights h' for graduating the pressure.

I I are gaging or regulating screws placed beneath the levers H H, for the purpose of relieving the ginning-rollers from pressure when under proper action.

K K are rollers for removing the cotton from the ginning-rollers. They revolve in the same direction with the ginning-rollers, as indicated by arrows, and their surfaces are fluted or formed into slightly-projecting ridges for taking off the cotton more effectually. They are set parallel to the ginning-rollers and so close as to strip any fibers of cotton that may have a tendency to adhere to the ginning-rollers.

k k k k are bearings in which the journals of the cleaning-rollers are supported. They are movable upon the frame for the purpose of adjusting the rollers.

M is a main shaft of gin, to which power is applied from the prime mover. It is provided with a fast and loose pulley, m and m', to receive a belt.

N O P are pulleys on the main shaft, from which motion is communicated to the feeding-roller, beater, and lower ginning-roller.

Q is a pulley on the drum-shaft, from which motion is communicated to the clearing or stripping rollers.

R is a cover put upon the gin, which, in connection with the guard S, keeps the cotton from passing over the ginning-rollers should it be carried much above the inclined plane F before leaving the blades of the beater.

T is a partition put beneath the ginning-rollers to keep the ginned cotton separate from the seeds.

Having described the several parts of the gin, their construction, arrangement, and the method of adjusting them, it remains only to describe its operation, which is as follows, viz: The cotton is laid upon the table B, down which it slides by its own weight, and is taken up by the feeding-roller, successive portions following to take its place. It is carried round by the feeding-roller in the direction indicated by the arrow until it meets the beater which is moving in a contrary direction, and the blades of which take it from the feeding-roller, carry it partly around, and blow it down the inclined plane to the ginning-rollers. The force of the current is sufficient to carry some of the fibers between the rollers, and the channeled surfaces are thus enabled to seize the cotton and force out the seeds which fall through the opening at the foot of the inclined plane, while the ginned cotton passes through and falls from the rollers on the opposite side, or is removed and thrown off by the clearing and stripping rollers.

Instead of placing the ginning-rollers one above the other and depending upon the weight of the upper roller for separating the fibers from the seeds, they may be placed one forward of the other, with springs or weights of sufficient force to equal, or nearly so, the weight of the upper roller when arranged one above the other, and when the force of these is overcome to bring into play additional force to prevent the introduction of seeds or too much cotton, although the arrangement described above is deemed the best; and, instead of using weighted levers gaged by screws or other analogous device for the extra pressure, gaged springs may be substituted.

The ginning-rollers may be fluted or grooved in any of the methods heretofore practiced, as also the stripping or clearing rollers; but I deem the form represented in the drawings the most effective. I wish it to be distinctly understood that the roller-strippers are entirely different from stripping-brushes employed in the same gin and other machines.

The construction and arrangement of the parts above indicated I deem the best and most effective, and therefore have made them the most prominent; but I do not wish to confine myself thereto, but to point out and secure the principle or character of the improvements which I have invented, and therefore

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

1. Making the ends of the fluted, grooved, or ridged ginning-rollers without the flutes, grooves, or ridges, so that they shall run on each other, and thus prevent the injurious action of their parts operating on each other and the fibers of the cotton, as described.

2. The rotating, stripping, or cleaning rollers, in combination with the ginning-rollers, for the purpose and in the manner substantiallyas herein described.

3. The feeding-roller and beater or blower, in combination with the ginning-rollers, for the purpose of loosening the cotton and presenting it to the action of the ginning-rollers, as described.

4. The beater or blower, in combination with the ginning-rollers, for the purpose and in the manner described.

THEODORE ELY.

Witnesses:

CHAS. M. KELLER,

J. J. GREENOUGH.