2 Sheets—Sheet 1.

R. KITSON.

MACHINES FOR OPENING AND SEPARATING COTTON, &c.

No. 187,538. Patented Feb. 20, 1877.

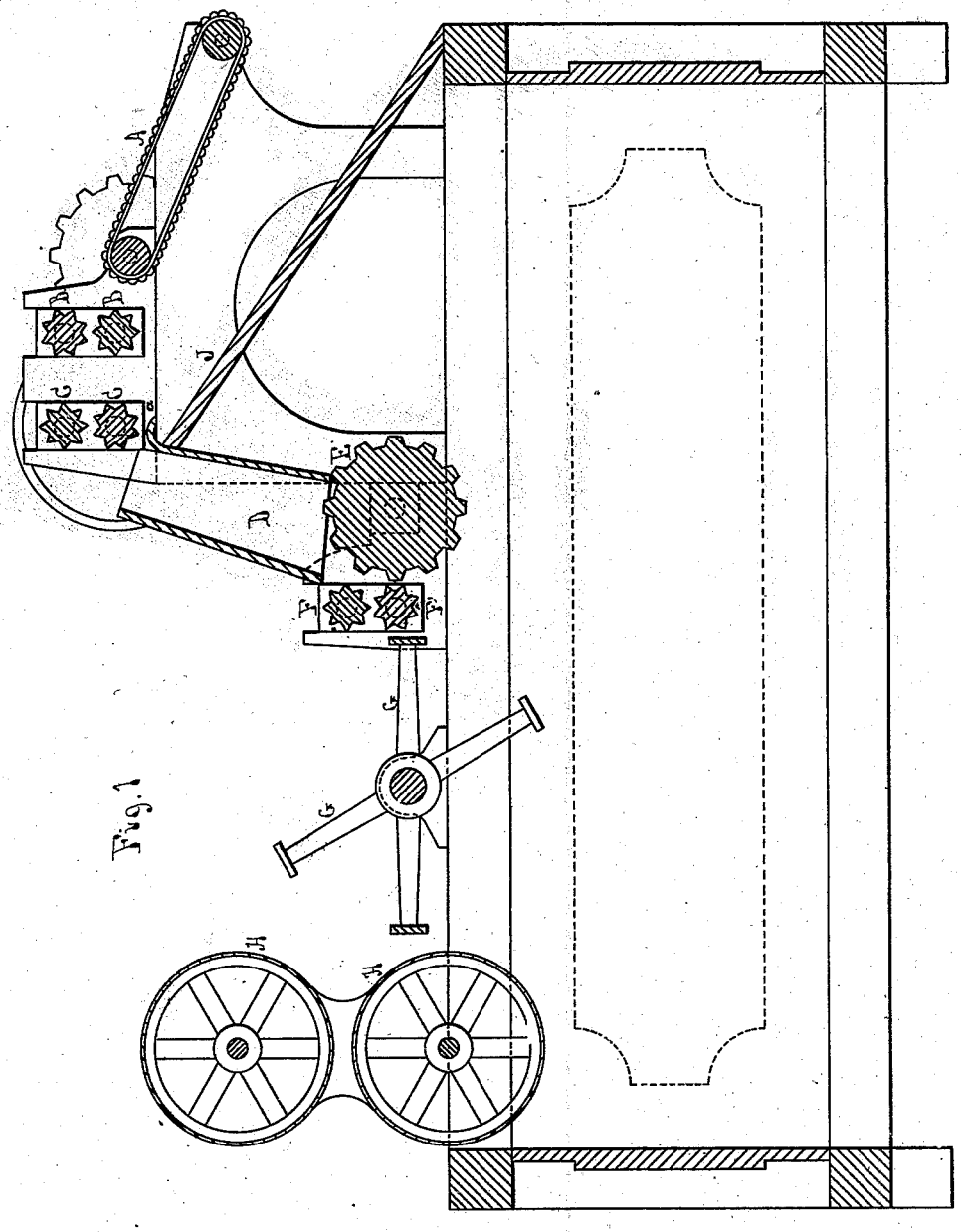

Fig. 1.

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2 Sheets—Sheet 2.

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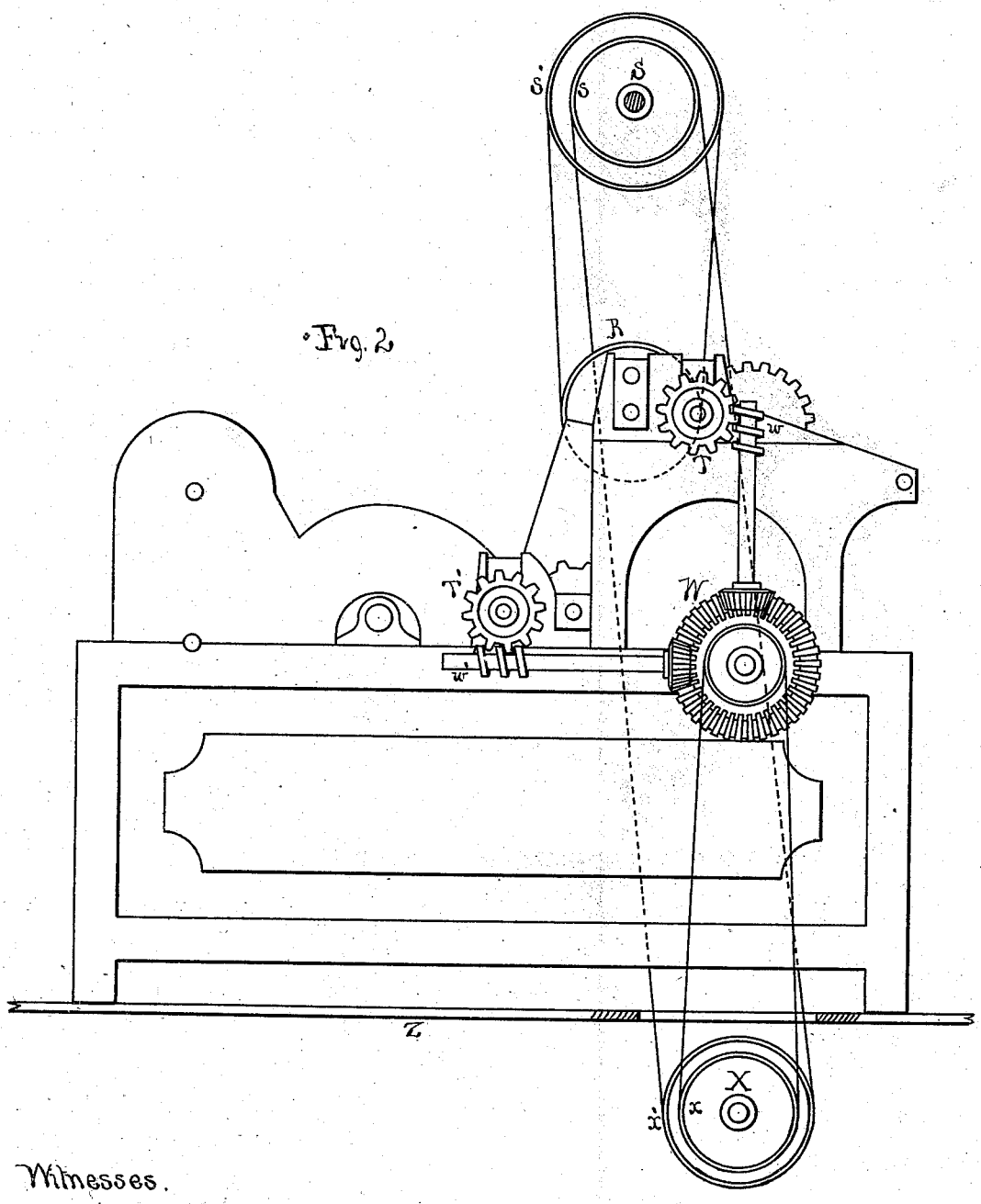
Fig. 2.



Witnesses.

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Inventor.

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UNITED STATES PATENT OFFICE.

RICHARD KITSON, OF LOWELL, MASSACHUSETTS.

IMPROVEMENT IN MACHINES FOR OPENING AND SEPARATING COTTON, &c.

Specification forming part of Letters Patent No. **187,538**, dated February 20, 1877; application filed July 1, 1876.

To all whom it may concern:

Be it known that I, RICHARD KITSON, of Lowell, in the county of Middlesex and State of Massachusetts, have invented certain Improvements in Machines for Opening and Separating Cotton, &c., of which the following is a specification:

My invention relates to the application of a new separating device between the apron and feed-rolls of the beater or scutcher of cotton or other openers; and consists, first, in the application of a pair of separating-rolls after and adjacent to a pair of grasping-rolls, the separating-rolls revolving with much greater rapidity than the grasping-rolls, the object of this part of my invention being to open and separate the lumps and bunches of cotton evenly as they come from the bale, before reaching the feed-rolls; second, in causing the cotton to be delivered from the grasping and separating rolls to the feed-rolls through a gaging device, the object of this part of my invention being to so measure or gage the cotton that a constantly uniform quantity of sufficient thickness will be delivered to the beater to enable a lap to be formed directly from the separating-rolls.

Heretofore the cotton has been taken from the bale and divided by hand while being laid upon the feed-apron, in order to deliver it, as nearly as possible, in a uniform sheet to the feed-rolls and beaters. This process was necessarily imperfect, even with the greatest care and skill on the part of the workman, and very defective if he were inattentive, thus impairing the lap, as well as exposing the beater to great strain and wear from the passage of lumps of cotton not sufficiently opened by hand. My improvement is devised to overcome these defects in a great measure.

By the use of a set of grasping-rolls, followed by a set of dividing-rolls running at high speed, and a measuring or gaging device, I get the cotton into the feed-rolls in a proper form and quantity, and of uniform density, to form a lap while thoroughly divided and pulled apart.

In the drawings, Figure 1 is a vertical section of my improved separating device attached to an opener. Fig. 2 is a side elevation, showing the driving mechanism of the grasping, dividing, and feed rolls.

A is the feed-apron. B B are fluted grasping-rolls, which take the cotton from the apron A. C C are fluted separating or dividing rolls, placed next after the grasping-rolls B B, which separating-rolls revolve with a very high speed compared with the grasping-rolls, the former making presumably one hundred and forty revolutions per minute, while the latter makes fourteen, or nearly so. As these dividing-rolls revolve so much faster than the grasping-rolls, they seize and draw apart or open all the lumps and bunches of cotton which pass through the grasping-rolls; and a great part of the opening of the cotton which has heretofore been done by hand I accomplish by means of these dividing-rolls C C. Hence, in the process of forming the lap, two of the beaters heretofore required may be dispensed with, while at the same time the expense of building and power required in running the openers are greatly reduced.

The cotton is delivered from the dividing-rolls C C, owing to their high speed, in so thin a sheet as to be incapable of forming a lap, and hence must be condensed or formed into a thick sheet before entering the feed-rolls and beater. For this purpose I use a condenser or gage box between the dividing-rolls and the feed-rolls.

If, however, it is not desired to form a lap from the beater, but only to extract the dirt from the divided cotton in an opener, the retarding of the cotton to render it a uniform sheet in size, quantity, and density is not important, and this separating device should deliver the cotton directly to the feed-rolls and beater, which extract the dirt without the intervention of intermediate mechanism.

The high speed at which the dividing-rolls C C run will suffice when properly arranged to throw the cotton into the feed-rolls and accomplish the result desired.

D is the condenser or gage box, which I attach to the frame under the separating-rolls C C, so that the cotton will fall into it from these rolls. This box may be made of any thin sheet metal or other material, the front

and sides being of any convenient shape, to prevent the cotton from escaping improperly, while between the back side of the condenser and the lower separating-roll C I leave a space, *a*, so that when the condenser overflows the surplus will be thrown by the lower separating-roll, along the inclined apron J, back to the cotton-bin.

Heretofore the cotton has been fed along from the apron directly through feed-rolls to the beater, the same amount being fed directly to the beater that is placed on the feed-apron, so that the shape, thickness, and density of the sheet delivered to the beater constantly varied according to the amount placed on the feed-apron, and as the size and uniform density and thickness, and consequent value, of the lap depended upon the uniform thickness and density of the quantity fed to and opened by the beater, the lap was correspondingly uneven. I obviate this difficulty by means of this gage or condenser box D, and cause the amount delivered to the beater in a given time to be entirely independent, in evenness, of the quantity placed upon the feed-apron A, as however unevenly it may be placed on the latter and fed along, as soon as the condenser overflows, the surplus is thrown back by the lower dividing-roll C, through the opening *a*, to the bin. This condenser is made a little wider at the bottom than at the top, so as to prevent the cotton from getting jammed or clogged in it. At the bottom of this condenser I place a large fluted feed-roll, E, which revolves slowly, and carries the cotton out to the next feed-rolls F F, which deliver it to the beater G. The cotton being well opened and separated by the dividing-rolls C C, its bulk is largely increased as it falls into the condenser; and in order that it may be discharged out of the condenser at about the same rate that it is fed into it, I make these feed-rolls F F revolve a little faster than the grasping-rolls B B, or from fifteen to twenty revolutions per minute, and by varying the speed of these rolls a lap of any desired thickness may be formed.

Any proper means well known to mechanics, and commonly used for that purpose, may be adopted to revolve the grasping, the dividing, and the feed rolls, such as belts or gears communicating with the engine or water-power which operates the mill.

It is not necessary to drive these rolls absolutely at the proportionate rates of speed I have mentioned, and the proportions in the rates of speed of these rollers may be slightly varied, to accommodate them to the different lengths of fiber of different varieties of cotton to be opened, which are so numerous that experiment alone will determine the comparative speed to be given to these rollers. I have given above, however, a proportionate rate of speed which is adapted to medium staple.

It will be observed that as the cotton is in an open and loose condition, free from lumps and bunches, and as it cannot get clogged or jammed in the condenser, the feed-rolls F F will deliver a constantly uniform quantity to the beater, and a correspondingly even lap will be formed.

The use of a single roll and a flat or shell plate in place of a pair of rolls has long been known in the art, and these devices have been considered heretofore equivalents of each other for separating and delivering cotton to a beater. I do not, therefore, think it necessary to enter into a minute description of each equivalent, well known in the art, of the different parts I have shown.

The grasping and feed rolls of the beater are driven by means of a beveled gear-wheel, W, which imparts motion to them by worm-gears *w* and *w'* and gear-wheels T and T', respectively, in the well-known form. This gear-wheel W is driven by a belt from the pulley *x* on the shaft X, which shaft is below the floor *z* of the room in which the beater is placed.

Another belt from the pulley *x'* on the said shaft causes the dividing-rolls to revolve at the desired speed by means of the pulleys *s* and *s'* and pulley R.

This method of driving the several rolls forms no part of my invention, as it is old and well known, and other means may be used, adapted to the room in which the beater is placed.

What I claim as new and of my invention is—

1. The combination of the grasping-rolls B B with the intermediate dividing-rolls C C and the feed-rolls F F, the said dividing-rolls being driven at a higher speed than either the grasping or the feed rolls, substantially as described.

2. The combination of the dividing-rolls C C, running at a given rate of speed, with the condenser D and the delivery feed-roll E, running at a less rate of speed, to deliver the fiber from the condenser to the beater, substantially as described.

3. The combination of the condenser D with the delivery feed-roll E, substantially as described.

4. The combination of the feed-apron A, the separating and condensing mechanism B B, C C, and D, and the feed-rolls F F, substantially as described.

RICHARD KITSON.

Witnesses:

D. HALL RICE,

ALFRED K. GARLAND.