

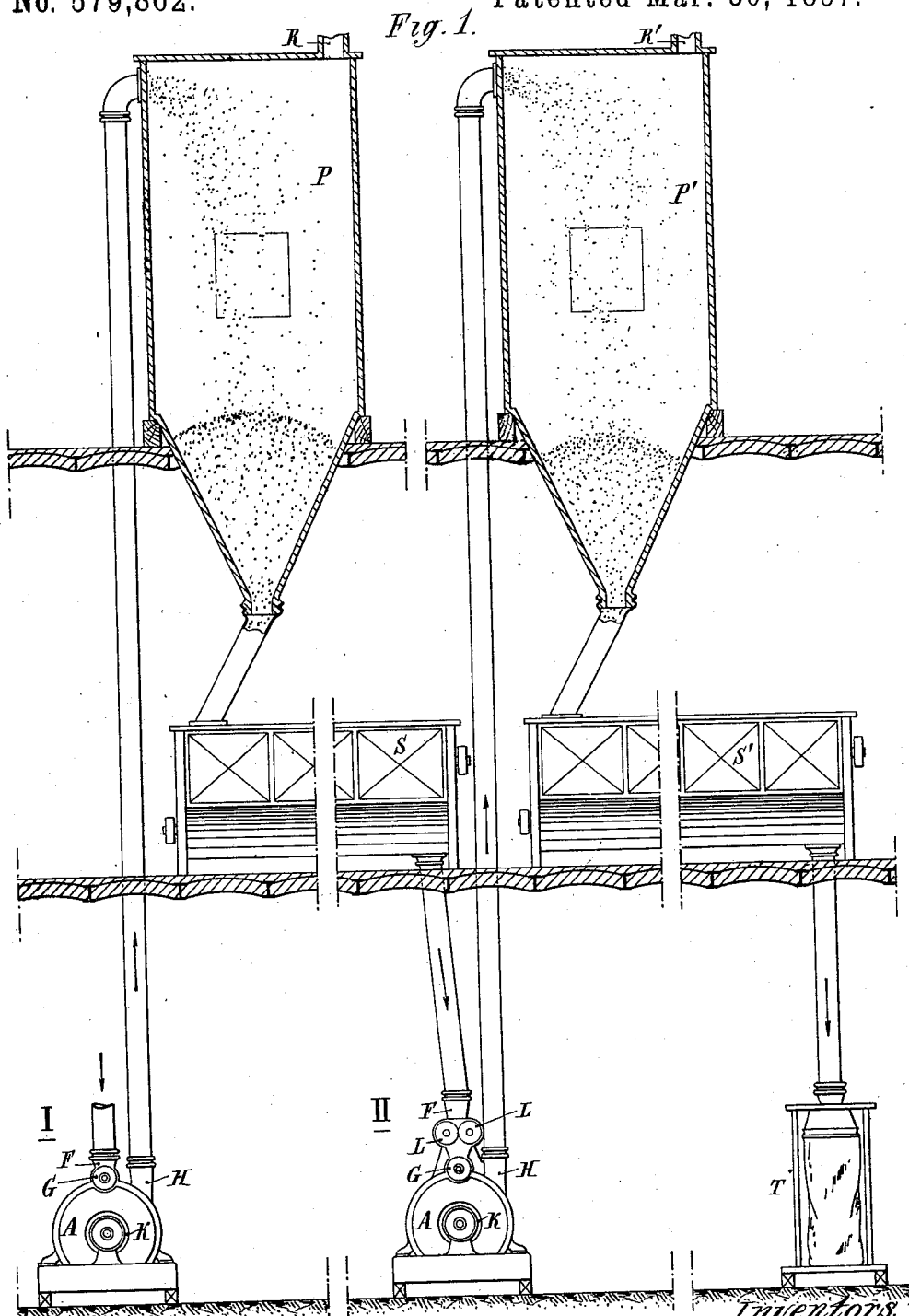
(No Model.)

2 Sheets—Sheet 1.

R. DANVIN & R. GIBORY.
METHOD OF AND APPARATUS FOR HULLING GRAIN.

No. 579,862.

Patented Mar. 30, 1897.



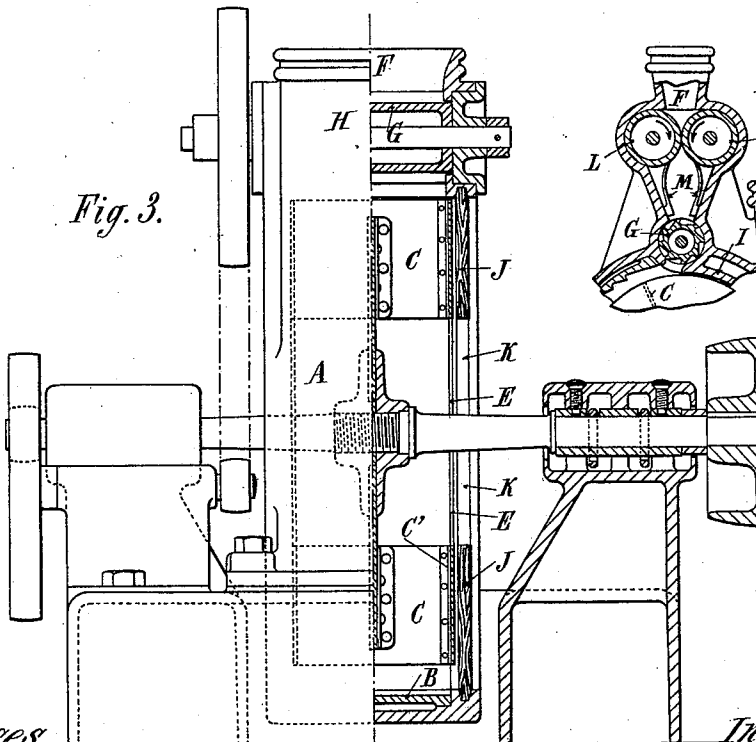
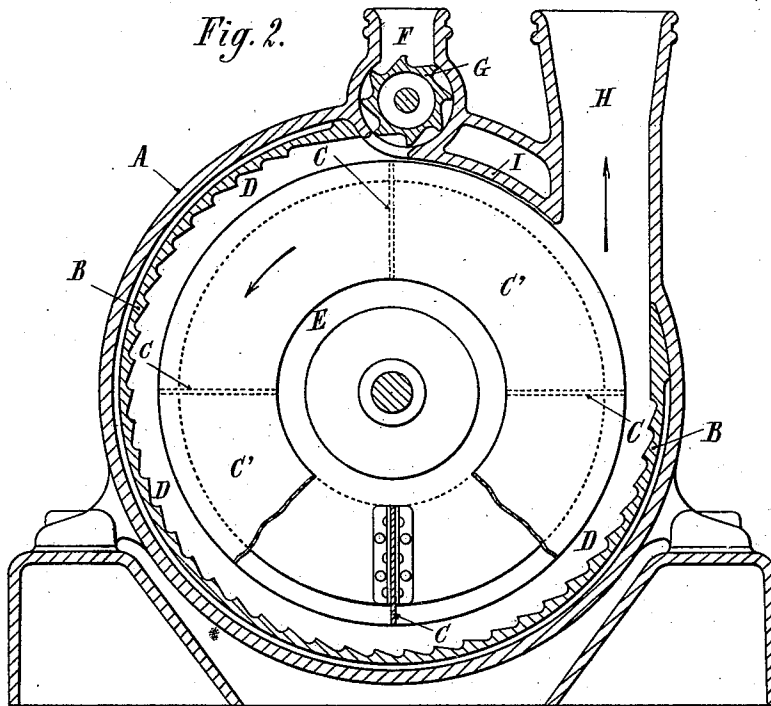
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By James L. Norring, *Atty.*

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UNITED STATES PATENT OFFICE.

ROGER DANVIN AND RAYMOND GIBORY, OF PARIS, FRANCE.

METHOD OF AND APPARATUS FOR HULLING GRAIN.

SPECIFICATION forming part of Letters Patent No. 579,862, dated March 30, 1897.

Application filed March 12, 1895. Serial No. 541,479. (No model.) Patented in France November 6, 1894, No. 242,650; in Germany January 23, 1895, No. 84,699; in Austria January 25, 1895, No. 45/2,320; in Hungary February 3, 1895, No. 2,170; in Spain February 20, 1895, No. 17,035; in Switzerland February 20, 1895, No. 9,988, and in England February 23, 1895, No. 3,953.

To all whom it may concern:

Be it known that we, ROGER DANVIN and RAYMOND GIBORY, citizens of the Republic of France, residing at the city of Paris, Republic of France, have invented certain Improvements in Methods of and Apparatus for Hulling Grain, (for which we have obtained patents in Austria, No. 45/2,320, dated January 25, 1895; in France, No. 242,650, dated November 6, 1894; in Hungary, No. 2,170, dated February 3, 1895; in Great Britain, No. 3,953, dated February 23, 1895; in Spain No. 17,035, dated February 20, 1895; in Switzerland, No. 9,988, dated February 20, 1895, and in Germany, No. 84,699, dated January 23, 1895;) and we do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, in which—

Figure 1 is a side elevation, partly in section, of the apparatus we employ. Fig. 2 is a vertical section through the hulling apparatus; Fig. 3, a view partly in end elevation and partly in section, and Fig. 4 a detail view in section of the rolls.

Letters of like name and kind refer to like parts in each of the figures.

The design of our invention is to provide an improved method of and apparatus for removing hulls from grain generally, but wheat more especially; and to this end said invention consists in the method and in the apparatus substantially as and for the purpose hereinafter specified.

In the carrying of our invention into practice we employ an apparatus to whose action the grain is first subjected for the removal of the hulls thereof, in the construction of which apparatus we employ a cylindrical shell or drum A, that is mounted on a suitable frame or bed-plate and provided on its inner circumference with a series of projections or ribs that are preferably either rectangular or triangular in cross-section. Instead of being formed on the drum itself, said ribs are formed on curved plates B and B', of metal or other hard material, suitably fastened to the interior of said drum.

Within the drum A is concentrically placed a fan C, composed of a number of radially-arranged flat plates mounted between two side or cheek pieces C' C'. 50

The diameter of the fan C relative to the internal diameter of the drum is such that an ample annular space D is left between the circumference of the fan and the ribbed interior of the drum. 55

The central portion of each side piece of the fan is removed to form a circular opening E for the passage of the fan-shaft and for the admission of air to the fan. 60

At its top the drum A has an inlet F for the grain to be operated upon, in which is placed transversely a roller G, having a toothed periphery that delivers the grain to the annular space D in a direction tangential thereto, and so outside of the path traveled by the fan. An outlet or discharge passage H, also arranged tangential to said annular space D, is located in the top of the drum A, adjacent to the inlet F, and projecting into said space between the inlet and outlet is a partition I, that extends close to and is curved concentrically with the cylinder. Said partition cuts off the grain passing through the annular space at the discharge-passage H and diverts the same into said passage. 75

Each side of the shell or drum A is provided with a head J, having a circular opening K, that is concentric with the adjacent opening E in the side piece of the fan and being provided for the like purpose of accommodating the fan-shaft and admitting air from the exterior of the mechanism. 85

To hull wheat by the use of the apparatus shown, the fan is revolved with such velocity that a blast of air will be drawn in at the center of the fan and directed with great force across the annular space between the circumference of the fan and the inner periphery of the drum and caused to travel through said space, making its exit through the discharge-passage H. Into this air-blast the grain is introduced tangentially by the feed-roller G, and, being caught by it, is thrown against the 95

ribbed or roughened interior of the drum with sufficient force to cause the bursting of the hull or bran. The air-blast alone is depended on to throw the grain against the drum, the
 5 vanes or blades of the fan not touching the grain at all. The result is that the grain is not subjected to any grinding or concussive action which would tend to pulverize it or reduce it to flour, but is simply carried by the
 10 air against the surface of the drum with a force sufficient to cause the bursting of the hull or bran thereon. By the action of the air drawn in at the center of the fan and projected outward toward the interior surface of
 15 the drum or the centrifugal movement of the air the grain is kept out against said surface, as it at the same time is carried along over such surface by the movement in a circular direction of the air between the fan periphery
 20 and the interior of the drum. This centrifugal action of the air is continuously going on toward the entire interior surface of the drum, so that it is thus insured that the grain in its passage through the drum will tend to
 25 keep continuously in contact with the inner surface thereof, with the almost certain result that none will escape without the rupture of its hull.

The introduction of the grain to the air-blast in a direction tangential to the fan is important, as thereby any contact of the grain with the fan is avoided.

From the discharge-opening H the product is carried by the air-blast to an overhead dust
 35 bin or chamber P, having at its top an outlet for the air. From said chamber the broken grain and loose bran are conducted to separating or bolting mechanism S, by which the light bran is removed. From the latter the
 40 bolted material, either directly or after having been again subjected to the action of a hulling apparatus, is conveyed to a pair of crushing-rolls L and L, and after having been acted on by the latter is subjected to the action of an apparatus like that into which the
 45 grain is first introduced. Preferably the rolls L and L are arranged as a part of said second apparatus, being mounted thereon, so that the product is delivered from them to the
 50 feed-roller G thereof; but, if desired, they can be located apart therefrom.

The action of the rolls upon the broken grain is to flatten the same and loosen portions of the hull or bran from any particles
 55 of the body of the grain which may still be held together, and thus render their complete separation easy and thorough by the apparatus to which the rolls deliver them.

The rolls are preferably adjustable toward
 60 and from each other, and they are adjusted so that their adjacent surfaces are sufficiently far apart to produce the flattening and loosening effect above described.

A clearer or scraper M is provided to keep
 65 the surface of each roller clean.

After being conveyed to a second dust bin or chamber P' and thence to sifting or bolting

mechanism S' the now thoroughly hulled and broken grain is transformed into flour and filled into bags or sacks T.

By using the series of outwardly traveling or centrifugal blasts of air to act upon the grain as it is being carried around within the shell or drum A, we secure an action upon
 70 the material being treated which is different from any action which is possible where the centrifugal movement of the particles caused by their being mechanically whirled around within the drum is relied upon to drive the
 75 particles of material against the abrading-surface. Where the centrifugal movement of the particles of material, due to their being whirled about within the casing, is relied on to drive them against the abrading-surface within the latter, the heavier particles are
 80 the ones which, having the most momentum, travel outward with the greatest velocity. They are the ones, then, which are driven against the abrading-surface, while the lighter particles, consisting of bran, with some
 85 of the granules or granular constituents of the berry adhering to the same, will not reach or be held against the abrading-surface. On the other hand, where our process is used, in the carrying out of which successive radially
 90 or centrifugally traveling blasts of air are employed to act upon the particles of material, produced by the partial or complete opening of the grain, the lighter particles, consisting of portions of the bran, with granules
 95 or small portions of the other constituents of the grain adhering thereto, are the ones which the blasts of air carry farthest and move quickest, so that they will be driven and held against the abrading-surface within
 100 the shell or drum A, to the end that all adhering granules or particles will be rubbed off of the pieces of bran, and the latter will be left absolutely clean, while the particles or granules thus removed from them will be
 105 mingled with the other granules or particles of the grain which have been previously separated. The result is that with the complete separation of the bran from the other constituents of the grain the flour-making portion
 110 of the latter can be most readily freed from the bran in the subsequent treatment.

It will be understood that the peculiar action of the radially or outwardly traveling air blast or blasts referred to upon the material
 120 within the casing or drum A is due to the fact that the pieces of bran, even with granules or particles of the contents of the grain-berry adhering to them, present to the air more surface in proportion to their weight than do
 125 the particles or granules separated from the bran during the travel of the material around the casing, and are consequently thrown out more quickly and held with greater force against the abrading-surface than the already-separated granules or particles. These
 130 granules or particles will of course be also thrown against the surface and abraded to round off their angles or corners.

The result of our process is that the bran produced is peculiarly clear of any adhering particles of the constituents of the grain, and the granules separated from the bran are all in rounded form and free from adhering small particles and dust, so that they will pass freely over the screens and fall without obstruction through the different-sized meshes of the same, which are to separate them according to size.

Having thus described our invention, what we claim is—

1. The method of hulling grain, which consists in moving the grain along, and forcing it against a curved abrading-surface by centrifugal blasts of air directed to such surface, at points successively farther and farther along the same, substantially as and for the purpose set forth.

2. The method of hulling grain, which consists in passing the grain over an extended surface by a current of air that moves toward and over the same, the movement toward such surface being in a direction at an angle to its movement over the surface, whereby the grain is kept in contact with said surface, substantially as and for the purpose shown.

3. The method of hulling grain, which consists in introducing the same into a chamber having a circular interior abrading-surface and subjecting the grain to the action of a current of air that has a centrifugal movement toward and a circular movement past such surface, whereby the grain tends to keep in contact therewith, substantially as and for the purpose described.

4. The method employed, which consists in introducing grain into a chamber having a suitable abrading-surface, and subjecting it to the action of a current of air to carry it against and over such surface, next, subjecting it to the action of rolls, and then introducing it to a second chamber having a suitable abrading-surface, and subjecting it to the action of a current of air, to carry it against and over such surface, substantially as and for the purpose specified.

5. In combination with a chamber having a curved abrading-surface, a rotary device within the chamber, with blades of such length as to leave a well-defined space between them and the abrading-surface, so as to prevent any grinding of the material between the blades and surface, means for introducing the material to be treated into the zone between the abrading-surface and the blades, and means for admitting air to the chamber at a point separate from that where the material is introduced, substantially as and for the purpose shown and described.

6. The combination of a suitable chamber, a rotary fan therein, an annular air-space being left between the interior of the chamber and the periphery of the fan, and means for

introducing grain to such space on a line tangential to the fan periphery, whereby the grain is delivered wholly outside the path of the fan, substantially as and for the purpose shown.

7. The combination of a suitable chamber, a rotary fan therein, an annular air-space being left between the interior of the chamber and the periphery of the fan, means for introducing grain to such space on a line tangential to the fan periphery, whereby the grain is delivered wholly outside of the path of the fan, and means for introducing air to such annular space from a point within the periphery of the fan, whereby it is caused to move outward against the inner wall of the chamber, substantially as and for the purpose specified.

8. The combination of a suitable chamber, a rotary fan therein composed of radially-arranged plates and side or cheek pieces, means for introducing air at or near the center of said fan, and means for introducing grain to an annular space between the fan periphery and the interior of the chamber, the direction of such introduction being on a line tangential to the fan periphery, and wholly outside of the path of the fan, substantially as and for the purpose set forth.

9. In an apparatus for grinding grain, the combination of the horizontal drum A, having at its top the inlet F and a discharge-passage H that is tangential to the space within the drum, the fan C inclosed in said drum, and comprising a series of vanes having secured thereto cheek-pieces C' C', arranged at right angles to the fan-vanes to direct the entire body of air and grain into an annular space D intermediate the fan and drum, the said cheek-pieces C' C' being provided with central openings E for passage of the fan-shaft and admission of air to the interior of the fan, the drum-head J provided with central openings K, coincident with the said openings E and for the same purpose, the plate B on the inner periphery of the fan-inclosing drum, the partition I extended between the grain-inlet F and discharge-outlet H, and having a surface curved concentrically with the fan and in close relation thereto, and the rotary distributor G, mounted in the inlet adjacent to the fan and adapted to pass the grain or like material tangentially into the annular space surrounding the fan, substantially as shown and described.

In testimony whereof we have hereunto subscribed our names in the presence of the two subscribing witnesses.

ROGER DANVIN.
RAYMOND GIBORY.

Witnesses:

LOUIS SULLIGER,
CLYDE SHROPSHIRE.