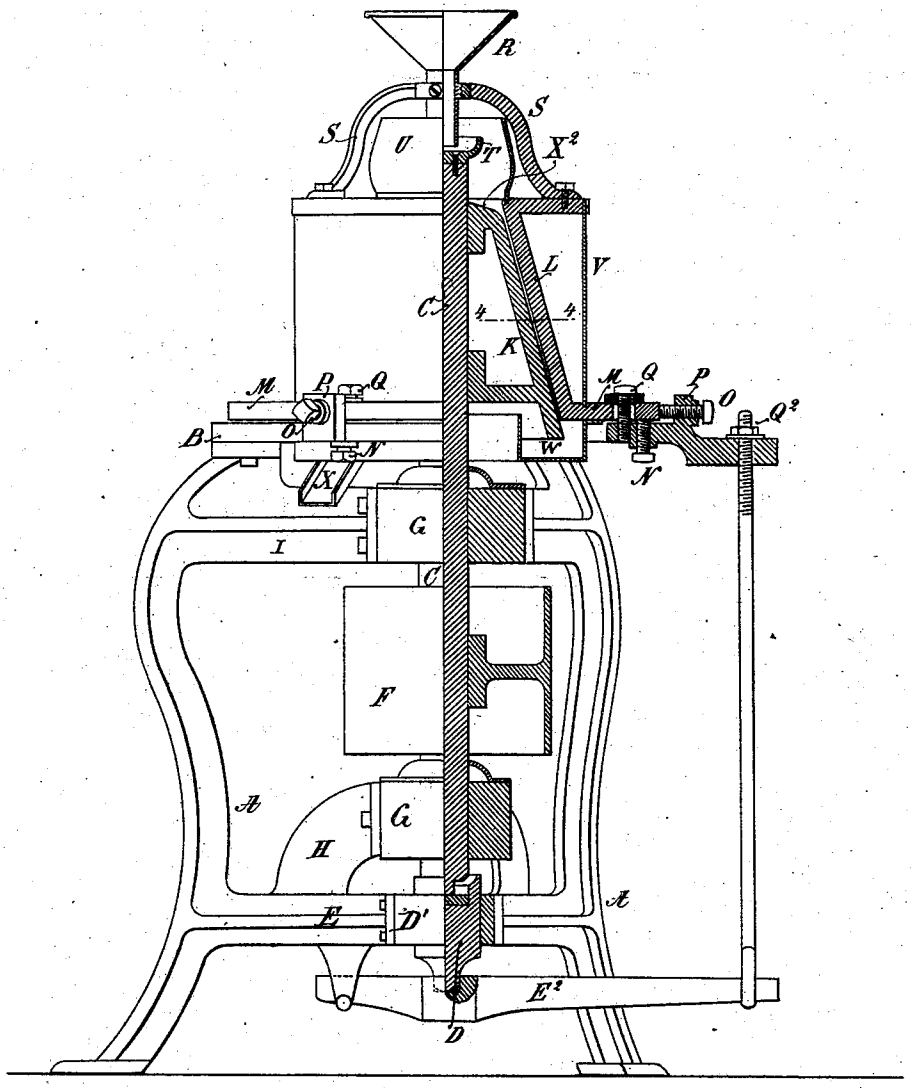
(No Model.) 2 Sheets—Sheet 1.

C. L. GRATIOT.

METHOD OF AND APPARATUS FOR DEGERMINATING WHEAT.

No. 260,750. Patented July 11, 1882.

Fig. 1.



WITNESSES

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Fig. 2,

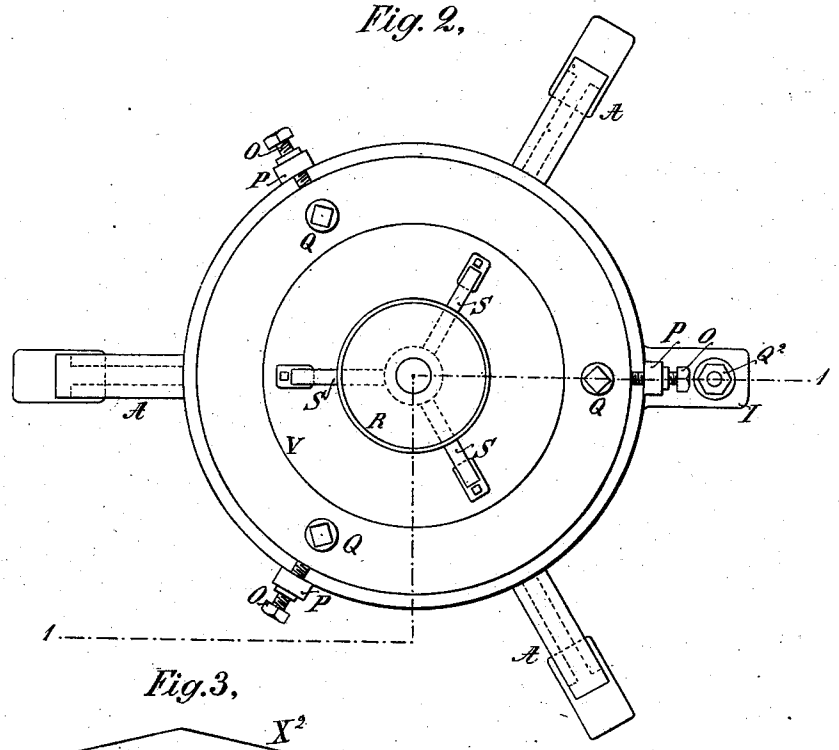


Fig. 3,

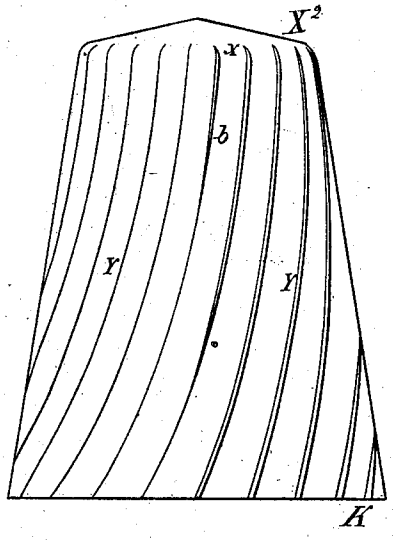
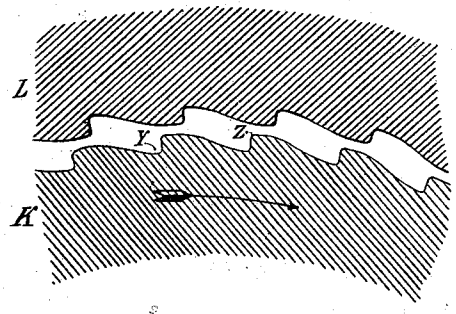


Fig. 4



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UNITED STATES PATENT OFFICE.

CHARLES L. GRATIOT, OF ST. LOUIS, MISSOURI, ASSIGNOR TO THE GRATIOT MANUFACTURING COMPANY, OF CHICAGO, ILLINOIS.

METHOD OF AND APPARATUS FOR DEGERMINATING WHEAT.

SPECIFICATION forming part of Letters Patent No. 260,750, dated July 11, 1882.

Application filed October 25, 1881. (No model.)

To all whom it may concern:

Be it known that I, CHARLES L. GRATIOT, of St. Louis, in the county of St. Louis and State of Missouri, have invented certain new and useful Improvements in a Method of and an Apparatus for Degerminating Wheat, of which the following is a specification.

The object of my invention is to remove the germ, fuzz, and other impurities of wheat contained in the creases of the kernels, as a preliminary step to the reduction of the wheat to middlings and flour.

My invention accordingly consists in a novel method and apparatus for breaking or cracking the kernels longitudinally through their creases, and then removing the germ, fuzz, and other impurities by rubbing or wearing them off without crushing or grinding the germs or the half-sections of the grains. I accomplish both this longitudinal breaking and subsequent cleaning by the continuous operation of mechanism which completely loosens and separates the germs and crease-dirt from their attachment to the kernels, owing to the length of time and thoroughness with which the cracked parts are rubbed, turned, and agitated in the practice of my invention, in accordance with which they are subjected to the influences of gravity and centrifugal force in a peculiar manner, as hereinafter fully explained. After the separation is accomplished the products of the apparatus may be readily screened, so as to leave the half-kernels clean and ready for grinding to middlings and flour.

In the accompanying drawings, illustrating a novel apparatus for carrying out my improved method, Figure 1 is an elevation partly in vertical section, on the line 1 1 of Fig. 2, of a complete machine. Fig. 2 is a plan or top view of the same. Fig. 3 is an elevation of a frustum-shaped roll; and Fig. 4 is a section of a roll and case, showing their furrows.

Referring to the letters upon the drawings, A indicates a main supporting-frame of any suitable construction, having an annular flat top, B.

C indicates a vertical burr spindle or shaft, resting upon its lower end, in a suitable vertically-sliding bearing-socket, D, within a laterally-adjustable bearing, D′, mounted in an opening through a cross-beam, E, of the main frame. The socket D is supported upon a lever, E^2.

The spindle is provided with a belt-pulley, F, and with two ordinary adjustable journal-bearings, G G, movable laterally in the bracket H and in the top cross-beam, I, whereby the vertical shaft may be always positively maintained in a perpendicular position.

Fixed and truly centered upon the upper end of the shaft is a hollow frustum-shaped metallic cracking-roll, K, fitting within a corresponding case, L. The operating-faces of the roll and case are preferably of chilled iron or porcelain. The case is provided with a flat annular bottom or bearing, M, which rests over the flat annular top of the frame, and is made adjustable vertically and horizontally by means of screws, so that its inner inclined surface shall be at equal distances from the outer surface of the frustum-roll at all points.

N N indicate set-screws passing through the annular top of the table, and bearing against the case-bottom. There should be at least three of these screws, and there may be more.

O O indicate screws passing through lugs P P, which serve to adjust the case horizontally. There should be at least three of these screws, and four may be employed.

Q Q indicate screws and nuts, which, when the case has been duly adjusted vertically and horizontally with respect to the roll, serve to hold the case firmly to the table-top in the adjusted position, the screw-holes through the bearing M being large enough to permit sufficient lateral adjusting movement.

The operation of these parts for the adjustment of the roll and roll-case into proper relations to each other is as follows: The case is first suspended, as it were, upon the roll, the screws Q Q being retracted, and the lever E^2 being operated by means of the hand-wheel or nut Q^2, to lift the roll and case, so that the annular bottom bearing of the case shall be clear of its bearing on top of the frame. As the case exactly fits the roll, this will insure the adjustment of the interior inclined surface of the case exactly parallel with the outer surface of

the roll. Then the screws N N and O O are to be merely set up snugly in contact with the bottom bearing of the case. The roll is then lowered by the operation of the lever E^2 and hand-wheel to the proper position for spacing the roll and its case according to the size of the kernels of grain to be cracked. This having been done, the holding-screws Q Q are advanced so as to firmly clamp the case down upon the ends of the screws N N, when the mill will be in condition for work. Any other suitable means of adjustment may be employed.

R indicates a hopper secured in a bracket, S, on top of the case. This hopper delivers the grain into a saucer-like receptacle, T, secured on top of the spindle and surrounded by a glass globe, U, resting on the case. From this receptacle the grain falls over on the top surface of the roll, which preferably inclines outward, as shown in the drawings, and thence is fed down by gravity between the roll and case.

V indicates an exterior casing, which may be of wood or sheet metal, surrounding the case. After the grain is passed through the mill it is delivered into an annular receptacle, W, thence out at one side through the inclined delivery-spout X into any suitable receiver. The receptacle W is secured to the bottom of the case L, so as to move with it during its adjustments, and thus always be in position to receive the products of the mill and permit their removal by a suitable ordinary brush or scraper.

The operating-face of the roll is preferably slightly beveled or more inclined, as at X, near its top, as indicated in Figs. 1 and 3, in order that the grain may more readily find its way end foremost between the roll and its case.

In order to effect the chief object of my invention, I provide furrows Y in the frustum-roll, of a depth of about three-eighths of an inch at the deepest part, extending from top to bottom upon an inclination with reference to the axis of the frustum of about thirty degrees, more or less. These furrows, however, I prefer not to have run around upon the same incline from the top to the bottom, but to incline less from the perpendicular for about one-fifth of the way from the top, and then to increase their inclination the balance of the way to the bottom, substantially as illustrated. These furrows in this mill should be, say, about three-fourths of an inch wide at the top, and about an inch and a half wide at the bottom in a full-sized roll, leaving corresponding oval cleaning-surfaces, Z, between the shallowest parts of the furrows. These cleaning surfaces or ridges Z of the furrows, being rounded slightly, do not cut, but simply break, and then afterward rub or wear and clean the broken grain with only very slight, if any, flouring.

The roll of this machine I prefer to make about fourteen inches in length, seven inches in diameter at the top, fourteen inches in diameter at the bottom, and provided with about twenty-five furrows. These figures may be varied somewhat in the construction of the machine; but the roll must not be too long, on account of danger of heating and flouring the grain, or too short, on account of danger of not doing its proper work effectively.

The case is provided with corresponding-shaped furrows and ridges, except that they are reversed with respect to those of the roll. The result of this construction is that as the grain is delivered between the roll and its case the kernels will assume with great regularity a position to enter the furrows end foremost. In this position they will first, by the action of the upper part of the roll, be cracked or broken apart longitudinally through their creases, the grain by preference having been previously screened or sized and the case having been previously trued and set in place about the roll accordingly at a suitable distance for accomplishing this result. The cracked and divided kernels will then pass rapidly down the furrows. Between the point *b* and the bottom the half-sections of the kernels will be turned over and thoroughly rubbed on all sides, and their fuzz, crease-dirt, and exposed germs are disconnected from them without breaking the germs.

Instead of having the case adjustable vertically, as described, I may adjust the roll vertically within a fixed case by means of lever E^2 at the bottom of the frame.

Instead, also, of having the angles of the furrows changed, as described, I may have the furrows of the same angle of inclination with respect to the roll-axis from end to end.

I am aware that it is not new to split or break kernels of wheat longitudinally through their creases, and that methods and apparatus have been devised to degerminate and clean wheat. I am also aware that frustum-shaped rollers with diagonal furrows have been used for grinding coffee and other substances. I am also aware that horizontal disk-rolls with radial furrows and rounded ridges, and that parallel cylindrical rolls with similar furrows and ridges, have been employed for cracking kernels of wheat as a step toward complete degermination and cleaning of the half-sections of the grain. But I am not aware that a degerminating-roll has been made of frustum shape with proper inclined furrows and ridges, adapted not only to crack the grain, but afterward, during its gradual passage downward under the action of gravity, to turn it repeatedly in the continuous operation of the mill, and rub off and release the germs and crease-dirt from their attachment to the kernels, and finally deliver the products, uncut and unground, out of the mill at the bottom of the roll. The practical results of the use of such a frustum or nearly conical-shaped degerminating-roll are demonstrated by experiment to be highly satisfactory.

This machine, in addition to being used primarily to split the kernels and clean their half

parts, as above set forth, may, by adjusting the roll and case closer together, be used to reduce grain that has been split originally by this or other machines; but I prefer to employ this machine for the primary work, and to use for the further reduction machines of modified construction, for which I intend to make application for Letters Patent of the United States.

It will be readily understood that by my method the kernels, immediately after being broken along their creases, are subjected to the influences of gravity and centrifugal force, by which treatment the too rapid discharge of the kernels is prevented by their being over and over again thrown off from the roll by centrifugal force, and against the case, with a tendency to turn over in being thrown off and to rub against each other as well as against the roll and case, and that the half-kernels in falling from the case downward against the roll are gradually fed along or caused to approach the point of discharge in constant rubbing motion, tending to clean all their surfaces.

It will thus be seen that I provide a new method, as well as an improved apparatus, for longitudinally dividing and then turning, rubbing, and cleaning kernels of wheat without grinding either the grain or its germs, the operation of which is continuous, speedy, economical, and thorough. Accordingly,

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

1. The herein-described method of degerminating wheat by a continuous operation, consisting in first cracking the kernels longitudinally through the creases, and then releasing the germ, fuzz, and crease-dirt from the cracked grain or half-kernels by subjecting them to the influences of gravity and centrifugal force, whereby they are thoroughly agitated, repeatedly turned and rubbed, and gradually fed along, substantially in the manner set forth.

2. The frustum-shaped degerminating-roll having furrows provided with rounded ridges Z, and extending from top to bottom of the roll in a direction diagonal to its axis, substantially as and for the purpose set forth.

3. The combination of the case having continuous furrows extending from top to bottom, the frustum-shaped roll inclosed by said case, and having like but reverse continuous furrows on its exterior surface, extending from top to bottom diagonally to its vertical axis, and means by which said roll and case are suitably supported relatively to each other, whereby they are adapted to operate upon the kernels without grinding, substantially as and for the purpose set forth.

4. The combination of the frustum-shaped roll having the continuous furrows from top to bottom extending diagonally to its vertical axis, arranged at a greater angle to the axis of the roll at their lower or longer portions than at their upper or shorter portions, and provided with rounded ridges, and the corresponding case or shell having like formed continuous furrows on its inner surface arranged in a similar manner to those on the roll, but inclined in reverse direction, whereby the grains are cracked and cleaned without cutting or grinding, substantially as set forth.

5. In an apparatus for degerminating wheat by first cracking and then cleaning the kernels in the manner described, the combination of the frustum-shaped roll having the furrows continuous from top to bottom on its exterior surface, and arranged diagonally to its vertical axis, the case having furrows on its inner surface similar to those of the roll, but inclined in a reverse direction, and supporting an adjusting mechanism, by which the roll and case may be spaced to operate upon different-sized kernels without grinding them, substantially as set forth.

In testimony whereof I have hereunto subscribed my name this 13th day of October, A. D. 1881.

CHARLES L. GRATIOT.

Witnesses:

MARCUS S. HOPKINS,

JOSEPH I. PEYTON.