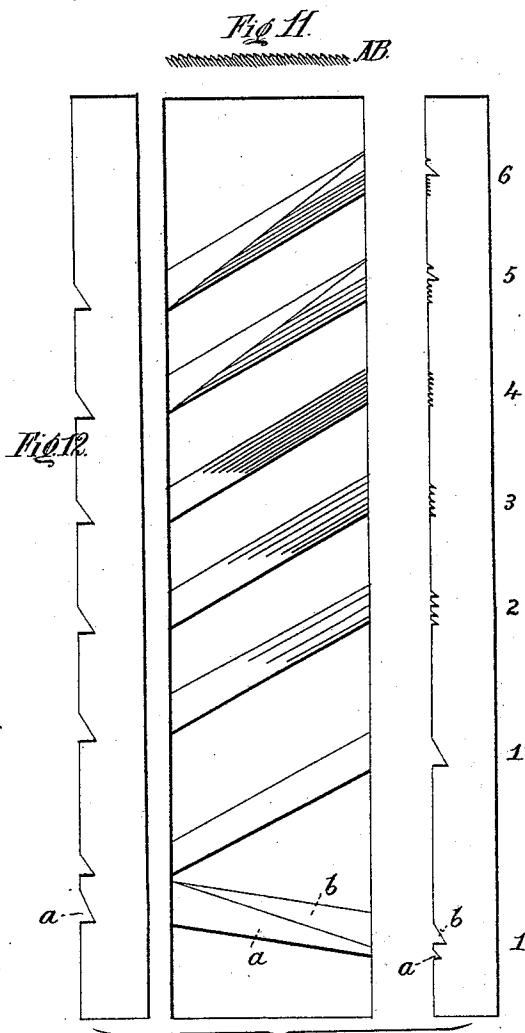
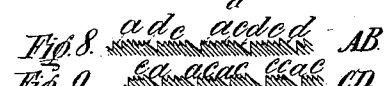
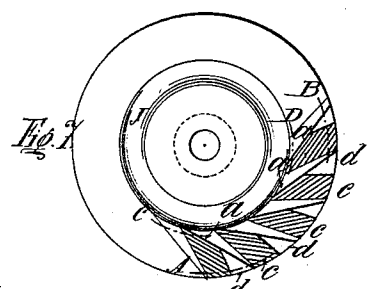
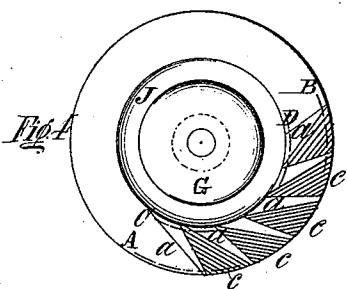
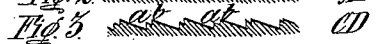
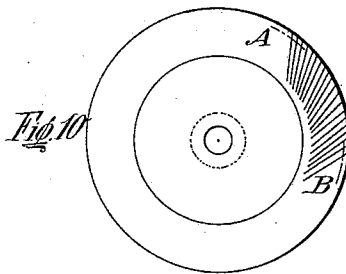
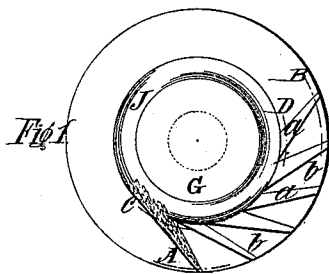


(No Model.)

J. SCHWEITZER.
SYSTEM OF GROOVES FOR MILLSTONES.

No. 439,900.

Patented Nov. 4, 1890.



Attest
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UNITED STATES PATENT OFFICE.

JOSEPH SCHWEITZER, OF PARIS, FRANCE.

SYSTEM OF GROOVES FOR MILLSTONES.

SPECIFICATION forming part of Letters Patent No. 439,900, dated November 4, 1890.

Application filed October 6, 1888. Serial No. 287,372. (No model.) Patented in England June 1, 1885, No. 6,630.

To all whom it may concern:

Be it known that I, JOSEPH SCHWEITZER, a citizen of the Republic of France, and a resident of Paris, in the said Republic, have invented a new System of Millstone-Dress, (which is described in my British patent, No. 6,630, dated June 1, 1885,) of which the following is a full, clear, and exact description.

This invention relates to a special system of grooves or dress for millstones or grinders, which is particularly useful in the new mill which is described in my application for Letters Patent of the United States of even date herewith, Serial No. 287,373, and which carries into effect the rational system of milling invented by myself.

With stone grinders it has generally been sought to obtain the reduction at one grinding which is performed under the pressure due to the considerable weight of the upper stone. With metal grinders, on the contrary, it is sought to obtain the gradual reduction of the wheat, which gives much superior results, although heretofore the operations in this direction with metallic millstones or grinders have given only imperfect results on account of the irrational mode of construction, particularly with respect to the grooves or dress employed. To remedy the defects I have devised a system of grooves which gives a gradual and rational reduction. It can most conveniently be described in connection with the accompanying drawings, which represent said system; and in which—

Figure 1 is a plan of the lower grinder of the splitting-mill or first break. Figs. 2 and 3 are sections on lines A B and C D, respectively, of said grinder. Figs. 4, 5, and 6 are similar views of the lower grinder of the reduction-mill, and Figs. 7, 8, and 9 of the lower grinder of the converting or finishing mill. Fig. 10 is an inverted plan of the upper grinder; Fig. 11, a section of the same on line A B of Fig. 10; and Fig. 12 shows on a larger scale by a development on a plane and elevations at opposite sides the different types of grooves in a series of mills for gradual reduction, the ends of the grooves where the grain enters between the grinders being shown at the left of the figure and the ends where it leaves the same at the right of said figure.

As stated in my before-mentioned application, the mill for which I have designed this particular kind of grooves or dress is so constructed as to have a minimum height, which enables the different mills necessary to a gradual reduction to be superposed, and thus to be constructed in one story without elevators, which are required in arrangements in use wherein the mills are placed on the same horizontal plane. This mill may be adapted to split the grains longitudinally or to reduce or convert the split grain into grits or farinas, or to grind or pulverize the other products by modifying the grooves, as will be explained hereinafter.

The different apparatus which enter into my complete milling machinery are, first, a splitting-mill; second, a reducing-mill, and, third, a converting-mill.

For the splitting-mill the lower grinder is provided with feeding-grooves *a* and counter-grooves *b*, inclined to the radius. (See Figs. 1, 2, and 3.) The grooves *a* serve for the entrance of the grains between the grinders and the counter-grooves for the exit therefrom. The grooves *a* are wide and deep at their origin—that is to say, at the ends nearest the center of the grinder, where the grains enter—and their dimensions diminish toward the exterior, as may be seen from the sections, Figs. 2, 3, and 12. In cross-section the grooves are of such form that the two sides represent the hypotenuse and shortest side of a right-angled triangle, the said shortest side being vertical and the hypotenuse forming an inclined plane, which rolls the grains to the bottom of the groove, so as to keep them lengthwise thereof and make them slide in that direction. Between each feeding-groove *a* and the next is a counter-groove *b*, which is arranged opposite to the groove *a*—that is to say, the counter-grooves *b* are narrow and shallow toward the center of the grinder and enlarge toward the outside, where the grains escape. (See Figs. 1, 2, 3, and 12.) The cross-section of the counter-grooves is of the same form as those of the grooves *a*. The upper grinder is also provided with grooves, but uniformly, and they have a form like those of the lower grinder and the same inclination to the radius. The operation of these grinders is as follows: The grains of wheat

are thrown into the hopper of the mill, and thence descend over the convex or dome-like central portion G of the plate carrying the lower grinder into the circular thread J of said plate, where under the influence of rotation the said grains naturally place themselves with their longitudinal axes tangent to a circle about the axis of rotation at the center of said plate. From the throat J the grains easily pass into the grooves *a*, which, with this object, are of large dimensions at their origin and are inclined to the radius in the direction of rotation, as before explained. Moreover, in consequence of the tangential position which they occupy relatively to the throat J and the form of the grooves with their lower surfaces inclined, the grains enter endwise with the grooves, roll to the bottom thereof, and preserve in the passage across the grinder this longitudinal or endwise direction, which is of prime importance in splitting. As the grains descend into the grooves they enter portions less wide and deep until the grooves can no longer contain them. At this time the upper grinder carries them over, pressing them against the sharp edges which separate the grooves *a* from the counter-grooves *b*, and during the passage these edges split the grains longitudinally without crushing them. Hardly have they been split when the pieces fall into the grooves *b*, by which they easily pass out from between the grinders, since these counter-grooves increase in dimensions toward the circumference. By this disposition, therefore, as soon as the work is over the grains are expelled, and I thus avoid the useless retention of the grains between the grinders, a retention which on the one hand is detrimental to a good longitudinal splitting, and on the other demands an excess of motive power, which is a pure loss, at the same time producing waste in low-grade flour.

For the reducing-mills the lower conical grinder has the system of grooves shown in Figs. 4, 5, and 6. The grooves are based on the like principle to those of the splitting-mill previously described. The grooves *a* have always the same form, but naturally are in size proportioned to the degree of reduction to be obtained in the passage through the mill; but the counter-grooves, instead of forming a single conduit between each feeding-groove *a* and its neighbor, are divided each into a number of small parallel grooves *c*, opening at the inner end into the appropriate groove *a* and terminating at the circumference, these little grooves having always in cross-section a form with inclined lower surface, as shown in Fig. 5, their depth being proportionate to the size of the semolina and grits to be obtained.

In the converting-mill, which finishes the conversion into flour, the class of grooves (shown in Figs. 7, 8, and 9) is still the same, only they are smaller, and where necessary, in order to avoid heating, the longer of the small grooves *c* do not extend entirely to the

circumference, but end in a counter-groove *d* parallel, or nearly so, with the feeding-groove *a*, so that the material once acted on is not retained uselessly in the mills.

The upper grinders, Figs. 10 and 11, can be provided with grooves either uniform or like those of the lower grinder, either straight or oblique to the radius, either parallel with or running inversely to those of the lower grinders, this last disposition being the most advantageous, since it favors the more rapid delivery of the grain.

In Fig. 12 at 1 and 1' are represented the grooving of the lower and upper grinders, respectively, of the splitting-mill and at 2, 3, 4, 5, and 6 the grooving in the successive mills of a complete gradual-reduction series.

I claim as my invention or discovery—

1. A splitting-mill comprising, in combination with an upper grinder having grooves oblique to the radius and of the form in cross-section of an acute angle with one side vertical, a lower revolving grinder provided with feeding-grooves of similar form inclined to the radius, wide and deep toward the center for receiving the grains from a circular throat in the lower plate, in which they have assumed a longitudinal position, and diminishing in depth and width toward the circumference, and provided also with counter-grooves of like form interposed between adjacent feeding-grooves and increasing in depth and width toward the circumference, substantially as described.

2. A reduction-mill comprising, in combination with an upper grooved grinder, a lower revolving grinder provided with feeding-grooves diminishing in width and depth from center to circumference and having one face vertical and the other inclined thereto at an acute angle, and provided also with a series of small counter-grooves arranged in the spaces between adjacent feeding-grooves and extending from the vertical faces of the feeding-grooves toward the circumference of the grinder, substantially as described.

3. A converting or finishing mill comprising, in combination with an upper grooved grinder, a lower revolving grinder having feeding-grooves inclined to the radius, wide and deep toward the center and diminishing in width and depth toward the circumference, a series of small counter-grooves in the space between adjacent feeding-grooves extending from the latter outward, and counter-grooves parallel with the feeding-grooves, which tap the small counter-grooves and shorten the longest of them, substantially as described.

4. Milling machinery having sets of grinders for gradual reduction, and comprising for the splitting-mill a grooved upper grinder and a lower grinder having feeding-grooves in the form of an acute angle in cross-section, with one side vertical, alternating with counter-grooves, the feeding-grooves wide and deep toward the center and diminishing in width and depth toward the circumference, and the counter-

grooves increasing in width and depth toward the circumference, and for the several gradual-reduction mills a grooved upper grinder with feeding-grooves, as just specified, alternating with a series of small counter-grooves extending from said feeding-grooves outward, substantially as described.

5 In combination with an upper grooved grinder, a lower revolving grinder provided
10 with feeding-grooves diminishing in width and depth from center to circumference, with one face vertical and the other inclined thereto at an acute angle, and provided also with counter-grooves in the spaces between
15 feeding-grooves, the counter-grooves being of a form like the feeding-grooves, but increasing in depth and width from center to circumference, substantially as described.

6. In combination with an upper grooved
20 grinder, a lower revolving grinder provided,

first, with feeding-grooves diminishing in width and depth toward the circumference, and formed each by a vertical and an inclined face meeting in an acute angle; second, with
25 small counter-grooves extending from the vertical face of the feeding-grooves outward, and, third, with counter-grooves tapping the outer ends of the small counter-grooves parallel with the feeding-grooves, and being of a form
30 similar to said feeding-grooves, but increasing in width and depth toward the circumference of the grinder, substantially as described.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JOSEPH SCHWEITZER.

Witnesses:

PAUL GIRAL,
R. J. PRESTON.