No. 706,259. Patented Aug. 5, 1902.

J. SCHWEITZER.

GROOVING MILLSTONES.

(Application filed Dec. 28, 1897.)

(No Model.)

Fig. 1.

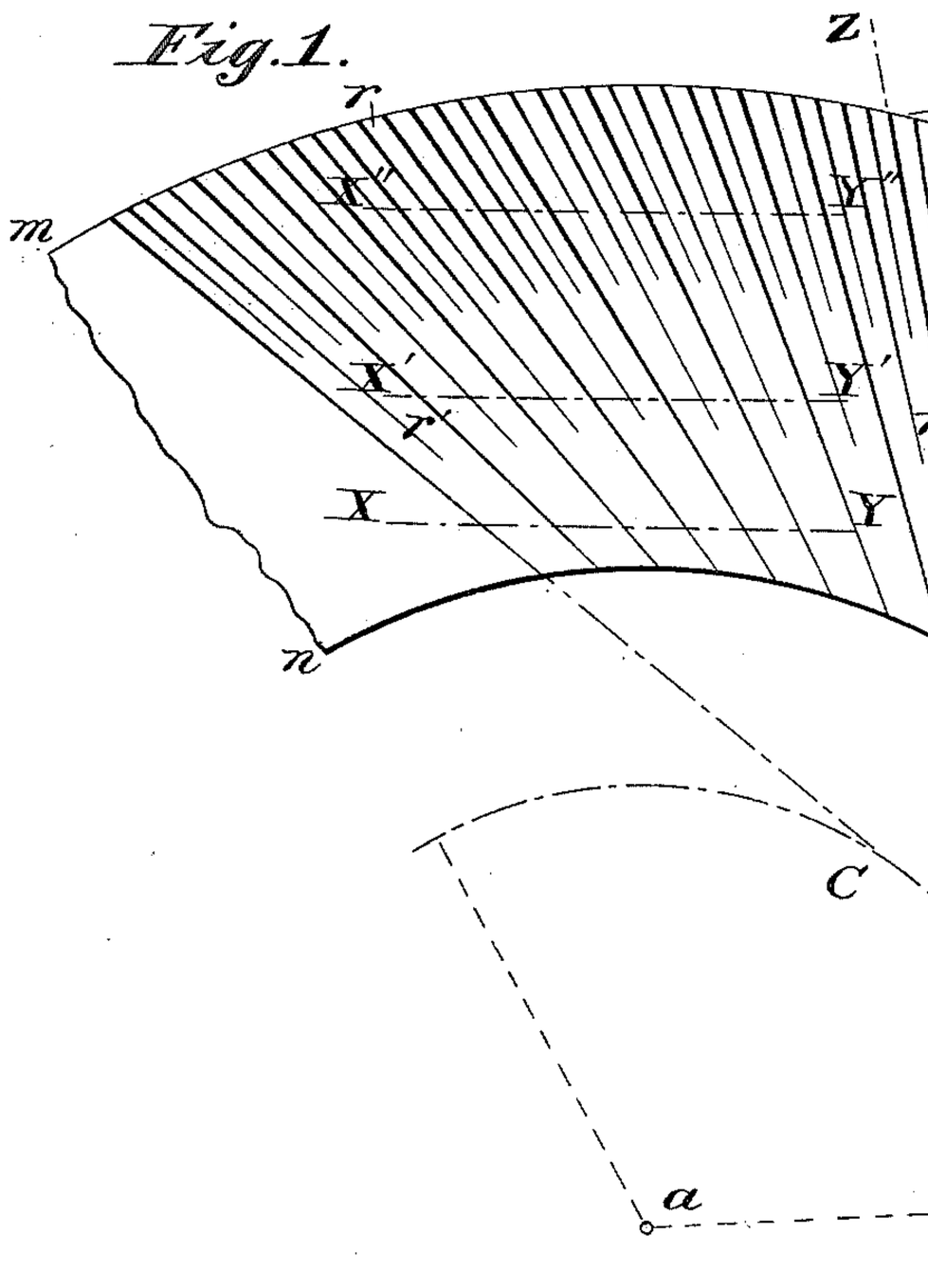


Fig. 2.

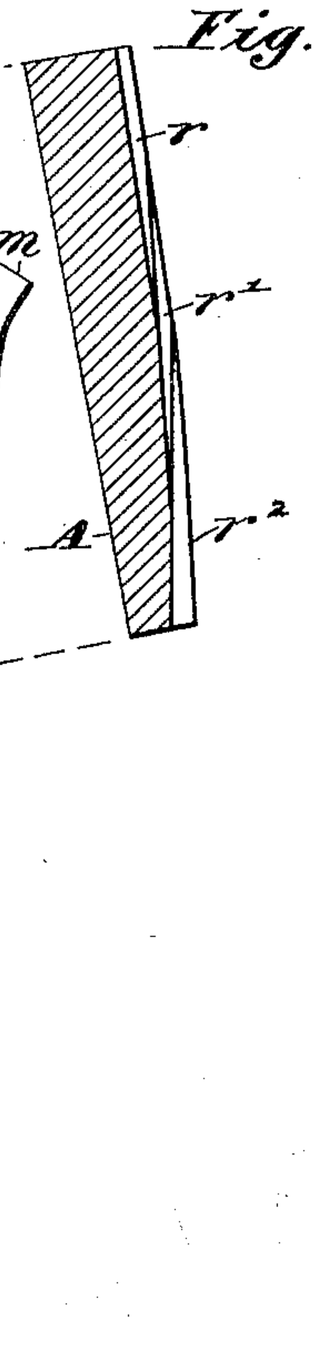


Fig. 3.

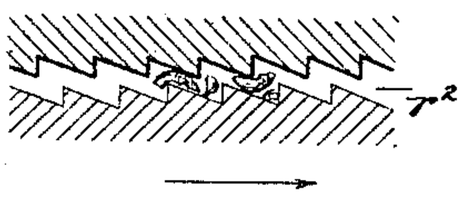


Fig. 4.

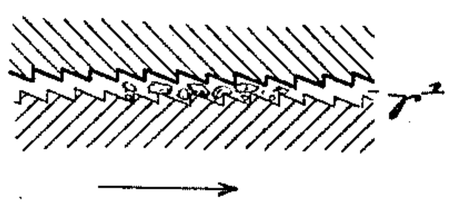


Fig. 5.

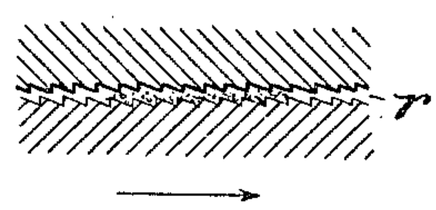
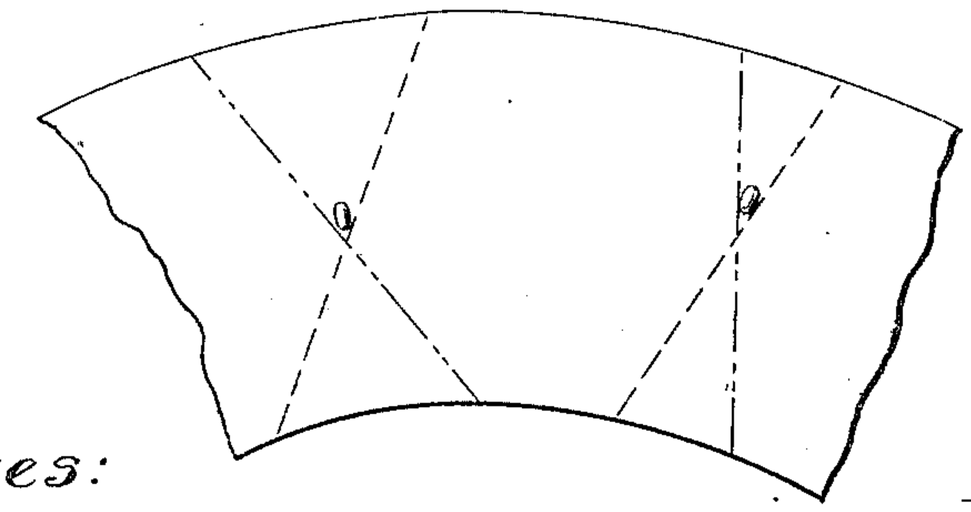


Fig. 6.



Witnesses:
J. B. Marlin
L. B. Alderete

Inventor:
Joseph Schweitzer
By Herbert Sefton Jones
Attorney,
James B. Rogers
Associate Attorney

UNITED STATES PATENT OFFICE.

JOSEPH SCHWEITZER, OF PARIS, FRANCE, ASSIGNOR TO LA SOCIÉTÉ INTERNATIONALE DE MEUNERIE ET DE PANIFICATION SYSTEME SCHWEITZER, OF BRUSSELS, BELGIUM.

GROOVING MILLSTONES.

SPECIFICATION forming part of Letters Patent No. 706,259, dated August 5, 1902.

Application filed December 28, 1897. Serial No. 663,894. (No model.)

To all whom it may concern:

Be it known that I, JOSEPH SCHWEITZER, engineer, 1 Rue Méhul, Paris, in the Republic of France, have invented an Improvement in Grooving Grinding-Disks, (for which I have obtained patents in Austria August 10, 1895, No. 45/2,842, September 6, 1895, No. 45/3,136, and June 30, 1897, No. 44/2,846; in France March 25, 1896, No. 255,069; in Belgium July 7, 1897, No. 129,289; in Hungary June 5, 1894, No. 550, November 4, 1895, No. 4,248, and November 8, 1895, No. 4,320; in Germany January 3, 1896; in Spain April 21, 1896, No. 1,853; in England January 12, 1895, No. 789; in Hong-Kong May 22, 1896, and January 12, 1895, entitled "Improvements in or connected with flour-mills;" in India August 5, 1896, No. 13; in Turkey October 19, 1895, No. 470; in Switzerland December 4, 1895, No. 11,636; in Italy March 31, 1896, No. 40,340, and June 30, 1897, No. LXXXVII, 246; in Finland May 22, 1896, No. 632, and in Luxemburg October 28, 1897, No. 2,996,) of which the following is a specification.

The invention which forms the object of the present application for Letters Patent relates to grinding-mills of that kind in which grooved disks are employed to effect the grinding.

It consists in an improved arrangement of the grooves by means of which all the advantages of the system of grinding known as "progressive" are attained by a single passage of the grain between the grinding-disks. The progressive grinding of grain has been hitherto effected by its successive passage between a series of millstones or disks or rollers provided with grooves successively finer, the first stones having the object of cracking or breaking the grain and the following stones serving to reduce the grist to finer and finer flour. I have attained the same result and reduced to the minimum the working disks by the use of an improved system of grooves formed of groups and channels associated and cut with the greatest precision, so that their size and their respective depth shall decrease continuously from the interior to the periphery, each reduction of the length and of the number of the grooves corresponding to one of the periods of the progressive grinding. I will now proceed to describe by aid of the accompanying drawings the exact arrangement of these grooves, as well as the means which I make use of for producing them with precision on the stones or disks employed, and I shall define the nature of the surface which the grinding-disk then presents, which will make clearly comprehensible the special method of action of the said grooves upon the grain.

Figure 1 is a plan view of a portion of a grooved disk. Fig. 2 is a section of this disk on the line Z Z of a groove. Fig. 3 is a section on the line X Y. Fig. 4 is a section on the line X′ Y′. Fig. 5 is a section on the line X″ Y″. Fig. 6 is a plan view showing the method of action of the grooves upon the grain.

As shown in Fig. 1 my improved grooves are formed of successive groups of combined grooves cut obliquely in the milling-disk A and in such a manner that the said grooves will be tangential to the same circle C the center whereof corresponds to the center of the disk. Each group is composed of a principal groove r^2 of sufficient size and depth close to the interior edge $n\ n$ of the disk to permit the easy entrance of the grain and which is subdivided into two or more shallower grooves $r'\ r'$, which in their turn are divided into still shallower grooves $r\ r$, arriving at the exterior edge $m\ m$ of the disk, and which are sufficiently near together to produce fine flour. These grooves are of triangular section and possess one face approximately vertical, while the other inclines at a considerable angle. The said grooves are all tangential to the same internal circle. (See Fig. 1.) All the grooves r^2 are at the same angle with regard to the plane of the disk, and all the grooves r' form the same angle therewith, which angle is smaller than that formed by the grooves r^2. Finally the grooves r form a still smaller angle with respect to the said plane.

It may be seen from Figs. 2, 3, 4, and 5 that the depth of these grooves increases progressively from the exterior edge m of this crown to the interior edge n. It will be understood that under these conditions the operation of

the grooves r r' r^2 will correspond to the successive operations in the progressive grinding, because the large and deep grooves r^2 cause the removal of the bran and the cracking of the grain. The little grooves r' r' cause the formation of the grist or semolina, and the fine grooves r r produce the fine flour.

In order to form these grooves, I proceed in the following manner: The disk which it is desired to groove is mounted upon a horizontal table revolving upon a vertical axle which coincides with the center of the disk and of the circle C, to which the grooves are to be tangential, and use is made of a tool which moves in a straight line, forming with the horizontal plane an angle corresponding to the increase of depth which the grooves are to present from the exterior rim of the disk to its interior rim. After each stroke the table bearing the disk is caused to revolve to an angle corresponding to the interval which separates two successive grooves. Thus I commence by cutting the finest grooves r. Then I give the tool a greater inclination, so as to cut the intermediate grooves r', and finally the tool-holder is further inclined to cut the grooves r^2. In order to facilitate this operation, it is advisable to give to the upper face of the ring a slightly-conical form. During the milling the lower disk is caused to turn in the direction indicated in Figs. 3, 4, and 5—that is to say, in such a manner that it is the inclined faces of the grooves and not the crests of these same grooves which approach the one to the other. It results from this that the grain is squeezed and rubbed between two series of surfaces which are not superposable, the dimensions and the respective distances of which diminish gradually, as shown in Figs. 3, 4, and 5. Further, the inclination of the groove is such that the grain will be equally clipped, as shown in Fig. 6. This action has at the same time the effect of propelling the grain rapidly outward by sliding along a groove. These special characteristics of my improved grooved milling-disks offer an important advantage in that the grain is submitted to the action of the surfaces aforesaid and is rubbed and broken up by their contact under conditions different from those of ordinary millstones, in which the revolving stone finely dressed acts mostly like a file upon the grains held by the grooves of the fixed stone.

My disks effect the complete decortication of all kinds of grains, as has been proved by experiment, this effect being due to the combined motion of rotation of the disk and of the revolving motion which the said grains take between disks not very close together in this way.

It will be seen that in my system all the operations of progressive grinding are realized in a single passage of the grain between two milling-disks, the working surfaces of which are reduced to the minimum, and that friction and heating will be reduced to a minimum and considerably-increased yield and great economy of labor will be obtained.

What I claim is—

1. A grinding disk or ring having successive groups of combined grooves cut therein all decreasing in size and depth from the inner edge of the ring toward the periphery and all tangential to the same interior circle the center whereof coincides with that of the ring, the principal groove extending the entire width of the ring and being sufficiently wide and deep near the inner edge thereof to receive, cut and crack the grain, and being divided into secondary grooves extending from the periphery about half the width of the ring, said principal grooves being divided into still shorter grooves extending only a short distance from the periphery, said secondary grooves forming the grist and the last-mentioned grooves forming the fine flour.

2. A grinding apparatus provided with identically-dressed grinding disks or rings constructed to revolve so that the inclined faces of the grooves approach each other and the diagonal grooves of each disk cross each other, whereby the grain is sheared or clipped and propelled along the grooves toward the periphery of the disks decreasing the time the grain is acted upon and lessening the heating thereof, all of said grooves being tangential to the same interior circle the center whereof coincides with that of the disks and all being of the same form and decreasing in size and depth toward the periphery of the disk, the principal groove extending the entire width of the disk being sufficiently wide and deep near the inner edge thereof to receive cut and crack the grain, and being divided into secondary grooves of less length, said principal grooves being divided into still shorter grooves extending only a short distance from the periphery, the secondary grooves forming the grist and the last-mentioned grooves forming the fine flour.

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

JOSEPH SCHWEITZER.

Witnesses:
LOUIS TALLFER,
JACQUES CONDOMY.