

No. 812,799.

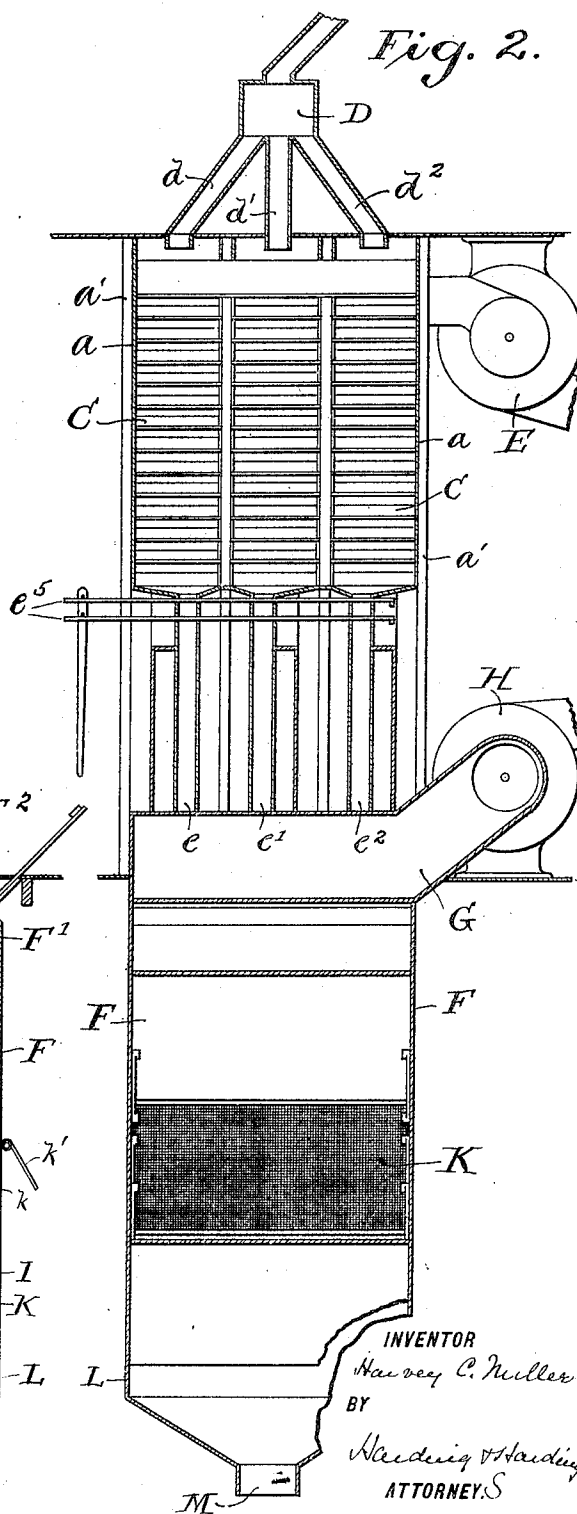
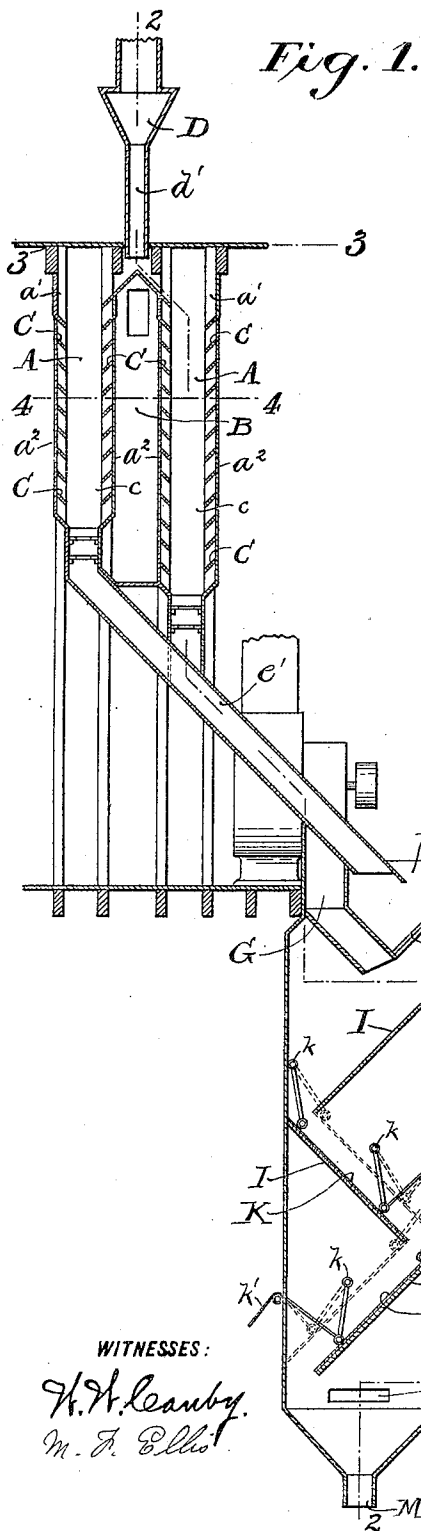
PATENTED FEB. 13, 1906.

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## APPARATUS FOR CLEANING GRAINS.

APPLICATION FILED SEPT. 27, 1904.

3 SHEETS--SHEET 1.



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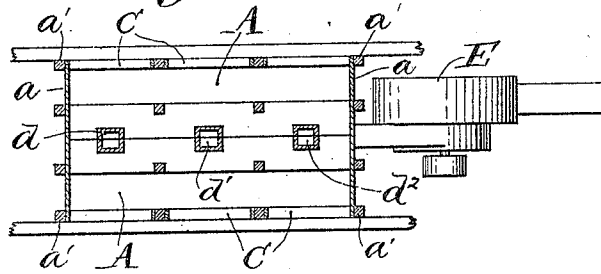
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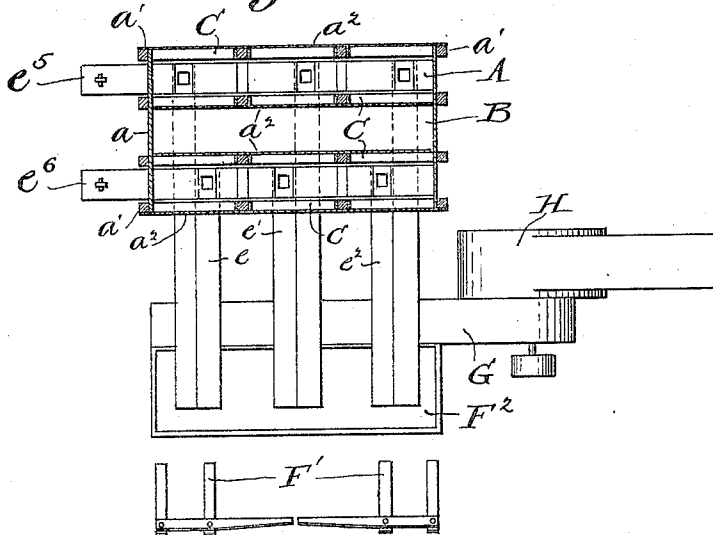
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3 SHEETS—SHEET 2.

*Fig. 3.*



*Fig. 4.*



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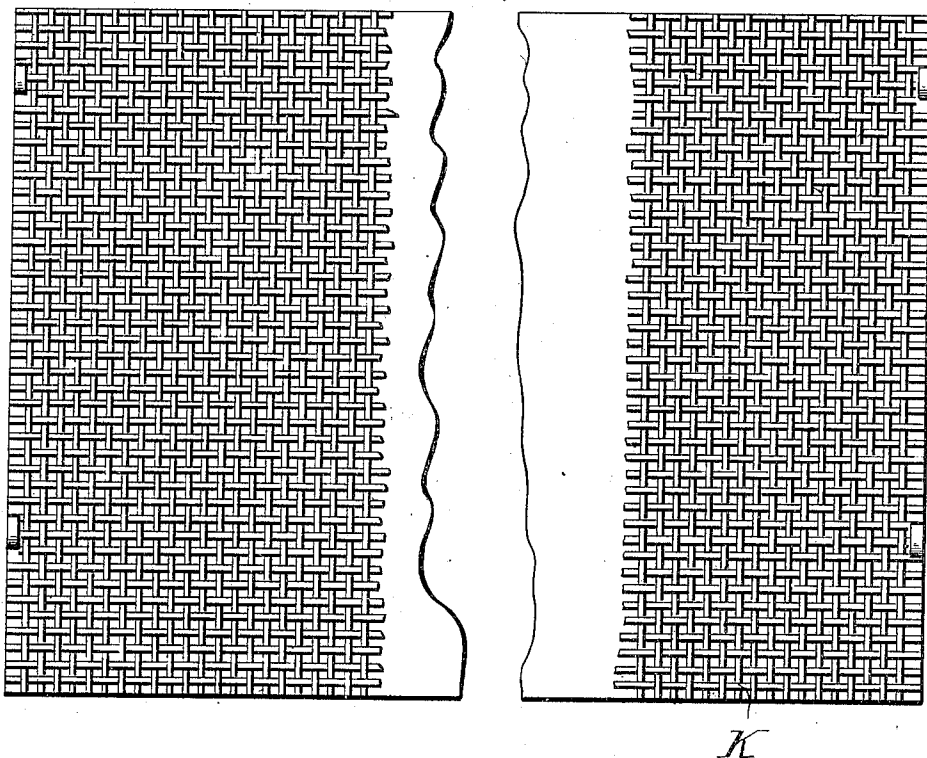
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3 SHEETS—SHEET 3.

*Fig. 5*



*Fig. 6*



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# UNITED STATES PATENT OFFICE.

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## APPARATUS FOR CLEANING GRAINS.

No. 812,799.

Specification of Letters Patent.

Patented Feb. 13, 1906.

Original application filed June 18, 1904, Serial No. 213,114. Divided and this application filed September 27, 1904. Serial No. 226,107.

*To all whom it may concern:*

Be it known that I, HARVEY C. MILLER, a citizen of the United States, residing at Philadelphia, county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Apparatus for Cleaning Grains, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

In many cases grain—such, for instance, as corn or wheat—has been damaged either by becoming musty or coated or impregnated with dirt or other foreign material or in any other manner whereby its original quality or luster is impaired. By reason of this the grain becomes of a lower grade from its initial condition, and thus is sold at a lower price.

My invention has for its object to take this character of grain and by the treatment hereinafter described restore it to its initial condition or bring it to a higher grade than it was before treatment. The process or method which I use to obtain this result consists in first thoroughly drying the grain. This initial treatment brings the foreign matter to a dry condition, enabling it to be readily removed by the subsequent treatment. As I use air for this drying step, it also to a greater or less extent deodorizes the grain and brings it and its contained matter to a cool and dry condition. The grain after this preliminary treatment passes by gravity through a chamber over inclined abrading-surfaces which are so arranged that the movement of the grain is from time to time suddenly arrested and the direction of the movement changed. This treatment causes the grain to roll or tumble round and round, bringing all parts of the grain under the action of the abrading-surface. The stoppage and change of direction, as it were, jolts the grain, disintegrating the foreign material. A current of air passes up through this chamber (preferably by suction) in a direction opposite to the movement of the grains to act upon the foreign matter. As before described, the grain enters this chamber after having been thoroughly dried and cooled and with the foreign matter reduced to a thoroughly-dried condition. In this condition in the passage of the grain over the abrading-surfaces and with the shock of the periodical arrest of its motion and change of direction the foreign matter becomes loosened

or separated therefrom and the air-current carries it away in such a manner that the grain passing away at the end of the chamber is entirely free from its foreign matter. The movement of the grain over the abrading-surfaces will also polish the surface of the grain. As will hereinafter appear, while in most cases wood will be sufficient as an abrading-surface, yet if a sharper abrading-surface be required a metal projection, such as a wire screen, may be interposed on the wood.

When I have spoken and hereinafter speak of "grain," I mean wheat, corn, oats, and the like.

I do not herein claim the hereinbefore-described method, as the same forms the subject-matter of the application filed June 18, 1904, Serial No. 213,114, of which this is a division.

I will now describe the apparatus which I have invented to carry out the above-described method, which apparatus is illustrated in the accompanying drawings, in which—

Figure 1 is a sectional elevation. Fig. 2 is a section on line 2 2 of Fig. 1. Fig. 3 is a section on line 3 3 of Fig. 1. Fig. 4 is a section on the line 4 4 of Fig. 1. Fig. 5 is a plan view of the roughened plate, and Fig. 6 is an elevation of Fig. 5.

As before described, the grain to be treated, with its foreign matter, is first thoroughly dried, cooled, and partially or entirely deodorized. This is accomplished in the apparatus shown in detail in Figs. 1 and 2. It consists of two solid end walls *a*, divided into two longitudinal chambers A and an intermediate chamber B by the perforated walls *a*<sup>2</sup>. The walls *a*<sup>2</sup> are preferably formed of wire screen. In each of these chambers A are inclined sets of shelves or vanes C, projecting toward each other from the opposite walls of each chamber, leaving a space *c* in each chamber A between the ends of said vanes. D is a receiving-hopper having distributing-chutes *d* *d'* *d*<sup>2</sup> to each chamber A and entering said chambers A at different points in their width. Connected with the space B is a fan E. This apparatus is placed in an open room where it has free access to the air, and the grain is fed from the hopper into the chambers A. The fan is then operated. This causes a current of air to pass from the outside of the chambers A across the chambers A into the space B. In this movement of the air it passes

through the grain in the chambers A, and this action of the air in connection with the vanes C and the space *c* causes the grains to be shifted and turned from side to side, exposing all parts of the grain to the air. This action is continued until the grain is thoroughly dried and cooled. From the bottom of each of the chambers A three chutes *e e' e<sup>2</sup>* lead to a hopper F<sup>2</sup> over the vertical shaft F.

A valve *e<sup>5</sup>* controls the delivery from chambers A to chutes *e e' e<sup>2</sup>*. By this valve the time which the grain is held in chambers A may be determined. In the case of grain which has become greatly heated or very wet it may be retained in the chambers A for a longer period to enable the air to act on it for a greater length of time.

The top of the shaft F is closed by the gate or valve F'. There is also an outlet G connected with a fan H, the shaft being otherwise closed at the top. In this shaft projecting from opposite sides are the inclined shelves I, substantially of like angle. The shelf projecting from one side, however, overlaps or is in line with the upper end of the shelf from the other side, so that the grain in passing from one shelf, as will hereinafter be more fully described, strikes the next lower shelf projecting from the other side near its upper end and has its motion arrested and its direction changed and rolls or slides along said shelf. The shelves are under ordinary circumstances made of wood, although one or more of them may be covered by a roughened or corrugated metallic plate or screen K, as shown in Fig. 2, with respect to the lowermost shelf. This plate or screen K is hinged at *k* and has connected to it a cord *k'*, which passes through the wall of the shaft, so that by it the plate may be manipulated from the outside to superimpose the roughened plate upon the shelf, as shown in full lines, Fig. 1, or to lift it free therefrom and out of the line of travel of the grain, as shown in dotted lines in said figure.

Near the lower end of the shaft F is an opening L, connected with the atmosphere. At the bottom of the shaft F is the delivery-chute M. As may be seen, with the exception of the air-inlet and opening leading to the fan and the valve or gate, the shaft is practically closed.

When the grain, as before described, is thoroughly dried and cooled in and by the apparatus and method first described, it passes from the chutes *e e' e<sup>2</sup>* to the hopper F<sup>2</sup>, and when the gate F' is opened it passes by gravity through the shaft F and out the chute M. During its passage through the shaft it first rolls down the first shelf I. After leaving the lower end thereof it strikes against the upper end of the next shelf I, projecting from the opposite side, thus having its motion temporarily and suddenly arrested and its direction of movement changed to pass down the last-mentioned shelf. In this man-

ner it rolls down each shelf, stops suddenly, and changes its direction, thus abrading off all foreign matter, which is carried off by the air-current moving in the opposite direction. This abrading action also polishes the surface of the grain. The abrading-surfaces or shelves may be roughened, if desired and necessary, by any means desired, one being shown and before described.

Having now fully described my invention, what I claim, and desire to protect by Letters Patent, is—

1. In an apparatus of the character and for the purpose described, in combination, a shaft, inclined shelves projecting from opposite sides thereof, a roughened plate adapted to overlie its corresponding shelf, said plate being supported so as to be movable to and from its corresponding shelf, and means to produce a current of air from the bottom to the top of said shaft.

2. In an apparatus of the character and for the purpose described, in combination, a shaft, inclined shelves projecting from opposite sides thereof, a roughened plate corresponding to one or more of said shelves, said plate being pivotally supported and adapted to rest upon and be moved away from its corresponding shelf, and means to produce a current of air from the bottom to top of said shaft.

3. In an apparatus of the character and for the purpose described, in combination, a shaft, inclined shelves projecting from opposite sides thereof, a roughened plate corresponding to one or more of said shelves, said plate being pivotally supported and adapted to rest upon and be moved away from its corresponding shelf, a device connected to said plate and passing through said shaft to manipulate said plate, and means to produce a current of air from the bottom to the top of said shaft.

4. In an apparatus of the character and for the purpose described, in combination, a shaft, inclined shelves projecting from opposite sides thereof, the lower end of the shelves projecting from one side being in line with the upper end of the shelf projecting from the opposite side, a roughened plate corresponding to one or more of said shelves, said plate being pivotally supported and adapted to rest upon and be moved away from its corresponding shelf, and means to produce a current of air from the bottom to the top of said shaft.

5. In an apparatus of the character and for the purpose described, in combination, a shaft, inclined shelves projecting from opposite sides thereof, the lower end of the shelves projecting from one side being in line with the upper end of the shelves projecting from the opposite side, a roughened plate corresponding to one or more of said shelves, said plate being pivotally supported and adapted

to rest upon and be moved away from its corresponding shelf, a device connected to said plate and passing through the wall of said shaft to manipulate said plate, and means to  
5 produce a current of air from the bottom to top of said shaft.

6. In an apparatus of the character and for the purpose described, in combination, a shaft, inclined shelves projecting from opposite sides thereof, a roughened plate adapted to overlie its corresponding shelf, said plate being supported so as to be movable to and from its corresponding shelf, a device, exterior to the shaft, and connection between said  
15 device and the plate, whereby the plate may be moved from the exterior of the shaft to and from the shelf.

7. In an apparatus of the character and for the purpose described, in combination, a  
20 chamber having two opposite perforated walls, inclined shelves projecting at like angles from points on the opposite perforated sides at the same horizontal plane and terminating in the same horizontal plane, there

being a space between the inner ends of corresponding shelves on opposite sides and means to carry air through said chamber from side to side through said perforated walls.

8. In an apparatus of the character and for the purpose described, an apparatus comprising two chambers separated by a space, the longitudinal walls of each chamber being perforated, inclined shelves in each chamber projecting at like angles from points on the opposite perforated sides at the same horizontal plane and terminating in the same  
35 horizontal plane, there being a space between the inner ends of corresponding shelves on opposite sides, and a pressure or exhaust chamber intermediate of said two chambers.  
40

In testimony of which invention I have hereunto set my hand, at Philadelphia, on this 22d day of September, 1904.

HARVEY C. MILLER.

Witnesses:

ALBERT McEVoy,  
M. M. HAMILTON.