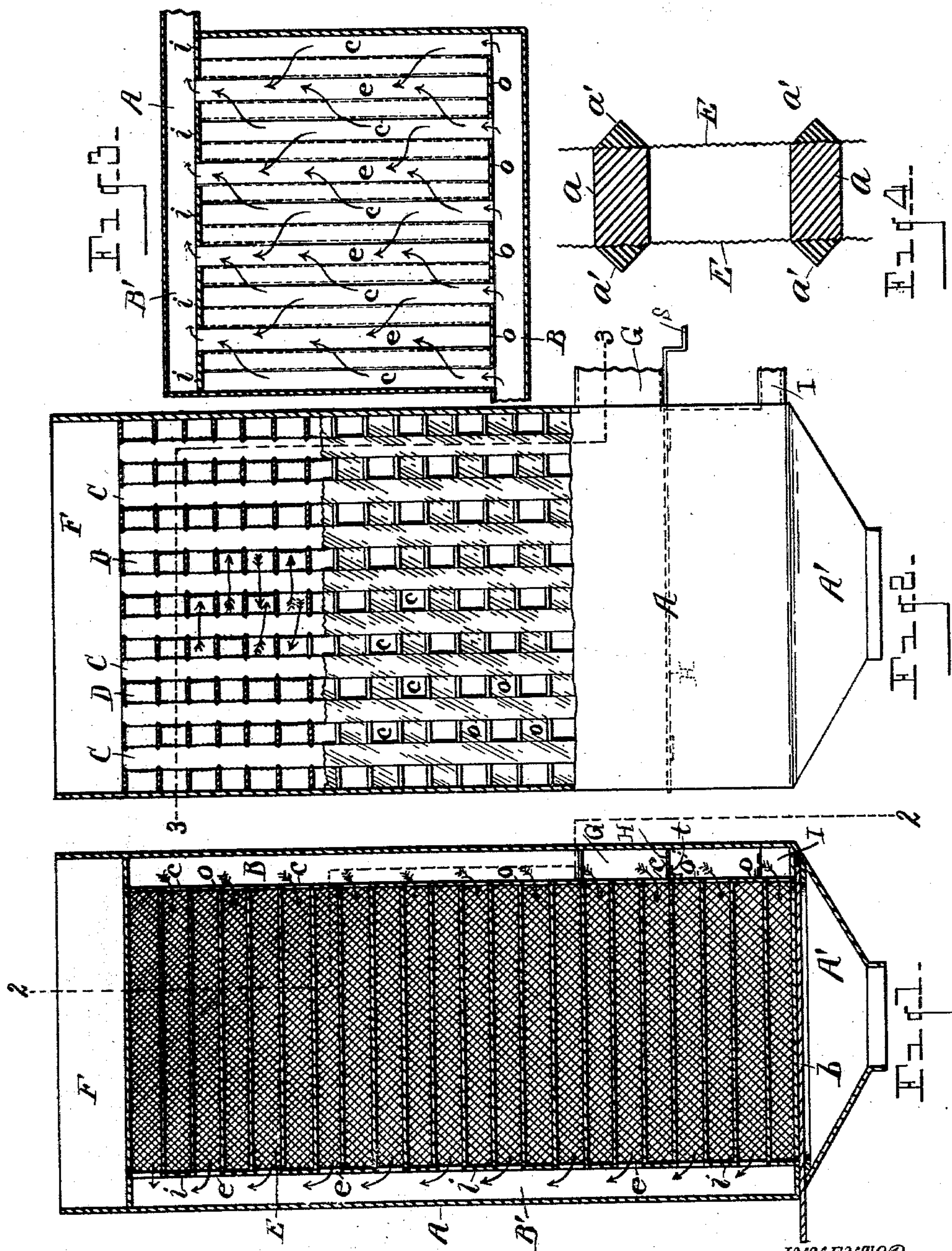


(No Model.)

W. E. ELLIS.
GRAIN DRIER.

No. 596,964.

Patented Jan. 4, 1898.



WITNESSES

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GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 596,964, dated January 4, 1898.

Application filed May 12, 1897. Serial No. 636,268. (No model.)

To all whom it may concern:

Be it known that I, WYNN E. ELLIS, a citizen of the United States, residing at Detroit, in the county of Wayne, State of Michigan, have invented certain new and useful Improvements in Grain-Driers; and I do declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

This invention relates to new and useful improvements in devices for drying grain and other cereals or substances; and it consists in the construction and arrangement of parts hereinafter fully set forth, and pointed out in the claims.

The objects of the invention are to provide simple and effective means for drying wet grain in such manner as to facilitate the operation of drying, to effect a uniform and even drying of all parts of the grain exposed to the hot-air blast, and to render a rehandling of the grain unnecessary, which objects are attained by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical section through my improved drying apparatus. Fig. 2 is a side elevation, partly in section, as on line 2 2 of Fig. 1. Fig. 3 is a horizontal section through the upper portion of the drying apparatus. Fig. 4 is an enlarged detail in section, showing a beveled projection extending into the grain-space of the drier to obviate undue pressure upon the grain at the bottom of said grain-space.

Referring to the letters of reference, A designates an inclosing case, of suitable construction, which is preferably rectangular in form and of considerable height. On opposite sides of said case are closed air-chambers, of which the chamber B communicates with the source of hot-air supply and the chamber B' with the air-exhaust. Crossing transversely the interior of said case between said opposed air-chambers are the alternate grain and air spaces C and D, respectively. The grain-spaces C are closed at their ends, but are open at the top and provided at their bottom with a door or slide b, which may be withdrawn to

discharge the contents of the grain-space into the hopper A'. The air-spaces D do not extend in an unbroken space from the top to the bottom, but are divided horizontally by a series of horizontally-extending dividing-strips a, which divide the air-spaces D into a series of independent horizontal air-flues c and e, respectively, of which the flues c are provided with an open end communicating with the air-supply or blast-chamber B, but are closed, as shown at i in Fig. 3, at their opposite ends, so that said flues c have no direct communication with the exhaust-chamber B', while the air-flues e are closed at their ends adjacent to the air-blast chamber B, as shown at o, and are open at their opposite ends, so as to discharge into the exhaust-chamber B'. These air-flues c and e alternate in vertical order, so that each of the air-spaces D is divided into a series of said alternating air-flues c and e.

The partition dividing the grain-spaces C from the air-spaces D consists of a wire screen E or other foraminous wall adapted to admit of the passage of air therethrough, but capable of confining the grain and other material to be dried within the grain-spaces C.

By means of the arrangement of the air-flues as above described it will be seen that the air-spaces are divided vertically into a series of horizontal air-flues whose open ends alternately communicate with the air-blast chamber and with the exhaust-chamber and that the arrangement is such as to form horizontal tiers of these air-flues c and e, which alternate horizontally, between which are the interposed grain-spaces C, whereby the air-blast is caused to pass alternately from opposite sides through the grain-space from top to bottom, as shown by arrows in Figs. 2 and 3, the open-ended flues c, communicating with the air-supply, receiving the air-blast, which passes across the interposed grain-space on opposite sides and discharges into the opposed flues e, which serve as discharge-ports to convey the air laden with moisture of the wet grain through which it has passed into the exhaust-chamber B'.

It has been found in the practice of drying wet grain by confining it in thin vertical layers or divisions and passing a blast of hot air therethrough from one side to the other that the grain upon the side at which the air-blast

enters becomes unduly dried, while the grain upon the opposite side is still too wet for commercial purposes, owing to the fact that the moisture driven out of the grain first encountered by the air-blast condenses upon the colder grain as it is driven therethrough, thereby leaving the grain upon the discharge side of the thin division thereof still wet when the grain upon the opposite side shall have been sufficiently dried, resulting in an uneven drying of the grain and necessitating a rehandling thereof to again pass it through the drier in order to attain a more uniform drying of the grain.

In the construction herein shown and described I obviate the necessity of rehandling the grain and at the same time effect a perfect and uniform drying thereof by reason of the alternation of the hot-air blast, which passes through the grain-space from side to side in vertical reciprocal succession. When the grain to be dried is first placed in the grain-spaces, it is swollen with the moisture contained thereby and therefore occupies more space than when partially or completely dried. This being the fact, the grain in the process of drying gradually settles in the grain-spaces, so that a portion thereof through which the hot air is passed in one direction will upon settling to the line of a lower tier of flues receive an air-blast therethrough from the opposite direction, and so on as it settles or is gradually moved downward through the grain-space. Said grain is subject to alternating blasts of hot air, which pass therethrough from opposite sides in reciprocal succession, whereby a most perfect and uniform drying of the grain is effected, rendering all parts thereof equally dry and obviating the overdrying of any portion, so that when once the grain is passed through the drier it is ready for commercial use without rehandling.

The walls of the case rise above the grain and air spaces of the drier, as shown at F, forming a receptacle which receives the wet grain and from which it is fed into the open upper ends of the grain-spaces C. The upper ends of the air-spaces being closed prevents the grain from falling therein.

Projecting from the edges of the dividing-strips *a* and extending laterally into the grain-spaces are the beveled strips *a'*, which receive upon their upper inclined faces a portion of the weight of the grain filling the grain-spaces and prevent in a measure the tendency of said grain to pack in the bottom of said spaces and obviate undue lateral pressure upon the screen-walls thereof. Said beveled strips also serve to prevent the air-blast from passing upward or downward through the grain into the adjacent exhaust-flue above or below the flue into which the air-blast enters, compelling the air instead to pass laterally through the grain in the grain-space into the exhaust-flue on the opposite side thereof.

The grain when dried must first be cooled

before it can be conveyed to the rolls, for in its heated state it is unfit for grinding.

To effect a cooling of the grain while in the drier, there is provided a horizontal damper H, which is hinged at *t* within the blast-chamber B and is adapted to be swung upward by means of the handle *s*, so as to stand across the blast-chamber and divide the lower portion of said chamber from the upper portion thereof, as shown in Fig. 1 and by dotted lines in Fig. 2. By this means the hot-air blast, which enters the chamber B through the supply-pipe G, is cut off from the lower portion of said chamber, so that no hot air will pass through the grain in the lower portions of the grain-spaces. This enables the passing of a cold blast of air through the grain in the lower portion of the drier, which cold air enters the lower division of the chamber B through the cold-air pipe I, whereby the grain may be dried and cooled to normal temperature while in the drier, from which it may be conveyed to the rolls for grinding or to storage-bins for shipping. When it is not desired to use the cold air upon the grain, the damper H is swung down, thus opening the entire area of the chamber B to the hot-air blast.

Having thus fully set forth my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a grain-drier, the combination with the air induct and egress, the series of parallel grain and air spaces arranged alternately and having a screen or perforated wall between them, the grain-spaces being closed at the ends and open at the top and having a discharge-opening at the bottom, the air-spaces consisting of a series of horizontal flues having alternately open and closed ends and communicating alternately at opposite ends with the air-induct and the air-educt, said air-flues communicating with the grain-spaces through said screen or perforated partition by which arrangement an air-blast is caused to cross the grain-space from side to side in reciprocal succession.

2. In a grain-drier, the combination with the inclosing case having the air-induct and air-educt, the series of alternating grain and air spaces crossing said case, said grain-spaces being closed at the ends and provided with a discharge at the bottom, screens or perforated walls separating said grain and air spaces, a series of horizontal strips dividing said air-spaces into a series of horizontal flues alternately communicating at one end with the air-induct and alternately communicating at the opposite end with the air-educt, and communicating with the grain-spaces through said screens or perforated partitions.

3. In a grain-drier, the combination with the inclosing case, a series of alternating grain and air spaces crossing said case transversely and extending vertically thereof, said grain-spaces being closed at their outer ends, open at the top and provided with a discharge at

the bottom, the screens or perforated partitions dividing said grain and air spaces, said air-spaces being divided into a series of independent horizontal air-flues whose opposite ends are alternately closed forming alternating air-blast and air-exhaust flues, the air-blast chamber on one side of said case communicating with and common to all of said blast-flues, the air-educt chamber on the opposite side of said case communicating with and common to all of said air-exhaust flues,

whereby the air-blast is caused to cross the grain-spaces laterally from the air-blast flues to the air-exhaust flues in vertical reciprocal succession.

In testimony whereof I affix my signature in presence of two witnesses.

WYNN E. ELLIS.

Witnesses:

E. S. WHEELER,
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