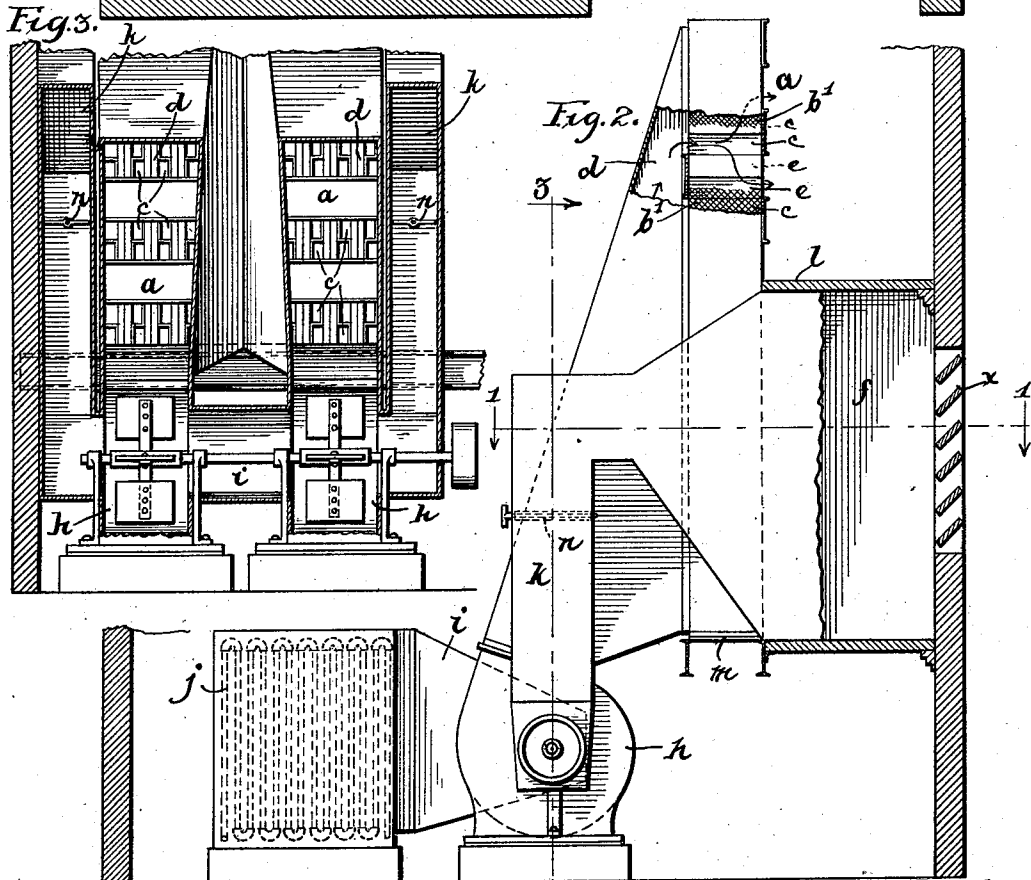
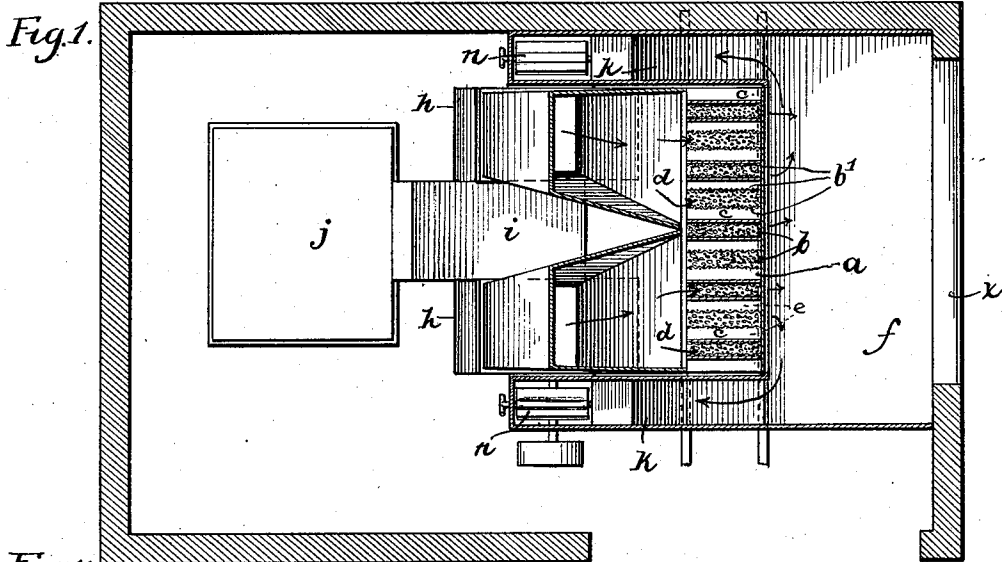


W. E. ELLIS.  
 DRYING GRAIN.  
 APPLICATION FILED NOV. 2, 1908.

1,001,259.

Patented Aug. 22, 1911.



Witnesses:-  
 Frank W. Quinn  
 Gene Russell

Inventor:  
 Wm. E. Ellis  
 By Frank Asbach  
 his Atty.

# UNITED STATES PATENT OFFICE.

WYNN E. ELLIS, OF CHICAGO, ILLINOIS.

DRYING GRAIN.

1,001,259.

Specification of Letters Patent. Patented Aug. 22, 1911.

Application filed November 2, 1908. Serial No. 460,599.

*To all whom it may concern:*

Be it known that I, WYNN E. ELLIS, a resident of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Drying Grain, of which the following is a full, clear, and exact description.

The invention relates to drying of grain.

In treating wet grain to eliminate the moisture, it is now common practice to force a blast of hot air through the grain columns under sufficient pressure to force the hot air through the drier containing the grain. In practice it frequently occurs that some of the grain becomes cracked or blistered in the drier. This results from the pressure and dryness of the air in those parts of the drier where the blast contacts with the grain initially and from the uneven heating and drying of the different portions of the kernels, causing sudden and uneven shrinkage of one portion of the kernel before another has been treated.

The present invention designs to provide an improved method and apparatus whereby this deterioration of the grain in the drying process will be overcome by impregnating the hot air with a small percentage of moisture sufficient to prevent cracking or blistering of the grain without materially interfering with the drying process.

The invention consists in the several novel features hereinafter set forth and more particularly defined by claim at the conclusion hereof.

In the drawings: Figure 1 is a horizontal section of an apparatus for treating grain in accordance with the invention, the section being taken on line 1—1 of Fig. 2. Fig. 2 is a side elevation, parts being shown in section. Fig. 3 is a section on line 3—3 of Fig. 2.

In the practice of the invention the supply of air is first heated to the proper temperature for drying and forced through a grain-drier of suitable construction in which the grain is usually disposed in vertical shafts communicating with the supply and exhaust-chambers, to cause the hot air under pressure to pass through the grain-column or columns. The hot air-blast initially contacts with the grain adjacent the inlet or supply-chamber and in transit through the grain columns, its heat-units are transferred to the grain and the moisture in the

grain is carried off to the exhaust-chamber by the air-blast. When the temperature and pressure of the air forced through the drier are sufficient to efficiently dry the grain within a given period, it being desirable as a matter of economy to avoid lengthy treatment in the drier, that grain which is disposed in the drier where the hot air-blast will contact therewith before the air has been impregnated with moisture from the grain and some of its heat-units have been transferred to the grain, will sometimes crack or blister as a result of the dryness of the air-blast and the pressure of the hot-air from the supply-chamber, causing uneven shrinkage or drying of the grain, and therefore the quality of the grain is deteriorated in the drying process. To prevent this, a small percentage of moist air is conducted to the air-supply and admixed with the hot-air in transit from the heater to the drier. As a result, the air-blast before it enters the drier and contacts with the grain is impregnated with a small percentage of moisture, sufficient to prevent the uneven and sudden shrinkage of the grain, without however, impregnating the hot-air sufficiently to prevent drying of the grain. Moist air for mixture with the hot air-blast is taken from the exhaust-chamber of the drier where the air, which has passed through the drier, is slightly impregnated with moisture from the wet grain and thus the remaining heat-units of the exhaust-air are utilized. The moist air utilized for impregnating the supply is preferably that which issues from that portion of the drier in which the driest grain is disposed, and therefore the greatest volume of hot moist air may be utilized without excessively moistening the air-supply. The supply of moist air to the hot air supply may, after the grain has been dried sufficiently so that cracking or blistering of the grain will not result, be discontinued so that the grain may be finally treated with an unmoistened blast.

In the apparatus illustrated in the drawings for practicing the invention, *a* denotes a grain-drier of any suitable construction. This drier comprises a series of vertical grain-shafts *b*, between which are disposed pressure-flues *c*, communicating at one end with a supply-chamber *d* and closed at the other end, and exhaust-flues *e* each having

one end closed and the other opening into an exhaust-chamber *f*. The grain-shafts *b* are formed with foraminous sides *b'* and communicating at their opposite sides with the pressure flues and exhaust-flues respectively. The air blast is directed by said flues to pass from the supply-chamber *d* through the grain-columns in shafts *b* and thence to the exhaust-chamber *f*.

The air is forced through the drier and supplied to the chamber *d* by a pair of blowers *h*, each of which has its outlet connected to said chamber. These blowers have an air intake at each side thereof, and one intake of each blower is connected by a duct *i* with a suitable heater *j* through which the air drawn through duct *i* by the blowers passes and whereby the fresh air is heated to the desired temperature in transit to the supply-chamber *d*. The intake at the other side of each blower *h* is connected by a duct *k* with the exhaust-chamber *f*. This exhaust-chamber is divided into upper and lower compartments by a bulkhead or wall *l* which separates the exhaust issuing from the drier so that the exhaust from the upper portion of the drier containing the moister grain may be permitted to escape while that issuing from the lower portion of the drier containing the grain which has been treated for the longer period is supplied to the blower through ducts *k*. In practice the grain in the shafts is usually controlled by bottom-valves *m* so that a portion of the contents of the shafts will be discharged periodically and resultantly the grain will be treated successively in the different portions of the shafts, that nearest the bottom of the drier having been treated the longest period and is therefore in the driest and hottest condition. Resultantly the exhaust air in the lower compartment of the exhaust-chamber has passed through the hottest and driest grain in the drier and is conducted to the blowers for slightly impregnating the hot air supply with moisture so that the heat-units thereof are utilized in the air-blast passing to the drier. A damper or valve *n* in each duct *k* provides means for regulating and cutting off the supply of moist air to the blowers. In practice each of the compartments of the exhaust-chamber will be open to the atmosphere and one of the wheels of the lower compartment is provided with a louver *o* whereby the exhaust from the chamber *f* may be regulated as desired.

Having thus described the invention, what I claim as new and desire to secure by Letters Patent, is:—

1. The combination of a grain-shaft, a supply chamber and an exhaust chamber in communication with the grain-shaft, a heater, means for conducting air from the

heater to the supply-chamber, means for forcing air from the heater, and into the supply-chamber, means leading from the exhaust chamber and for conducting exhaust air impregnated with moisture to the current passing to the grain, so that it will mix with the hot air through the grain-shaft.

2. The combination of a grain-shaft, a supply chamber and an exhaust-chamber in communication with the grain-shaft, a heater, means for forcing air through the heater and into the supply-chamber, means dividing one portion of the exhaust-chamber from another so that the exhaust from the drier will be divided, and an air-duct leading from one of said portions of the exhaust-chamber and communicating with said supply-chamber, so that the hot air from the heater and the impregnated exhaust will be mixed and supplied to said supply-chamber and be forced through the grain-shaft.

3. The combination of a grain-shaft, a supply-chamber and an exhaust-chamber in communication with the grain-shaft, a heater, means for forcing air through the heater and into the supply-chamber, a wall dividing one portion of the exhaust-chamber from another so that the exhaust from the drier will be divided, and an air-duct leading from one of said portions of the exhaust-chamber and communicating with said supply-chamber so that the hot air from the heater and the impregnated exhaust will be mixed and supplied to said supply-chamber and be forced through the grain-shaft.

4. The combination of a grain-shaft, a supply-chamber and an exhaust-chamber in communication with the grain-shaft, a heater, means for forcing air through the heater and into the supply-chamber, a wall dividing one portion of the exhaust-chamber from another so that the exhaust from the drier will be divided, and an air-duct leading from one of the portions of the exhaust-chamber into said forcing-means so that the hot air from the heater and the exhaust impregnated with moisture will be mixed and supplied to the supply-chamber and be forced through the grain-shaft.

5. The combination of a grain-shaft, a supply-chamber and an exhaust-chamber in communication with the grain-shaft, a heater, means for forcing air through the heater and into the supply-chamber, an air-duct leading from the exhaust-chamber to said forcing-means so that hot air from the heater and the exhaust impregnated with moisture will be mixed and supplied to said supply-chamber and be forced through the grain-shaft, and means for regulating the volume of the impregnated exhaust passing to the supply-chamber.

6. The combination of a grain-shaft, a supply-chamber and an exhaust-chamber in communication with the grain-shaft, a heater, means for forcing air through the heater and into the supply-chamber, a wall dividing one portion of the exhaust-chamber from another so that the exhaust from the drier will be divided, an air-duct leading from one of the portions of the exhaust-chamber into said forcing-means so that the hot air from the heater and the exhaust

impregnated with moisture will be mixed and supplied to the supply-chamber and be forced through the grain-shaft, and means for regulating the volume of the impregnated exhaust passing to the supply-chamber.

WYNN E. ELLIS.

Witnesses:

FRED GERLACH,  
LEONE S. RUSSELL.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."