

(No Model.)

G. H. DIEHL.

GRAIN DRIER.

No. 318,704.

Patented May 26, 1885.

FIG. 1.

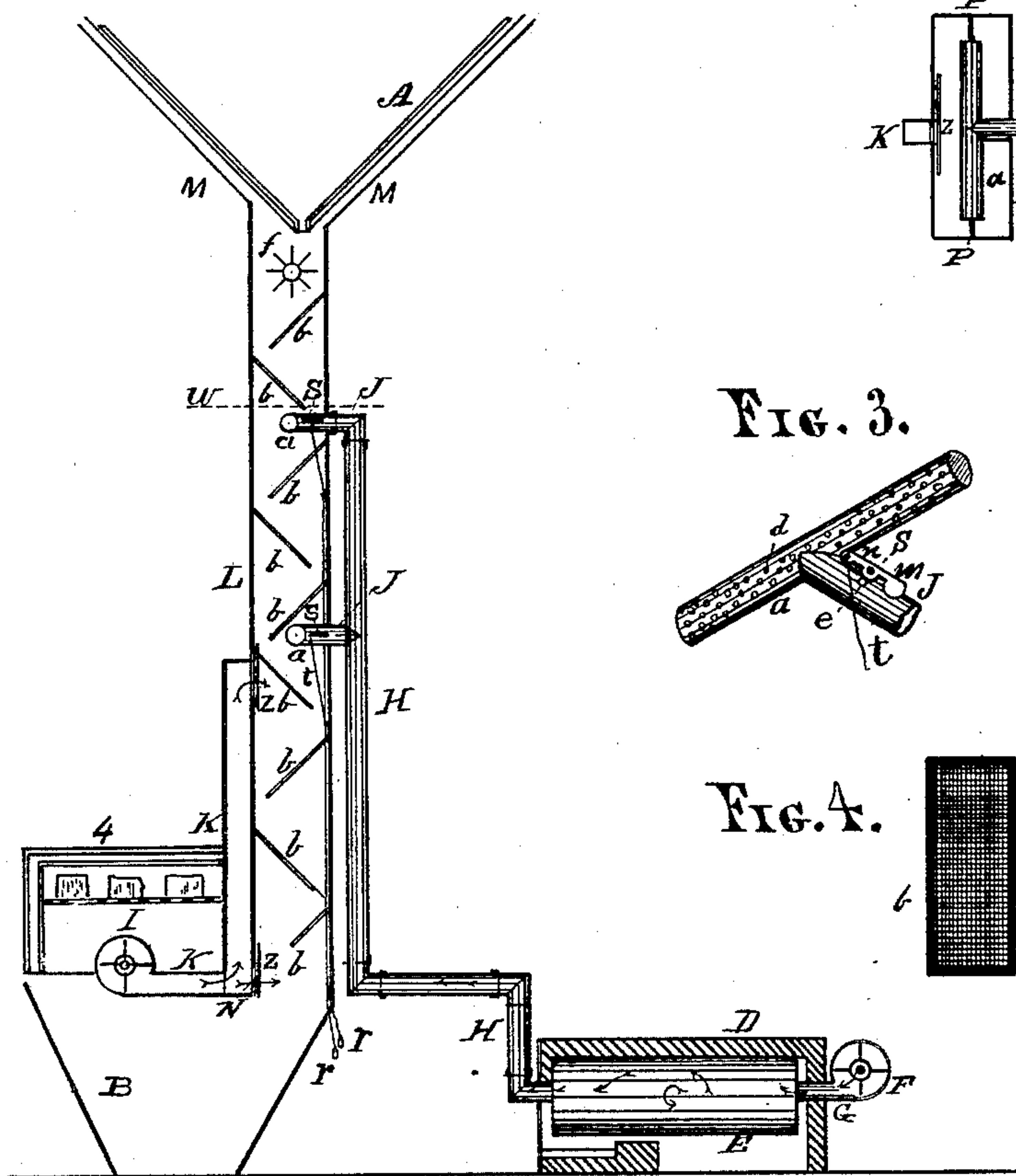


FIG. 2.

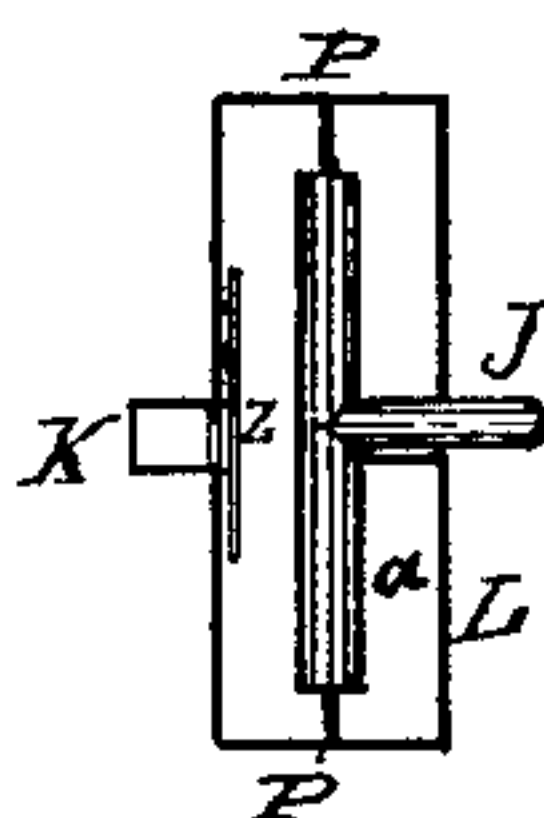


FIG. 3.

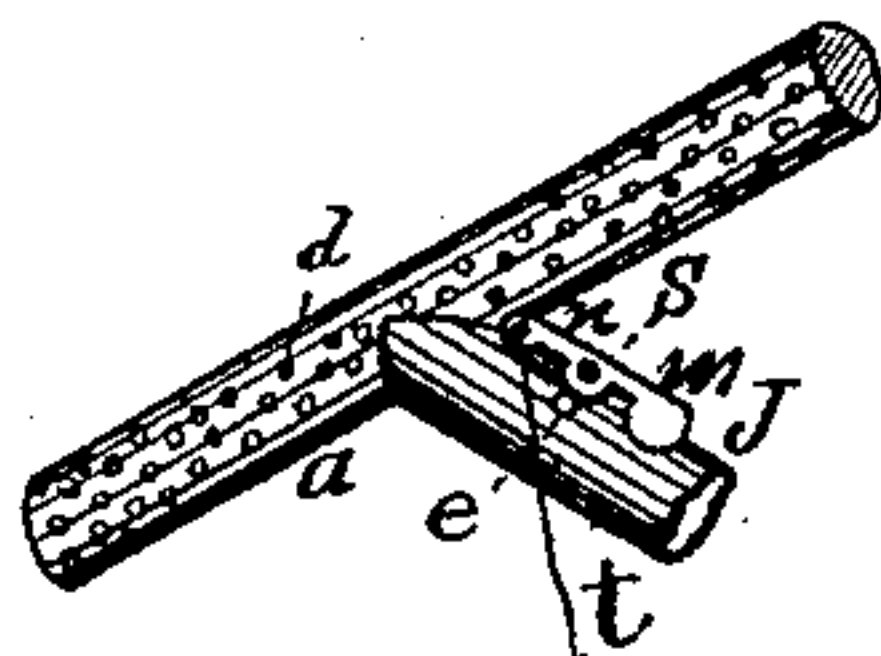


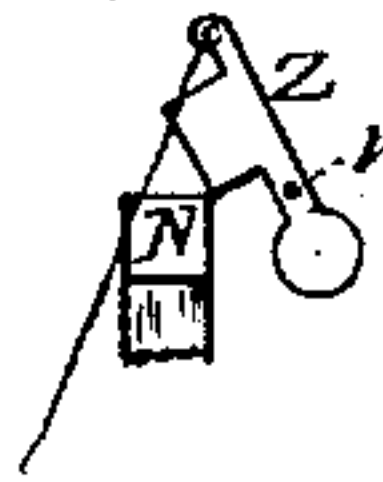
FIG. 4.



FIG. 5.



FIG. 6.



WITNESSES:

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GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 318,704, dated May 26, 1885.

Application filed September 15, 1884. (No model.)

To all whom it may concern:

Be it known that I, GEORGE H. DIEHL, a citizen of the United States, and a resident of the town of Lake, in the county of Cook and State of Illinois, have invented new and useful Improvements in Combined Grain Driers and Coolers, of which the following is a specification, reference being had to the accompanying drawings, illustrating the invention.

The present invention has for its purpose the airing, drying, and cooling of grain in elevators, or in a building erected to serve a like purpose.

It has been the custom to dry grain on hot floors, in heated cylinders, and by hot air applied in various ways, and by various mechanism; and it has been the custom to cool not only grain, but other material by the introduction of cold air; but it has not come to my knowledge that an apparatus has been constructed which can be utilized to accomplish any and all of these desirable objects.

It is well known that grain, unless dried by a high temperature, cannot be stored in large bins in considerable quantities safely without first being cooled, unless the grain is made too dry to be graded as sound natural grain. To obviate this objection in apparatus where grain is to be speedily dried, I provide means for cooling the grain by a part of the same means which are employed to dry the grain, and do the cooling, airing, and drying at the same time and by the single apparatus, and by what I term a "single process." In brief, the nature of my invention to attain this desirable object is as follows: A shaft of suitable dimensions is erected in an elevator so that it will reach the upper and lower bins, and connected with the shaft on one side is one or more hot-air pipes, and a cold-air pipe connects with the other side of the shaft, there being air-conducting pipes leading from the top of the shaft outward to the open air. Hung in the shaft just below the apex of the upper bin is an armed agitator which distributes the grain by the falling of the grain upon it, and in the shaft below the agitator are placed a series of deflectors to conduct the grain from side to side of the shaft, and thereby prevent its too rapid exit from the shaft. Suitable dampers are affixed to the pipes to regulate the blast of air

from the fan and furnace, and the hot air is admitted to the shaft through perforations at the under side of a pipe, whereby the latter cannot become clogged with the falling grain. The drying is done by expelling the moisture by heat, and the grain is cooled by passing down through a cold blast of air.

Figure 1 is a sectional elevation of a grain drier and cooler embodying my invention, showing also the position of the upper and lower grain-bins of an ordinary elevator, or the position of bins built with special reference to the drier and cooler. Fig. 2 is a horizontal section of Fig. 1 on line *w*; Fig. 3, an inverted perspective view of the heating-pipes which are inside of the shaft; Fig. 4, a face or flat side view of one of the deflecting-sieves removed from the shaft. Fig. 5 is a perspective view of the rotating separator removed from the shaft; Fig. 6, a face elevation of one of the weighted valves to the cold-air pipe.

L represents a shaft, made of wood or other suitable material, preferably of wood lined with sheet metal, and to extend as high up as practicable to enable the grain passing down through it to remain as long as possible in contact with hot and cold air; but for the reason that it is not convenient or possible to build the shaft L as high as it should be for attaining the best results in drying and cooling grain, there are placed in inclined positions within the shaft a series of sieve-deflectors, *b b*, &c., which not only retard the downward movement of the grain, but the grain is subjected to considerable friction by contact with the sieves, and by being projected from side to side of the shaft. Below the spout 2 of the upper bin, A, and extending the width of it, is an armed agitator, *f*, whose center of revolution is at one side of the spout 2, so that the incoming grain falling on the agitator will rotate it, and thus distribute the grain largely over the transverse area of the top of the shaft.

a a represent two hot-air-distributing pipes, which are perforated on their under sides to permit air to escape and prevent grain from entering therein. These pipes lie horizontally, and are secured to the shaft L by suitable fastening, P P, as shown at Fig. 2. Connecting with the pipes *a a* and an air-heating furnace, D, are pipes J J H H, whereby air

heated in the device E may be—in fact is—forced by a suction-blast fan, F, into one or both of the pipes *a a*. Ordinary disk-damper plates are hung in the pipes J J at S, Figs. 1 and 3, and by means of ordinary weighted levers *m n* they may be opened and closed by attached cords *t r*.

K represents the cold-air pipe, which communicates with the shaft L by means of openings N, which are closed by weighted dampers *v z*, Figs. 1 and 6, of ordinary construction. A cold-blast fan, I, is connected with pipe K, and for the purpose of cooling the grain it will be better if the air taken by the fan I comes from a cooling-room or a large refrigerator, 4, which may be adjacently located, or placed entirely outside of the structure, as most convenient.

The means for heating the air consists of a heavy cylinder, E, with heads set in a furnace-case, D, and the heads connecting with pipes G H. An old steam-boiler will serve well the purpose for the cylinder E.

Nothing is claimed on the construction of the heating-furnace, inasmuch as any apparatus which will heat a sufficient quantity of air will serve well the purpose; neither is it important that it should have a special location; but it is highly important that the heating-pipes should be securely insulated from any combustible substance. Only two inlets for the hot-air pipes are shown, as at J a J a, but more can be employed; and the same is true as to the opening N N to the cold-air pipes, so that hot or cold air may be let into the shaft L at any desired height.

A material advantage of the apparatus is that the supply of cold air can be so supplied that the grain cannot be parched; but it may

be kiln-dried, if desired, by lessening the supply of cold air; but by a proper proportion of cold and hot air grain dried in this apparatus has all the appearance of grain dried by the natural elements.

For airing and cooling grain the use of hot air is omitted, and when drying and cooling the force of the cold blast should not exceed that of the hot blast, for the reason that the hot air and steam will escape rapidly enough through the pipes M by the force derived from the blast F. Where the cold and hot air is applied, as stated, and the grain let onto the agitator *f*, the apparatus performs its work without further attention.

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

1. In grain driers and coolers combined, the hot-air pipe J H H, one or more, communicating with a heating-furnace, D F, and an air-distributing pipe, *a*, placed inside of the shaft L, and the cold-air pipe K, having one or more open communications, N, with the shaft for attaining a hot-air blast in the shaft L above a cold-air blast, and the shaft taking the grain at its top and conducting it to a place of delivery at its bottom, as specified.

2. In grain driers and coolers, the shaft L, which at its upper portion is supplied with a hot blast and the lower portion with a cold blast, and the agitator *f*, rotated by the gravity of the grain, in combination with the deflectors *b*, as and for the purpose specified.

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Witnesses:

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