

T. WALLACE.

Grain Drier.

No. 40,219.

Patented Oct. 6, 1863.

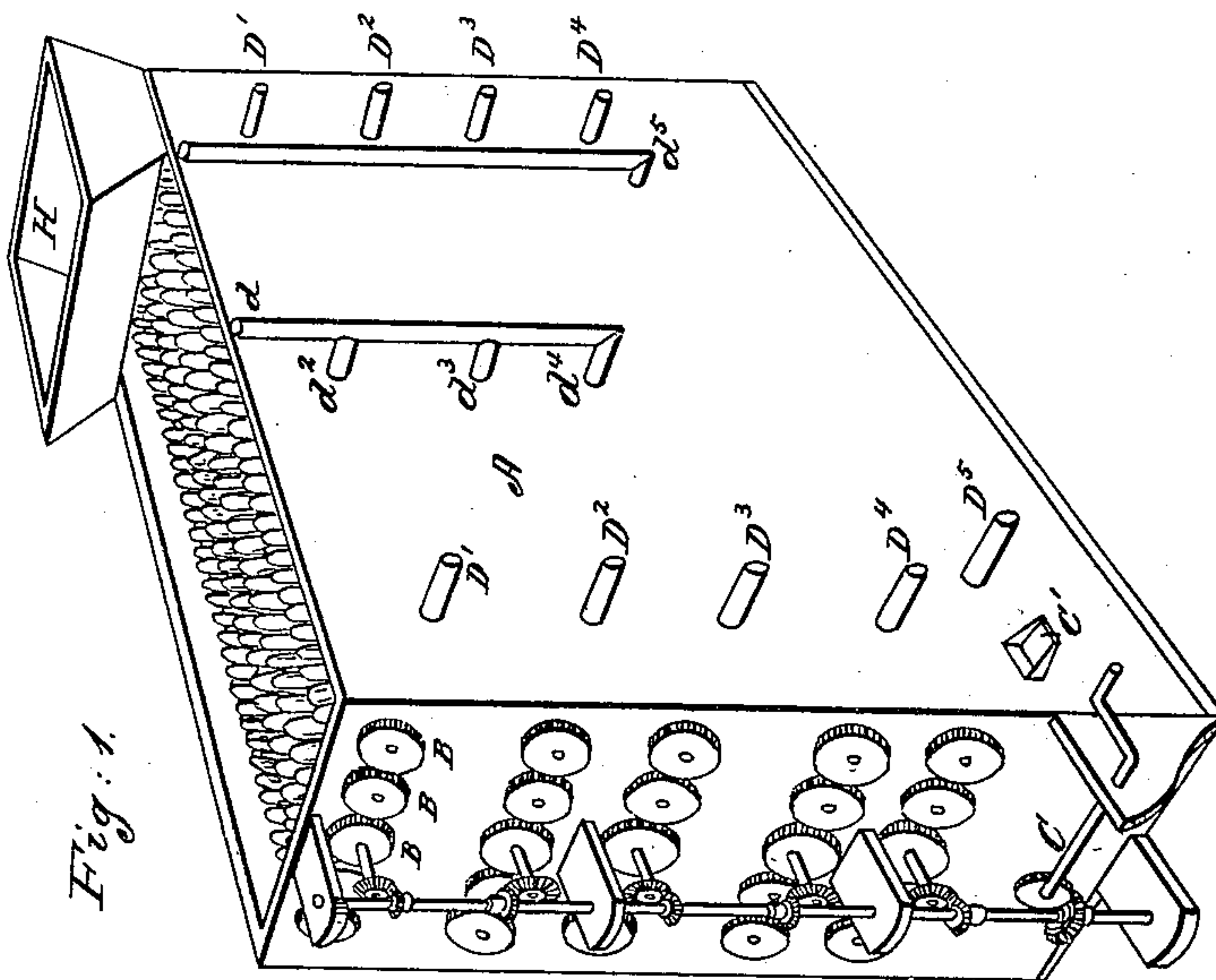


Fig: 1.

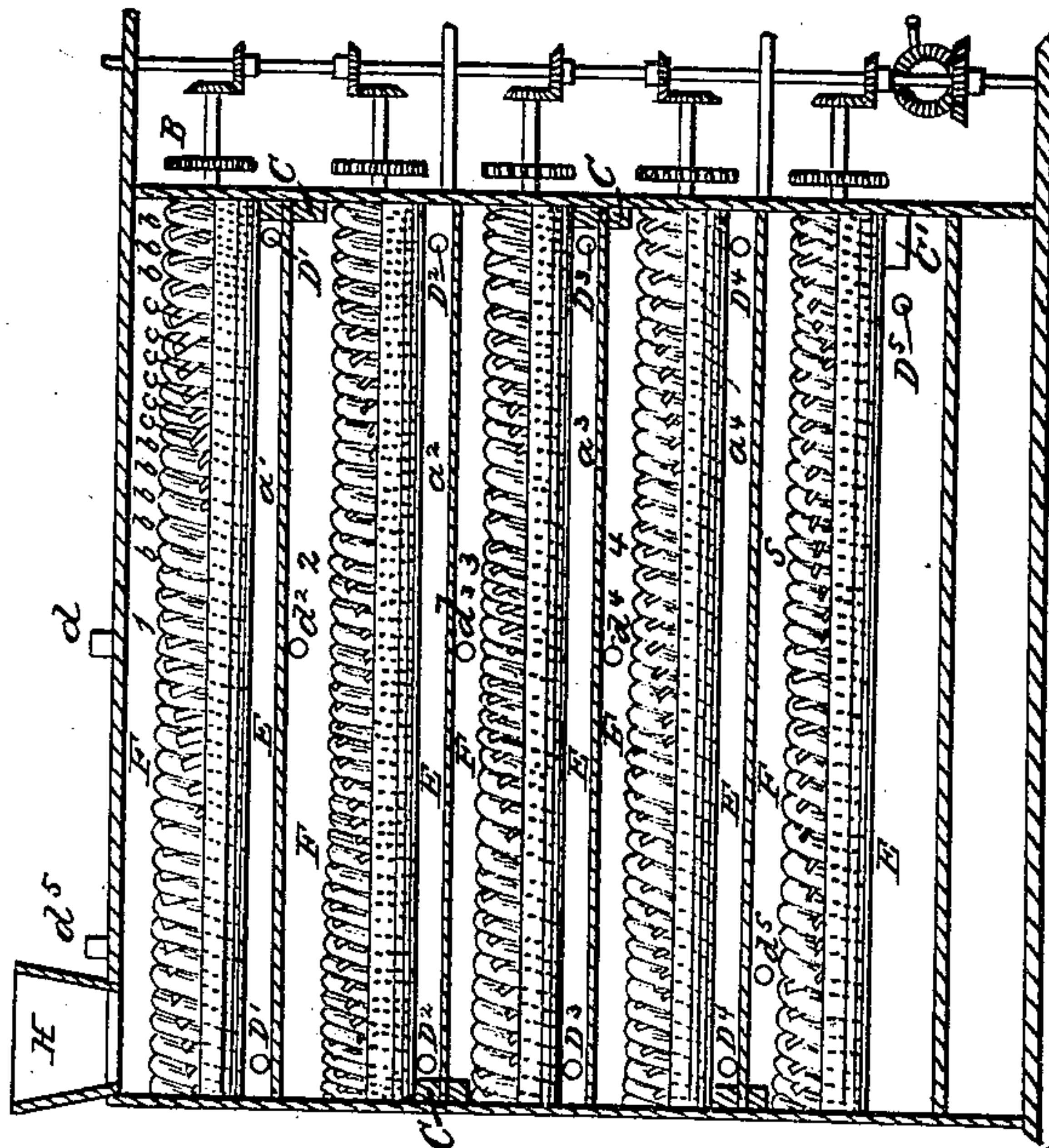


Fig: 2.

Witnesses:

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IMPROVEMENT IN GRAIN-DRIERS.

Specification forming part of Letters Patent No. 40,219, dated October 6, 1863.

To all whom it may concern:

Be it known that I, THOMAS WALLACE, of Chicago, in the county of Cook and State of Illinois, have invented a new and useful Improvement in Grain-Driers; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings and the letters and figures marked thereon, which form part of this specification.

In the aforesaid drawings, which are hereunto annexed, Figure 1 represents a perspective view of my invention; and Fig. 2, a side view thereof, with the wall removed, disclosing the interior arrangements.

The nature of my invention consists in constructing a grain-drying apparatus of two or more compartments, arranged one above the other and separated by air-tight floors or partitions, and causing the grain to pass along over perforated conveyers through the entire length of each of said air-tight compartments successively, and in admitting heated air into each of said compartments, and allowing the air, after having passed up through the grain, passing along through said compartments, as aforesaid, to escape directly from each compartment without entering the compartments above, thus drying the grain in a much more rapid and perfect manner than can be effected by any other apparatus for the purpose now in use.

It further consists in a peculiar device for carrying the grain in the said conveyers, and for stirring or agitating it, so as to allow the heated air to come in contact with it more perfectly than would otherwise be the case.

It further consists in treating the grain, after having been sufficiently dried, with a current of cold air, for the purpose of cooling the grain, and leaving it in better condition for storage or any other uses.

To enable those skilled in the art fully to understand how to construct and use my invention, I will proceed to describe the same with particularity, reference being made to the drawings hereunto annexed, in which similar letters denote corresponding parts of my invention in the different figures.

A in the said drawings represents a close box or inclosure, within which the apparatus for conveying and stirring the grain is ar-

ranged. The said box A is divided into several—two or more—horizontal sections by the horizontal partitions or floors, (marked at a' a^2 a^3 a^4 ,) which extend laterally through the entire width of A, and form the air-tight compartments or chambers marked 1 2 3 4 5 in Fig. 2. Passing longitudinally through each of the said air-tight compartments is a series of perforated semicircular troughs or grooves, through and along which the grain is carried, as hereinafter described, (marked E,) the edges of the adjacent troughs being joined together in such a manner as to prevent any air from passing between. Directly above each of said troughs E there is a shaft arranged parallel to the said grooves E, which is provided with a spiral or screw-shaped projection, (marked b in the drawings,) whose arrangement is such that when the shaft to which said spiral is attached is revolved the said spiral fits into the perforated groove E, and carries or moves the grain along said groove from one end of said groove to the other, whence it is discharged through a suitable spout or chute into the compartment below, where the same process is repeated. There are also arranged between the threads of said spiral b upon the said shaft, stirrers or fingers to stir up the grain and admit the air and heat thereto. These stirrers (marked c in the drawings) are small flat pieces of metal inserted into said shaft, whose faces are arranged parallel to the shaft, so as to present the greatest stirring-surfaces to the grain when the said shaft is revolved, as hereinafter described. These stirrers are inserted by means of a screw cut thereon in holes drilled for that purpose in the shaft, which shaft, for the purpose of facilitating the insertion of said stirrers, I construct hollow, as it is much easier and a much more rapid operation to perforate the hollow shaft than to drill the solid one. However, the shaft may be made solid if preferred.

H represents the hopper into which and through which the grain enters the machine, and G shows the spouts through which the grain falls from one elevation or chamber to the one immediately below.

D D D D represent pipes through which hot air is submitted into the grain-drier, one of said pipes opening into each end of each of said separate compartments thereof; and $d d d$ rep-

resent pipes opening out of each of said compartments, whereby the air escapes therefrom. It will be observed that the pipes D, whereby the air is admitted, are placed below the perforated channels, and the pipes *d* above the same in each of the compartments. The pipe D⁵, opening into the lower compartment, is for the purpose of admitting a current or blast of cold air to cool the grain after having been heated in the process of drying, which cold air passes up through the grain and escapes at the pipe *d*⁵, as in the case of the hot air.

G' represents the spout where the grain, after having been thoroughly dried and cooled, passes out of the machine.

The pipes D are connected to any suitable hot-air furnace, whereby the machine is supplied with hot-air, and the pipe D⁵ may be connected with any suitable blowing apparatus for generating a cold-air blast.

At the end of Fig. 1 is shown an arrangement of gear-wheels and a crank, C, whereby all the shafts F are revolved simultaneously.

Care should be taken to arrange the spiral upon the shafts in such a manner as to convey the grain in the proper direction along the channel, and there may be any number of horizontal series of grooves, and any number of grooves in each series, according to the required capacity of the machine and the length of time required for the grain to remain in the machine to be thoroughly dried.

When the revolving shafts, arranged as described and shown, are set in motion by the gearing shown, or any other suitable device, and the hot air admitted into the machine, and the cold blast forced into the lower compartment, then the grain is let into the hopper H, and thence falls into one end of the conveyers in the upper series, in which, by the operation of the spirals *b*, it is conveyed along to the opposite end thereof, where it falls through the spout G into the conveyers in compartment 2, where the same operation is repeated, and so on until the grain goes out of the machine at G'. In the meantime the hot-air which goes into the upper compartment passes up through the perforated semicircular channels, and through the grain therein, taking up from the grain and absorbing a portion of the moisture therein, and carrying it away, escaping from the top of the machine or through a suitable pipe made for that purpose, while the grain being thus partially dried goes down and through the second compartment, when the

hot air admitted into said second compartment passes up through it, absorbing other portions of the moisture therein, which is carried out through the pipe *d*, and so on until it is thoroughly dried and passes into the lower compartment or cooler, where it is cooled preparatory to passing out of the machine at G'. By this arrangement the grain is much more perfectly dried than it would be by having the machine consist of a single chamber, as the air admitted into the lower compartment of the drying arrangement would become surcharged with moisture, and if allowed to pass up through the entire machine would possess but little, if any, drying properties when it should reach the upper series of conveyers.

The partition *a*⁴ above the cooler should be of sufficient thickness and of such material as to be least affected by the superincumbent heat. To produce the best and most efficient result care should be taken to have only those parts of the conveyers E perforated which are covered by the grain, so as to prevent any air from passing up through the same which does not come in contact with the grain.

Having described the construction and operation of my improved grain-drier, I will proceed to specify what I claim as new therein and desire to secure by Letters Patent—I claim:

1. In a grain-drying apparatus, the combination and arrangement of a series of conveyers, situated one above the other in separate air-tight compartments, whereby the grain is carried back and forth through the kiln over a series of perforated inclined surfaces in a zigzag course where a separate hot-air blast is admitted into each of said compartments, arranged and operating as and for the purposes herein described.

2. The combination and arrangement of the perforated troughs E, the revolving-shaft F, provided with the spiral *b*, and stirrers *c*, and the spur-wheels B, miter-wheels *i k*, shaft I, miter-wheels *e f*, and shaft C, arranged and operating substantially as delineated and described.

3. The combination of the reciprocally-arranged conveyers E F, provided with the spiral *b*, and stirrers *c*, with the air-tight chambers, 1 2 3 4 5, constructed and operated as herein shown and specified.

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Witnesses:

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