

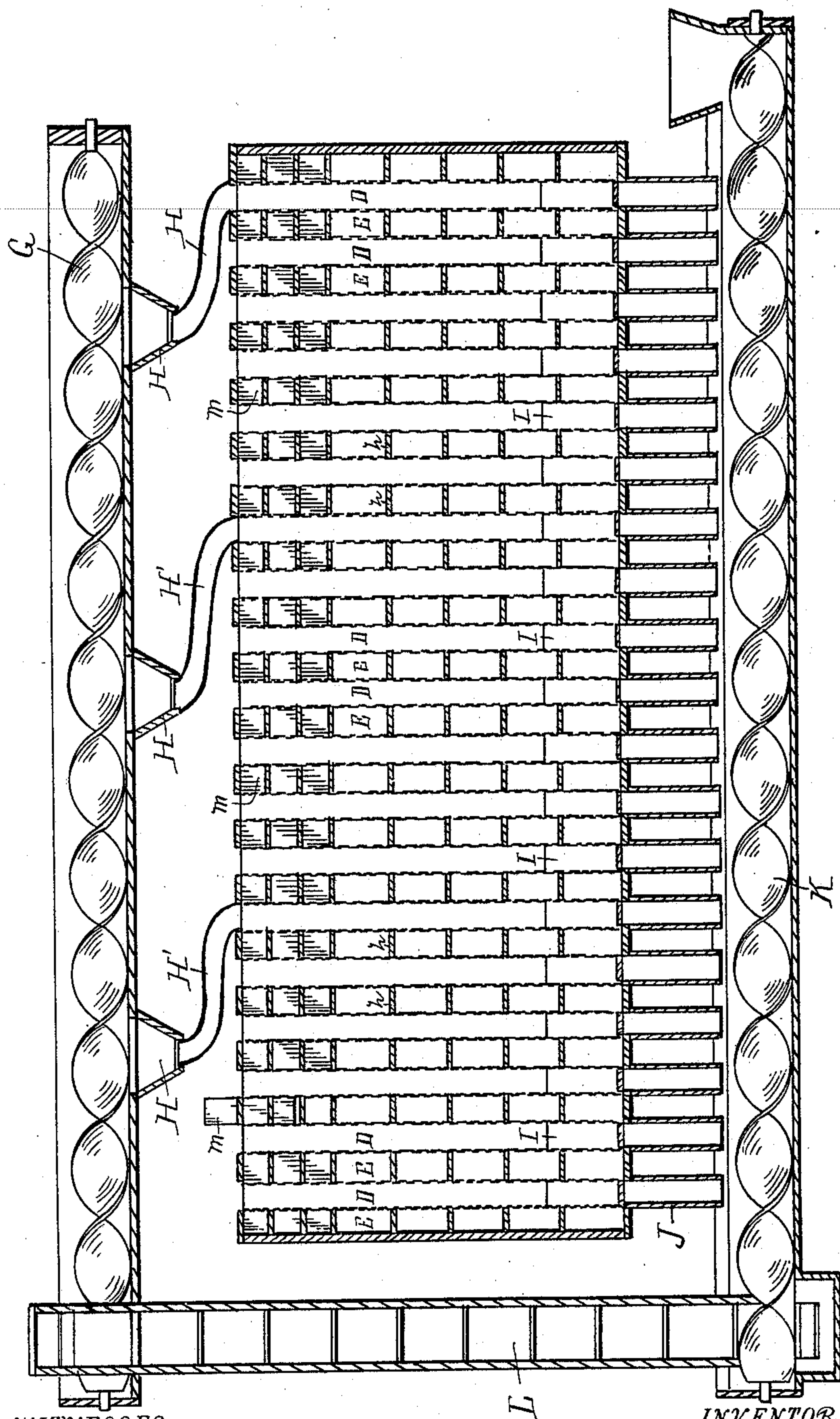
(No Model.)

2 Sheets—Sheet 1.

W. E. ELLIS.
GRAIN DRIER.

No. 596,655.

Patented Jan. 4, 1898.



WITNESSES

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Edward A. Stricker

INVENTOR

Wm. E. Ellis

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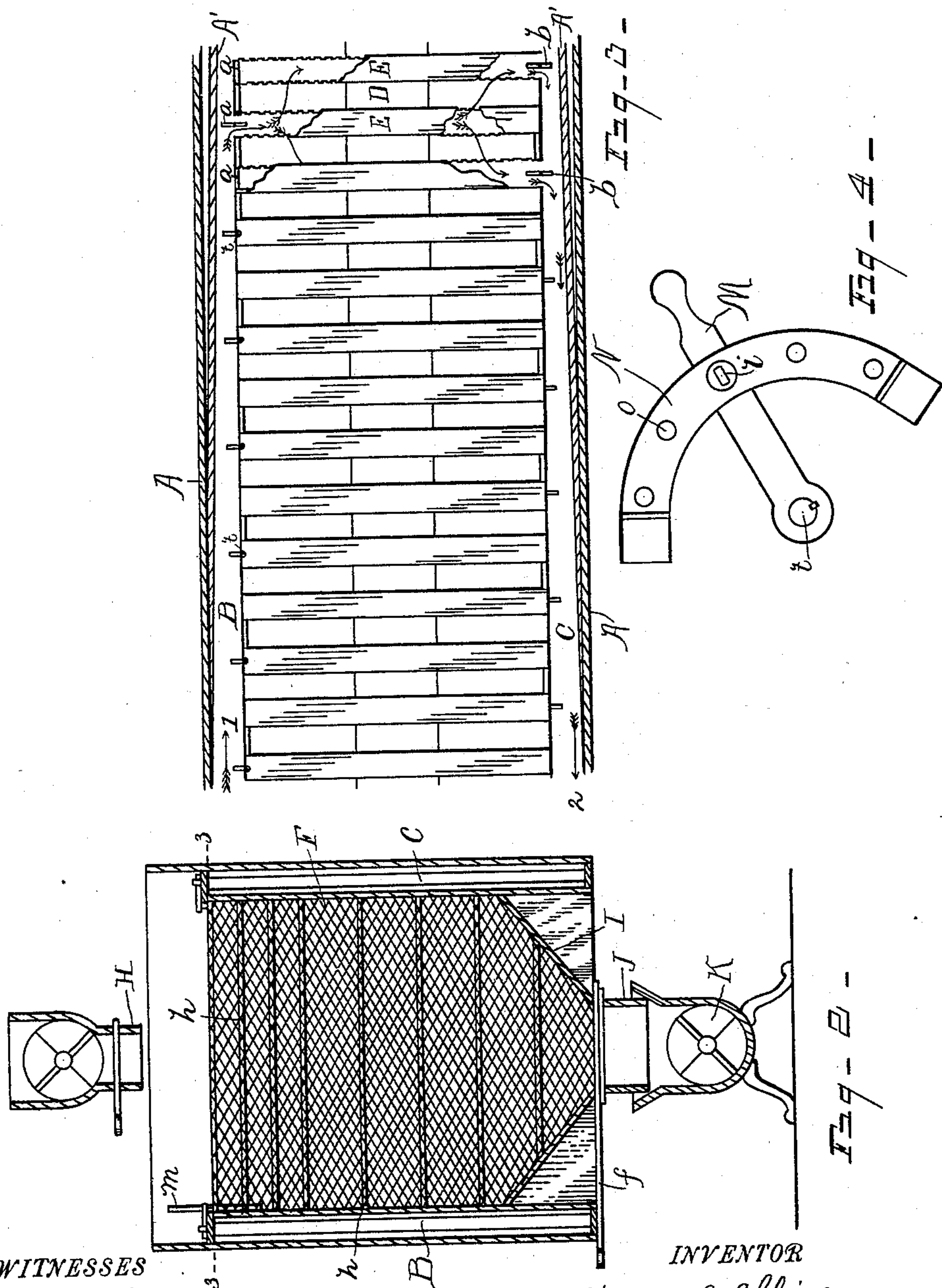
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UNITED STATES PATENT OFFICE.

WYNN E. ELLIS, OF DETROIT, MICHIGAN, ASSIGNOR OF ONE-HALF TO
TIMOTHY HURLEY, OF SAME PLACE.

GRAIN-DRIER.

SPECIFICATION forming part of Letters Patent No. 596,655, dated January 4, 1898.

Application filed January 24, 1896. Serial No. 576,662. (No model.)

To all whom it may concern:

Be it known that I, WYNN E. ELLIS, a citizen of Great Britain, residing at Detroit, in the county of Wayne and State of Michigan, have invented certain new and useful Improvements in Devices for Drying Grain and other Substances; 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 a device for drying grain and other substances; and it consists in the construction and arrangement of parts, as hereinafter more fully set forth, and pointed out particularly in the claims.

The object of the invention is to provide a simple and effective apparatus for drying wet grain, so as to render it marketable, in which the arrangement is such as to enable the grain to be readily handled and quickly and evenly dried, accomplishing in its operation a great saving in time, labor, and expense over the common means employed for this purpose, which object is attained by the construction illustrated in the accompanying drawings, in which—

Figure 1 is a central vertical longitudinal section through my improved grain-drying apparatus. Fig. 2 is a vertical transverse section through the same. Fig. 3 is a horizontal section on line 3 3 of Fig. 2, showing as well a portion of the top of the air-spaces broken away; and Fig. 4 is an enlarged plan of the circular bar and lever for actuating the dampers controlling the air-currents.

Referring to the letters of reference, A designates an inclosed case of any suitable size, preferably rectangular in form. Extending longitudinally of said case on each side and from the top to the bottom thereof are the air-chambers B and C, respectively, as clearly shown in Figs. 2 and 3, said chamber B of which is connected with a blast-fan, (not shown,) which is adapted to supply a hot-air blast at the required pressure. In Fig. 3 the arrow 1 indicates the induct end of chamber

B and the arrow 2 the educt end of chamber C, at which points said chambers are wider than at their opposite ends, which are contracted by an inclined partition A', by which means an equalization of the air-pressure is attained throughout the length of said chambers. Crossing the case transversely between said air-chambers on each side is a series of alternately open and closed spaces D and E, respectively. These spaces are separated by a series of screen partitions F, which are mounted upon a suitable framework and divide the entire interior of the case or housing into alternate grain and air spaces. The grain-spaces D are open at the top and are located between two of the air-spaces E, whose tops are tightly closed and which communicate at each end with the air-chambers B and C, respectively, forming a grain-space D, in which the wet grain is received and confined in a comparatively thin vertical layer or division, upon each side of which is an air-space E, from which a hot-air blast is passed through said division of grain in alternate succession, effecting a rapid and economical drying thereof. The hot blast of air after passing through the division of grain from one air-space into the other is discharged into the educt-chamber C, from which it is conveyed, with the moisture driven from the grain, through a suitable stack or exhaust-opening. (Not shown.)

At each end of the air-spaces E, and controlling the opening from said spaces into the respective chambers B and C, is a series of valves or dampers *a b*, which are pivoted centrally in said openings and adapted to turn upon central pivots, so as to stand across said openings when it is desired to close them or at right angles thereto when open, by which arrangement the opening of each alternate damper on opposite sides and at opposite ends of the air-spaces, so that each air-space shall have one open and one closed end in alternate succession, a blast of heated air entering the open end of the air-space from the chamber B will pass through the layer or division of grain on each side thereof and discharge into the opposite adjacent air-spaces, communicating through their open end with the exhaust or discharge chamber C, as shown by the direction of the arrows at the right of

Fig. 3. These air-spaces occupying an area equal to the entire surface of the grain-spaces in the divisions D cause a blast of heated air to be passed through every portion of the confined grain, whereby the moisture therein is rapidly and evenly evaporated. Should it be found that the grain in the divisions D does not dry as rapidly upon the exhaust side as it does upon the side from which the current of heated air enters, the blast of air after a time may be reversed by opening the closed series of dampers *a b* and closing those that were open, whereby the air-blast may be passed through the grain from the opposite side, as will be well understood, which reversal of the air-current effects a more uniform drying of the grain. When the grain in the layers or divisions shall have become nearly dry, the air-blast may be caused to pass through two opposite divisions before escaping by closing two of the successive dampers *b* at the discharge end of the air-spaces and opening the damper *b* in the third successive air-space and closing the corresponding damper *a* at the opposite end of said air-spaces, when the air-blast will be obliged to pass through two of the grain-divisions before discharging into the chamber C, effecting economy in the use of the heated air.

For filling the grain spaces or divisions in the drier I preferably employ a conveyer G, which extends longitudinally of the drier, above the top thereof, and is provided with a series of depending hoppers H, from which extends a flexible spout H', whereby the grain carried by said conveyer may be distributed so as to fill the various grain-spaces by placing said flexible spout in the opening at the upper ends thereof, as will be well understood.

The bottom of the grain-spaces, as will be seen, is provided with a hopper-bottom I, as clearly shown in Fig. 2, which communicates with a depending spout J, adapted to discharge into a conveyer K, located below the bottom of said drier and extending longitudinally thereof, by which means the grain when properly dried may be discharged into said conveyer and carried away as desired without the use of manual labor in handling.

Connecting the conveyers J K at one end is an elevator L, by which means the grain discharged from the drier may be again passed therethrough when found desirable.

Closing the hopper-bottoms of the series of grain-spaces is a series of slides *f*, which hold the grain therein during the process of drying, but which may be drawn outward when it is desired to discharge the grain therefrom.

Crossing the air-spaces E transversely is a series of strips *h*, (clearly shown in Figs. 1 and 2,) upon which the wire or screen F, forming the grain-spaces, is mounted and which serve to support the side of the wire or screen and prevent the lateral sagging thereof.

When the grain is filled with moisture, it swells sufficiently to greatly increase its bulk.

Therefore after it has been subjected for a time to the heat in the drier it shrinks considerably and settles in the grain-spaces. This shrinkage cannot be made up by the addition of more grain, as the added grain would not dry sufficiently by the time that which was first placed in the drier was ready to be discharged. Therefore to prevent an escape of the air-blast over the top of the grain after it shall have settled below the top of the grain-spaces there is employed a series of vertical slides or cut-offs *m* at the induct end of the air-spaces, which as the grain settles may be pushed downward to cut off the supply of air at the top of the grain-spaces, as the grain in drying settles below the upper transverse cross-pieces *h*, which divide the air-spaces horizontally and which at the top of the drier are placed closer together than at the bottom for this purpose, preventing an escape of the air over the top of the settled grain.

In Fig. 4 is shown an enlarged plan of the operating-lever M, mounted on the vertical shaft *t* of the pivoted dampers *a* and *b*, respectively, through which said dampers are opened and closed, as desired, said lever swinging under a circle-bar N, having a series of apertures *o* therein adapted to receive a pin *i*, which passes therethrough and through said lever to lock it in any desired position. By means of this lever said dampers are swung to regulate the flow of air as desired.

While I have shown and described a wire screen as forming the division between the air and grain spaces, it is evident that other material may be employed which forms a proper passage for the air. In some instances I may find it convenient to use a woven fabric for this purpose.

It will now be understood that by means of this improved drier wet grain of any description may be quickly and evenly dried, obviating the great time and labor incident to the ordinary process of drying grain and effecting economy in the handling thereof.

It will be understood that by this means of dividing the wet grain into thin vertical layers or divisions through which hot air under pressure is forced the operation of driving the moisture from the grain is greatly accelerated, enabling large quantities of grain to be perfectly and evenly dried within a few hours, which heretofore has required days to dry in an imperfect manner.

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 of the inclosing case, the series of vertical alternate grain and air spaces divided by perforated walls and crossing said case transversely, said air-spaces being closed at the top and bottom and open at their opposite ends, said grain-spaces being closed at their ends and open at their top and provided with a discharge-opening at the bottom, the induct air-chamber on one side of said case extending from the bot-

tom to the top thereof and common to all of said air-spaces, the educt air-chamber on the opposite side of said case also extending from the bottom to the top thereof and common to
5 all of said air-spaces, and the series of vertical dampers controlling the openings of said air-spaces into said induct and educt chambers respectively.

2. In a grain-drier, the combination of the
10 inclosing case, the series of vertical alternate grain and air spaces divided by perforated walls and crossing said case transversely, said air-spaces being closed at the top and bottom and open at their opposite ends, said grain-
15 spaces being closed at their ends and open at their top and provided with a discharge-opening at the bottom, the induct air-chamber on one side of said case extending from the bottom to the top thereof and common to all of
20 said air-spaces, the educt air-chamber on the opposite side of said case also extending from the bottom to the top thereof and common to

all of said air-spaces, and means for controlling the openings of said air-spaces into said induct and educt chambers, respectively, 25 whereby the blast may be caused to enter at one end of said air-spaces passing through the body of the interposed grain and out of the opposite end of the succeeding air-space into the educt-chamber. 30

3. In a drier, the combination with the air-supply, of a series of alternating grain and air spaces separated by a vertical screen, the air-spaces being provided with a series of horizontal strips upon which said screens are 35 mounted, and the vertical slides at the top of said air-spaces for cutting off the supply of air from the upper portion thereof.

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

WYNN E. ELLIS.

Witnesses:

E. S. WHEELER,
HORACE R. WHEELER.