O. W. RANDOLPH.

GRAIN DRIER.

APPLICATION FILED FEB. 3, 1919.

1,346,335.

Patented July 13, 1920.

2 SHEETS—SHEET 1.

Fig. 2.

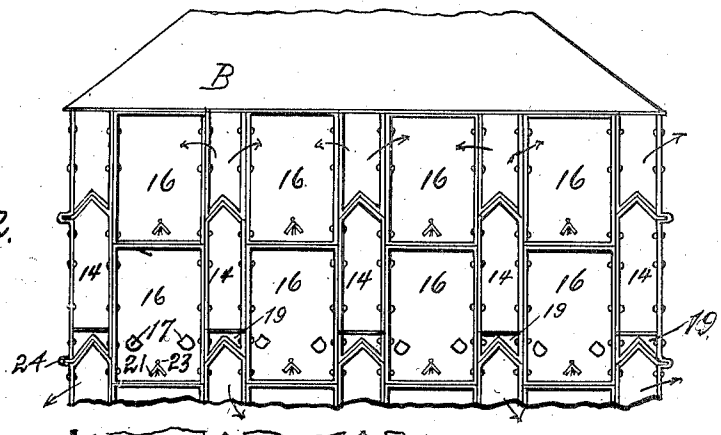


Fig. 3.

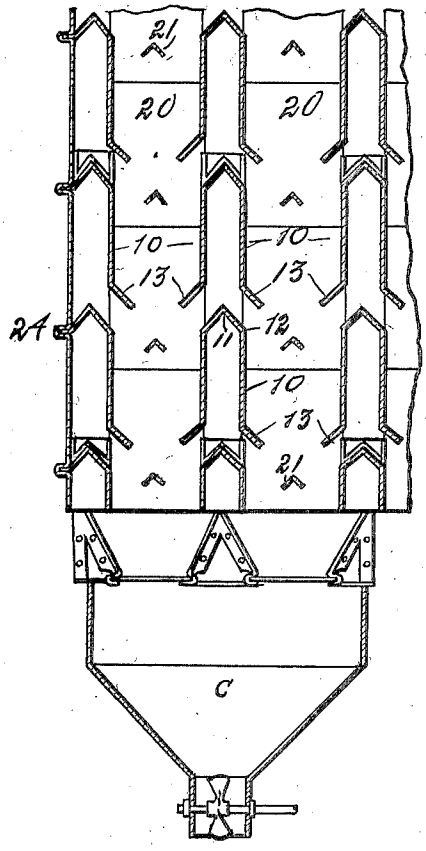
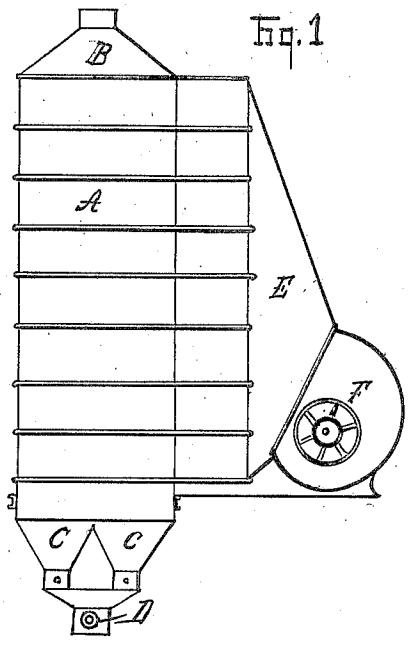


Fig. 1



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2 SHEETS—SHEET 2.

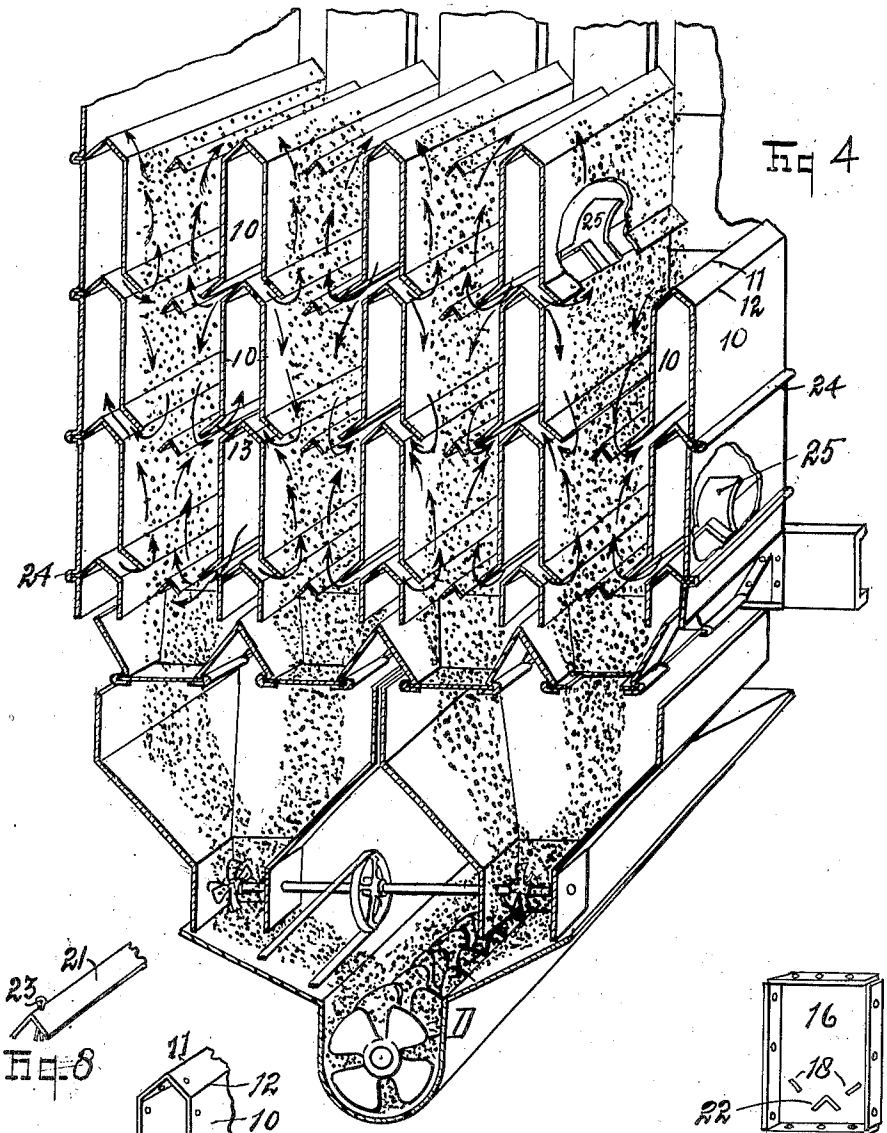


Fig. 4

Fig. 8

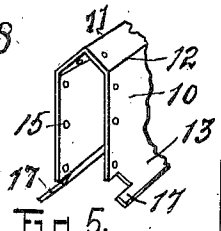


Fig. 5.

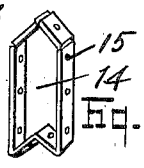


Fig. 6



Fig. 9

Fig. 7

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UNITED STATES PATENT OFFICE.

OLIVER W. RANDOLPH, OF TOLEDO, OHIO.

GRAIN-DRIER.

1,346,335. Specification of Letters Patent. Patented July 13, 1920.

Application filed February 3, 1919. Serial No. 274,736.

To all whom it may concern:

Be it known that I, OLIVER W. RANDOLPH, a citizen of the United States, residing at Toledo, in the county of Lucas and State of Ohio, 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 and figures of reference marked thereon, which form a part of this specification.

My invention relates to grain driers of the character illustrated in Letters Patent of the United States issued to me September 5, 1916, Number 1,196,979; September 4, 1917, Number 1,239,216, and August 27, 1918, Number 1,276,812, and is designed to furnish a structure, preferably of sheet metal, composed of grain-columns and air-ducts, vertically disposed and arranged, alternately, side by side. The grain to be dried is fed by gravity down through the grain-columns while air is forced into the air-ducts and thence out through the descending grain, thus, in its course to the open air, absorbing the moisture from the grain. The object of my invention, more particularly, is to construct the columns and ducts referred to of uniform interchangeable units, the walls of which provide the necessary partitions and which afford not only the proper air-openings leading into and from the grain-columns, but which also provide means for agitating and retarding the grain during its course through the drier to increase and prolong its exposure to the air-currents. My invention also relates to certain details of construction hereinafter described and pointed out in the claims.

To the ends indicated, my invention consists of the devices, construction and arrangement of parts hereinafter described, and illustrated in the accompanying drawings, in which—

Figure 1, is an outline end-elevation of a grain drier constructed according to the general plan of my said several patents and capable of embodying the present improvements; Fig. 2, a front-elevation of the upper part of a grain drier constructed according to my invention; Fig. 3, a cross-sectional elevation of a portion of the lower part of the same; Fig. 4, an enlarged view of the same, showing the course of the air-currents into, through and out of the grain-columns hereinafter referred to; Fig. 5, a perspective view of one end of one of the air-duct units hereinafter referred to; Fig. 6, a perspective view of a closure for the open end of the unit illustrated in Fig. 5; Fig. 7, a perspective view of a closure for the end of one of the horizontal compartments of the grain-column hereinafter referred to; Fig. 8, a perspective view of one end of one of the deflector-bars hereinafter referred to, and Fig. 9, a perspective view of a closure-piece for certain openings hereinafter referred to.

Like letters and numerals indicate like parts throughout the drawings.

The body of my machine, A, is rectangular in general outline, having at top a container B from which grain is discharged into the several grain-columns hereinafter described, and having at bottom grain discharge outlets C and a conveyer D for conveying the dried grain to a suitable receptacle. E is a hood the mouth of which covers and embraces the inlets of the several air-ducts hereinafter referred to, and which is supplied with air by a blower F. The air supplied by the blower through the hood is heated by means of a suitable heater, not shown. The size and capacity of my grain drier may be varied as may be required, depending upon the length and number of the superposed units, now to be described.

10 is a metal sheet of such length as to extend between the front and back walls of the machine. It is bent along its longitudinal center into inverted V-shape form, as at 11. It is also bent on longitudinal lines 12 so that the two sides of the sheet are substantially parallel. The margins of the sheet are also bent to flare outwardly and downwardly to form flanges 13. One end of each of these inverted trough-like devices is closed by means of a piece of sheet metal 14 consisting of a blank,—the outline of which will be readily understood without illustration,—which has been bent into form, as illustrated in Fig. 6, and which fits into the open end of the piece 10. The pieces 10 and 14 are correspondingly pierced, as at 15, for bolts or rivets. The pieces 10, bent and closed at one end, as above described, are arranged in vertical and horizontal rows, as indicated in Figs. 2, 3 and 4, the lower horizontal row having its open end exposed to the blast of the fan F. The pieces 10, in the horizontal

row next above, have their open ends at the front of the machine, the back ends toward the fan being closed. Thus the closed ends and the open ends of the horizontal rows of pieces 10 alternate from the lower part of the machine to the top.

In their vertical rows the pieces 10 have their flaring flanges 13 spaced above the sloping top of the subjacent corresponding member, as plainly indicated in Figs. 3 and 4.

The vertical rows of the members 10 are spaced apart horizontally and are secured in fixed vertical and horizontal relation by means of the devices now to be described.

16 is a rectangular piece of sheet metal, blanked and bent to box-like form, as shown in Fig. 7, and pierced for bolts or rivets to register with corresponding holes in the parts 10 and 14. On the ends of the flanges 13 are formed tongues 17 which when the parts 10 and 16 are brought into proper relation, will project through the oblique slots 18. (See Fig. 7.) The tongues 17 are bent backwardly against and into engagement with the outer wall of the piece 16. The adjoining edges of the parts 10, 14 and 16 are secured together by suitable bolts and rivets. Between the apex of the open ends of the pieces 10 and the bottom edge of the piece 10, next above, there is a space which is filled by a sheet metal piece 19. (See Fig. 9.)

It will now be seen that between the adjacent vertical rows of the pieces 10 are vertical spaces 20 into which project, at regular intervals, the downwardly inclined flanges 13, the walls of the passages 20 being formed by the adjacent vertical walls of the parts 10. The passages 20 are connected at their top with the grain supply B and at their bottom with the receptacles and conveyers C—D and constitute the grain-columns of the machine. Extending lengthwise through each of the passages 20, as indicated in Figs. 2, 3 and 4, is a metal strip 21 bent longitudinally into inverted V-shape, and which projects, at its ends, through correspondingly shaped slots 22 in the pieces 16. The piece 21 is secured against longitudinal movement by means of pins 23.

The outer walls of the outside vertical rows of the members 10 are connected with the members 10, as indicated at 24,—seen to the left in Fig. 4.

The operation of my device is as follows: The grain to be dried being admitted into the top of the passages 20, flows downwardly and is caught and retarded by the successive opposed converging pairs of flanges 13. After passing a pair of flanges the grain strikes the deflecting bars 21 and is spread outwardly and is again caught by the flanges and is again separated by the deflecting bars, and so on throughout its course to the outlet of the passage. As the grain thus pursues its downward sinuous course, being alternately confined and loosened by the successive constrictions, it encounters a series of suitably heated air-blasts which proceed from the hood E of the machine through those passages formed by the members 10 which have their open ends toward the fan. The air escapes from these passages under the flanges 13 into the adjacent grain-columns and flows upwardly and downwardly under the neighboring pairs of flanges 13 and thence through the outlet ducts to their open ends at the front of the machine and to the open air.

Under some conditions of operation I find it useful to place in the air-ducts baffle-plates 25 (see Fig. 4) which deflect laterally a portion of the air-currents causing a more uniform distribution of the air.

The usual openings and slides or shutters for their control are provided, but need not be here described.

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

1. In a grain drier, a series of air-ducts arranged in vertical and horizontal rows, the vertical rows being spaced apart to form therebetween grain-columns, said ducts consisting respectively of elongated members having parallel side-walls which converge to form a top, and having at bottom downwardly flaring flanges, said flanges and the subjacent converging tops being spaced apart to form air passages between said ducts and said grain-columns.

2. In a grain drier, a series of air-ducts arranged in vertical and horizontal rows, the vertical rows being spaced apart to form therebetween grain-columns, said ducts consisting respectively of elongated members having parallel side-walls which converge to form a top, and having at bottom downwardly flaring flanges, said flanges and the subjacent converging tops being spaced apart to form air passages between said ducts and said grain-columns, combined with a blower arranged to drive air into said air-ducts, and closures for the opposite ends of the alternate horizontal rows of air-ducts.

3. In a grain drier, a series of air-ducts arranged in vertical rows and in horizontal rows, the vertical rows being spaced apart to form grain-columns therebetween, said ducts consisting respectively of an elongated sheet metal member bent to form a top and two downwardly projecting parallel side-walls which at bottom have downwardly and outwardly flaring flanges, said flanges and the tops of the subjacent ducts being spaced apart to form at opposite sides of the grain-column opposed air-passages connecting the air-ducts and the grain-columns, and bars extending longitudinally through said grain-

columns substantially midway between said opposed air-passages.

4. In a grain drier, a grain-column, at opposite sides of said grain-column a plurality of air-ducts having outlets arranged to deliver air into said grain-column, and a plurality of air-ducts having inlets arranged to receive air from said grain-column, said delivering and receiving ducts being disposed in alternation one above the other, said grain-column being constricted at said outlets and said inlets to retard the flow of grain at said points, combined with means for delivering air to the air-duct first mentioned, and means for delivering grain to the grain-column.

5. In a device of the described character, a grain-column, at opposite sides of said grain-column corresponding series of alternating air-receiving and air-delivering air-ducts arranged in vertical columns one above the other, the corresponding air-ducts being disposed in horizontal alinement, and having at their under sides air-passages in communication with the grain-column, and means for retarding the flow of grain through the grain-column during its passage between said air-passages.

6. In a device of the described character, a series of air-ducts arranged one above the other, said ducts consisting respectively of an elongated strip bent along its longitudinal center and along and near to its margins to form depending flanged parallel side walls and a top with sloping sides, the alternating ends of said ducts being closed.

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

OLIVER W. RANDOLPH.

Witnesses:
W. A. De Forest,
Forrest Jeffries.