United States Patent [19]

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[11] **3,739,493**

[45] **June 19, 1973**

[54] **GRAIN DRYING APPARATUS**

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[22] Filed: **May 4, 1971**

[21] Appl. No.: **140,100**

[52] **U.S. Cl.** **34/167,** 34/174

[51] **Int. Cl.** **F26b 17/12**

[58] **Field of Search** 34/65, 167, 168, 34/169, 171, 173, 174

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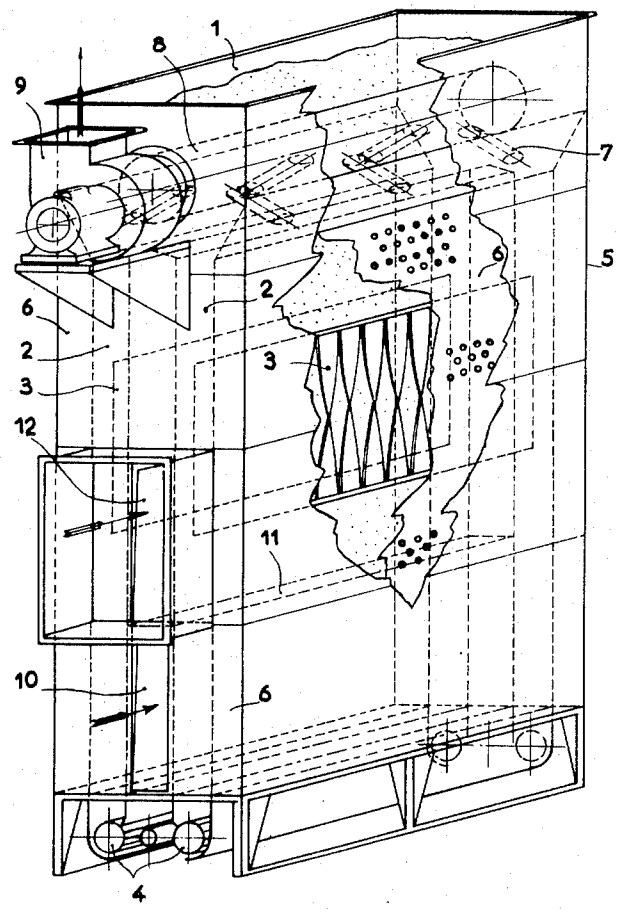
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[57] **ABSTRACT**

An appratus for drying grain in a continuous operation comprising an upper feeding box into which grain is fed, and a vertical passageway in communication with the feeding box and through which the grain falls under gravity. Means are provided for sucking air through the grain during its fall in the passageway and for axially inversing the flow of the grain during its fall.

6 Claims, 3 Drawing Figures



PATENTED JUN 19 1973

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SHEET 1 OF 2

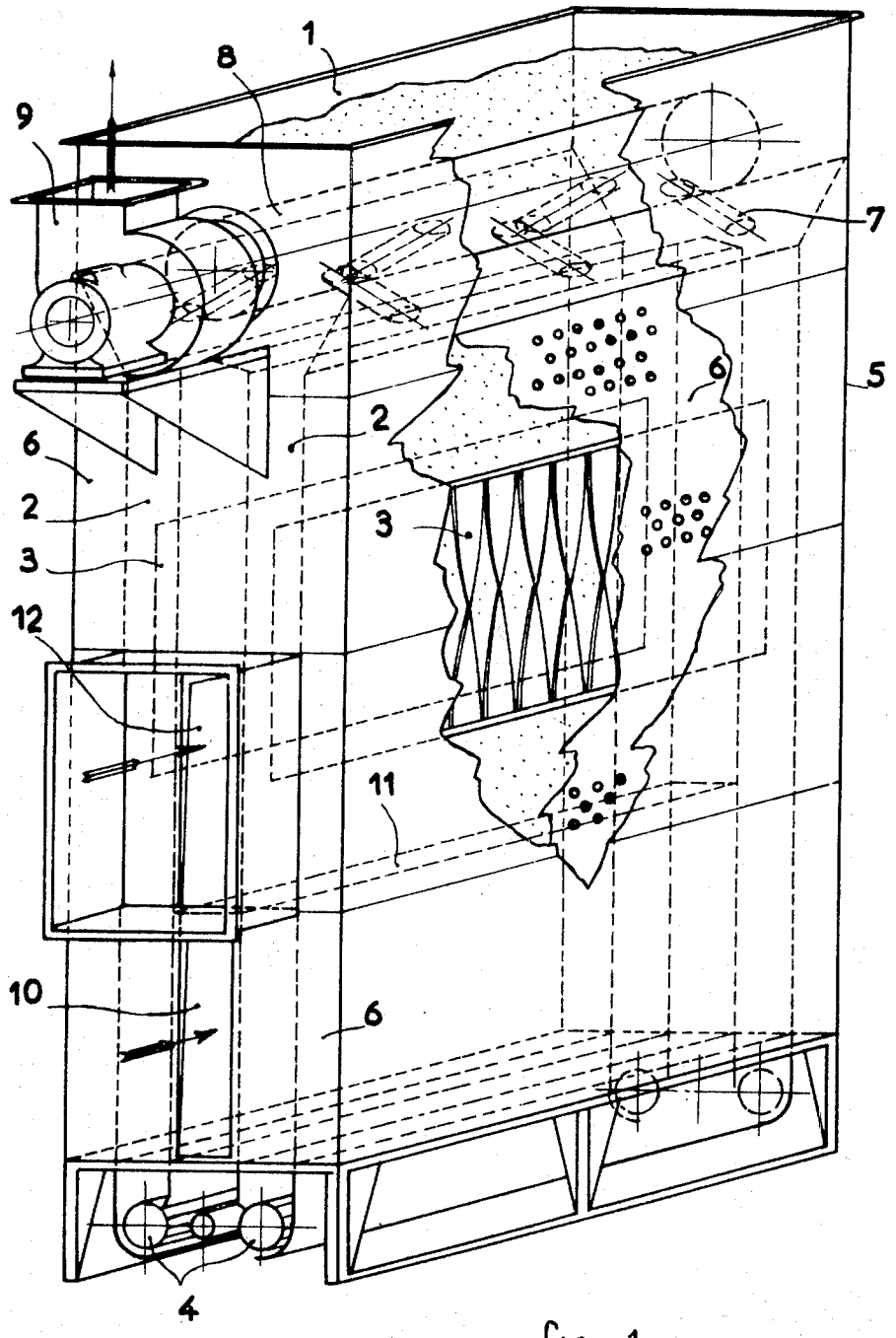


Fig. 1

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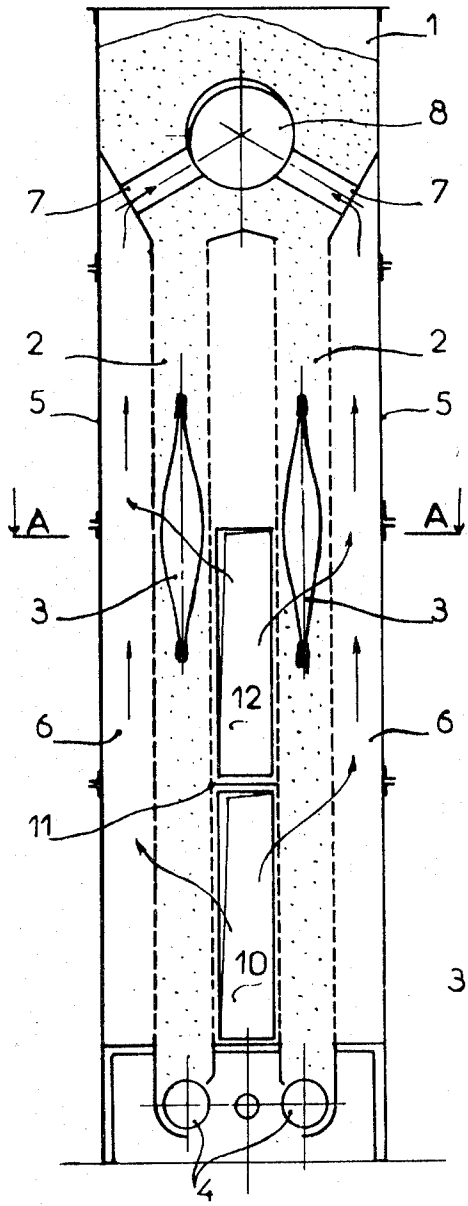


fig .2

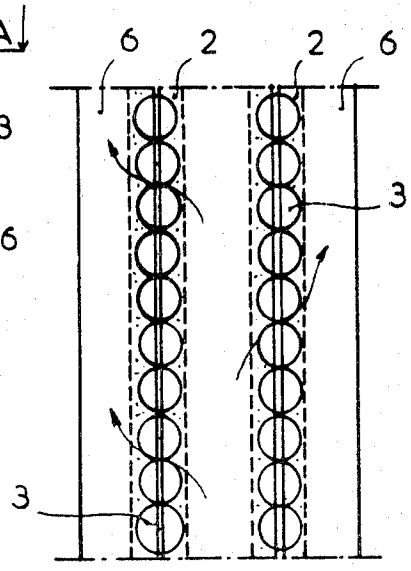


fig. 3

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GRAIN DRYING APPARATUS

The present invention relates to an apparatus for drying grain prior to stocking it in a silo, for example.

In all the known apparatus, whether static or continuous, drying of the grain is done by forcing hot air to flow through a layer of grain. Since such a layer offers a resistance to the passage of air, it is necessary to use a powerful fan. This causes turbulences which in turn cause the formation of neutral zones and of hot zones. In the first case, the excess humidity is not withdrawn from the grain and in the second case, the grain is grilled resulting in a lack of homogeneity in the drying of the grain.

The apparatus, in accordance with the invention, permits to overcome the above disadvantages by providing a single fan which causes a vacuum to be created around columns of grain falling under gravity. Hot and cold air are fed to the apparatus under normal pressure and sucked through the layer of grain in a regular and uniform manner.

The preferred embodiment of the apparatus, in accordance with the invention, comprises at its upper part a feeding box which feeds two vertical passageways through which the grain falls under gravity towards the lower part of the apparatus where dispensers regulate the flow of the grain towards stocking locations. The outside walls of the apparatus form air flow chambers with the walls of the passageways into which the grain flows. The above chambers communicate at the upper portion thereof with a manifold connected to a fan mounted directly on a wall of the apparatus. In the space between the two passageways are led hot air and cold air ducts providing the hot air necessary for drying the grain and the cold air necessary for cooling it in the two successive phases of the drying operation. An horizontal plate is placed between the two adjacent walls of the passageways to separate the hot and cold air zones. The passageways for the grain are made of perforated plates. A device is placed in each of the passageways at a predetermined height therein for axially inversing the flow of grain and so change the portion of the grain column which is exposed to the hot air flow during its fall towards the bottom part of the apparatus. A vacuum zone being created at the upper part of the air flow chambers, the hot air originating from the hot air duct flows through the grain towards the upper part of the air flow chambers. Similarly, the cold air originating from the cold air duct flows through the grain towards the upper part of the air flow chambers.

The invention will now be disclosed, by way of example, with reference to a preferred embodiment thereof and to the accompanying drawings in which :

FIG. 1 illustrates a perspective view of the apparatus, portions of the walls thereof being cut open to show certain details of construction;

FIG. 2 illustrates the apparatus in a longitudinal cross section; and

FIG. 3 illustrates a section view along line AA of FIG. 2 for illustrating the details of the grain flow inversers.

As illustrated in the drawings, the apparatus comprises at its upper part a feeding box 1 into which grain is fed and itself feeding two vertical passageways 2 in communication therewith and made of perforated plates. Inside each passageway and at a predetermined height thereof are located grain flow inversers 3, formed of a series of blades held at each end thereof by

means of a U-shaped bracket, which blades are twisted by 180° between the two brackets. The grain flow inversers are maintained in the passageways by means of brackets attached to the end walls of the apparatus. At the lower portion of the apparatus, the flow of the grain is regulated by means of dispensers 4. The apparatus comprises two lateral plates 5 forming the walls thereof and extending from the vertical walls of the feeding box 2. Such lateral walls 5 form with the outside walls of the passageways the air flow chambers 6, which chambers are connected by conduits 7 to a manifold 8 which is in turn connected to a fan 9. In the space between the two passageways is led, at the lower part of the apparatus, a cold air duct 10. An horizontal plate 11 limits the volume of cold air in the apparatus. Above such horizontal plate is led a hot air duct 12.

The drying of the grain is affected as follows:

The grain in the feeding box 1 falls under gravity in each passageway 2. The vibrations caused by the operation of the fan 9 which is mounted directly in the wall of the apparatus also help in the flow of the grain. While it is falling and approximately at mid-height of the hot air zone, the grain meets the grain flow inversers 3 the action which causes a separation and a turning around of the mass of grain in an helicoidal movement before such mass of grain leases the hot zone. In the lower portion of the apparatus, the grain is exposed to cold air for cooling the grain before it is directed towards stocking locations. The air flow through the mass of grain is caused by the vacuum created at the upper part of the air flow chambers 6 by fan 9 acting through conduit 7 leading to manifold 8. The hot air or the cold air, depending on the phases of operation, is sucked at normal pressure flows through the layers of grain in a regular and uniform fashion, thereby causing a perfect and homogeneous drying of the grain.

It is to be understood that the invention is not limited to the embodiment disclosed above but, on the contrary, embodies all the possible variations of such embodiment, particularly in the form, dimension, disposition of the elements thereof, falling within the ambit of the appended claims.

For example, in accordance with the invention, the drying assembly may be made of a number of apparatus as disclosed above disposed in parallel wherein each of the manifolds thereof are interconnected to form a single main manifold.

The apparatus, in accordance with the invention, apart from being very efficient, provides a saving in the consumption of power and in maintenance because it uses a single fan. It may be used in all cases when a good drying operation is required for the preservation of grain to be stored.

Applications which may be particularly interesting are those relating to flour-mills and to co-operative ensilage.

I claim :

1. An apparatus for drying grain in a continuous operation comprising an upper feeding box into which grain is fed, a vertical passageway in communication with said feeding box and through which grain falls under gravity, cold and hot air ducts located on one side of said passageway and in communication therewith, an air flow chamber located on the other side of said passageway and in communication therewith, a manifold connected to said air flow chamber at the upper part thereof, a fan connected to said manifold for

creating a vacuum in the upper part of said chamber thereby sucking cold and hot air upwardly through the grain as the grain falls by gravity, and a series of blades twisted by 180° positioned in said passageway for axially inversing the flow of grain and so change the portion of the grain flow exposed to the hot air during its fall towards the bottom part of the apparatus.

2. An apparatus as defined in claim **1,** wherein there are two passageways located one on each side of the central longitudinal axis of the apparatus.

3. An apparatus as defined in claim **2,** wherein the cold and hot air ducts are located between the two passageways and are separated by an horizontal partition,

the hot air duct being located above the cold air duct.

4. An apparatus as defined in claim **1,** further comprising U-shaped brackets encompassing the respective ends of all the blades for securing the blades to the apparatus parallel to the grain flow.

5. An apparatus as defined in claim **4,** wherein said blades are positioned about the center of the hot air zone.

6. A drying assembly comprising plural apparatus as defined in claim **1** connected in parallel and wherein the manifolds of all the apparatus are interconnected to form a main manifold.

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