

Method and equipment for uniform drying of agricultural plant seeds

Petru CÂRLESCU, Vlad ARSENOAIA, Ioan ȚENU, Radu ROȘCA

1"Ion Ionescu de la Brad" University of Agricultural Sciences and Veterinary Medicine of Iasi, Faculty of Agriculture, 3 Mihail Sadoveanu Alley;700490 Iași, România

INTRODUCTION

The invention relates to a process and apparatus for convective and uniform drying of agricultural plant seeds. Convective dryers are widely used in various fields, such as drying fruits, vegetables, grain seeds, pasta, etc. Seeds of agricultural plants, which are subjected to the technological drying operation, behave differently according to the structure and their composition. Therefore, some of them do not undergo aggressive drying conditions characterized by uneven temperatures and velocity of the drying agent when passing through the product layer to be dried. Several variants of dryers have been designed so far, such as: dryers with intermediate heating of the drying agent; dryers with partial recirculation of the drying agent; closed circuit dryers for the drying agent and coolers with combined technical solutions. All these dryers do not solve the problem of uniformity of drying agent flow. For example, vertical dryers in the world, such as perforated concentric cylinders (dried seeds are moving through the space generated by the two concentric bodies), drying is more intense towards the end of the mixing chamber of the drying agent. In order to overcome this drawback, a process and apparatus for uniformizing the drying/cooling agent parameters disposed above/below the burner (heat exchanger) inside the perforated cylinder, of the type with truncated plates based on the Coanda effect, has been designed and allows the distribution uniform heat/cold air in the product mass to be dried (Figure 1). **Patent application No. 132273 A2/2017.**

DESCRIPTION

The purpose of the invention is to solve the uniform drying/cooling of the product layer in the dryer by designing a process and apparatus to allow the flow of the fluid to be uniform. According to the invention, the process consists in uniformly distributing the drying/cooling agent throughout the product mass by creating a constant and equal velocity profile in each circular section of the seed bed to be dried.

According to the invention, the apparatus is a metallic structure consisting of a concentric concentric cone with a large flat base and a deflector, and a small base having decreasing diameters in the direction of flow of the drying agent to the last cone for complete routing of the drying agent.

The number of cone trunks, the height of each, the distance between them, the diameters of the small bases, the deflector diameters are correlated with the height of the drying/cooling columns, the thickness of the drying layer and the drying velocity of the drying agent.

The operation of the apparatus according to the invention is as follows:

- Feed (I) with seeds takes place on the upper part through the feed chute (1);
- The seeds move from top to bottom through the drying column (8);
- Uniform drying (II) is carried out on the conical trunks (3) and cone (2) with deflectors;
- The seed passes through the baffles (4) where the rupture takes place, descends to the resting zone (III), followed by the uniform cooling (IV) and the outlet (V) through the trough (12).

The drying agent preparation group consists of the axial fan (6) and the burner (5).

The drying column (8) is made of a metallic construction incorporating two concentrically positioned cylinders made of perforated stainless steel panels of different diameters (7) and (9).

By applying the invention the following advantages are obtained:

- uniformization of the drying process of agricultural plant seeds;
- reducing energy consumption for the drying process;
- reducing the drying time;
- improving the quality of seed drying;
- reducing the construction costs of a dryer;
- economy of building materials;
- reduce the length of the drying column or dryer size, as the drying is carried out uniformly. In existing dryers where the inside of the perforated cylinder is empty, drying occurs only at the end of the drilled drum as outlined above.

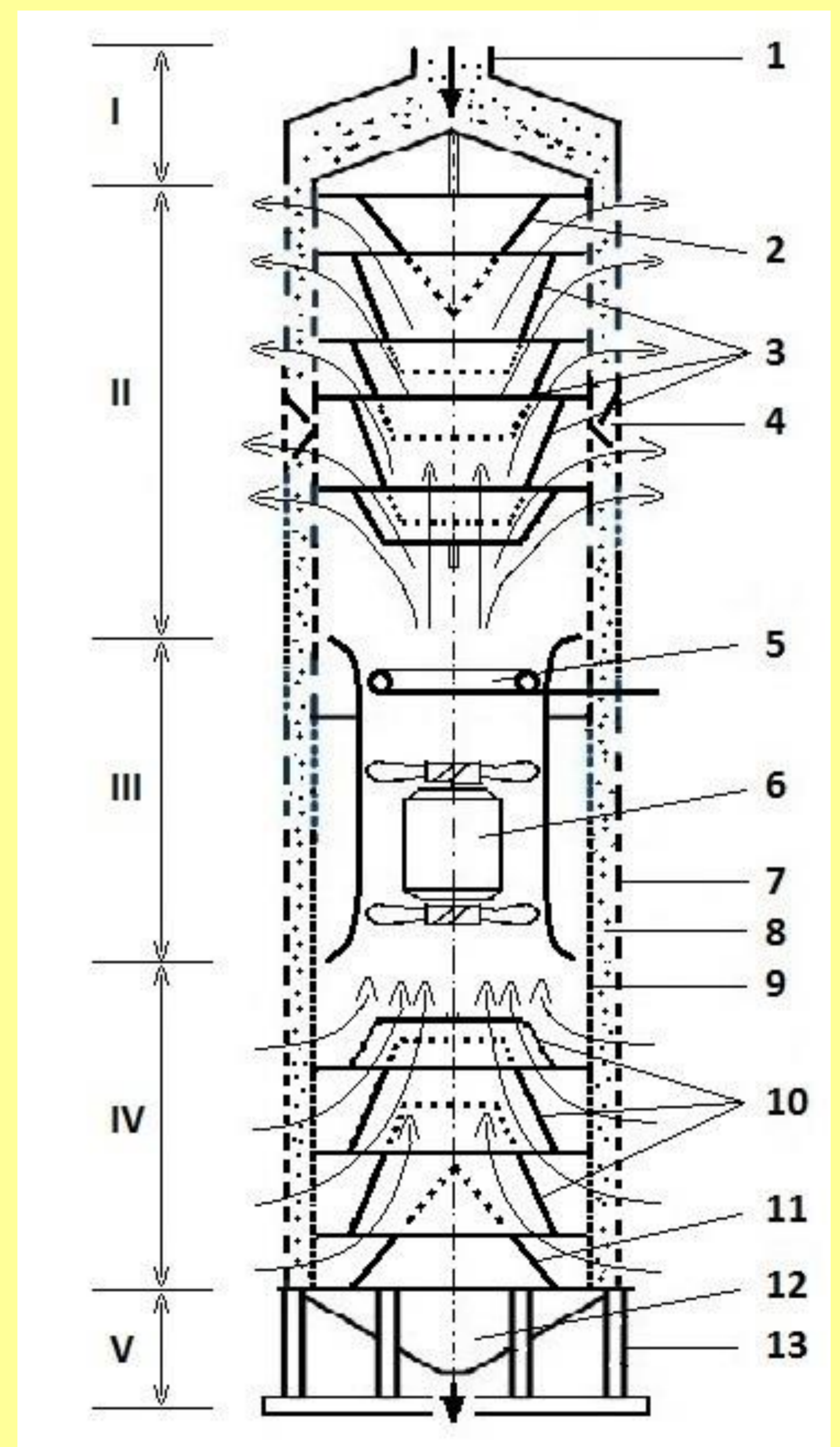


Figure 1. Scheme of dryer for uniform distribution of the drying/cooling agent

CONCLUSIONS

- By using the apparatus of the present invention, energy consumption per unit dry product is reduced by 6-10% and the drying time decreases by 10-15%.

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