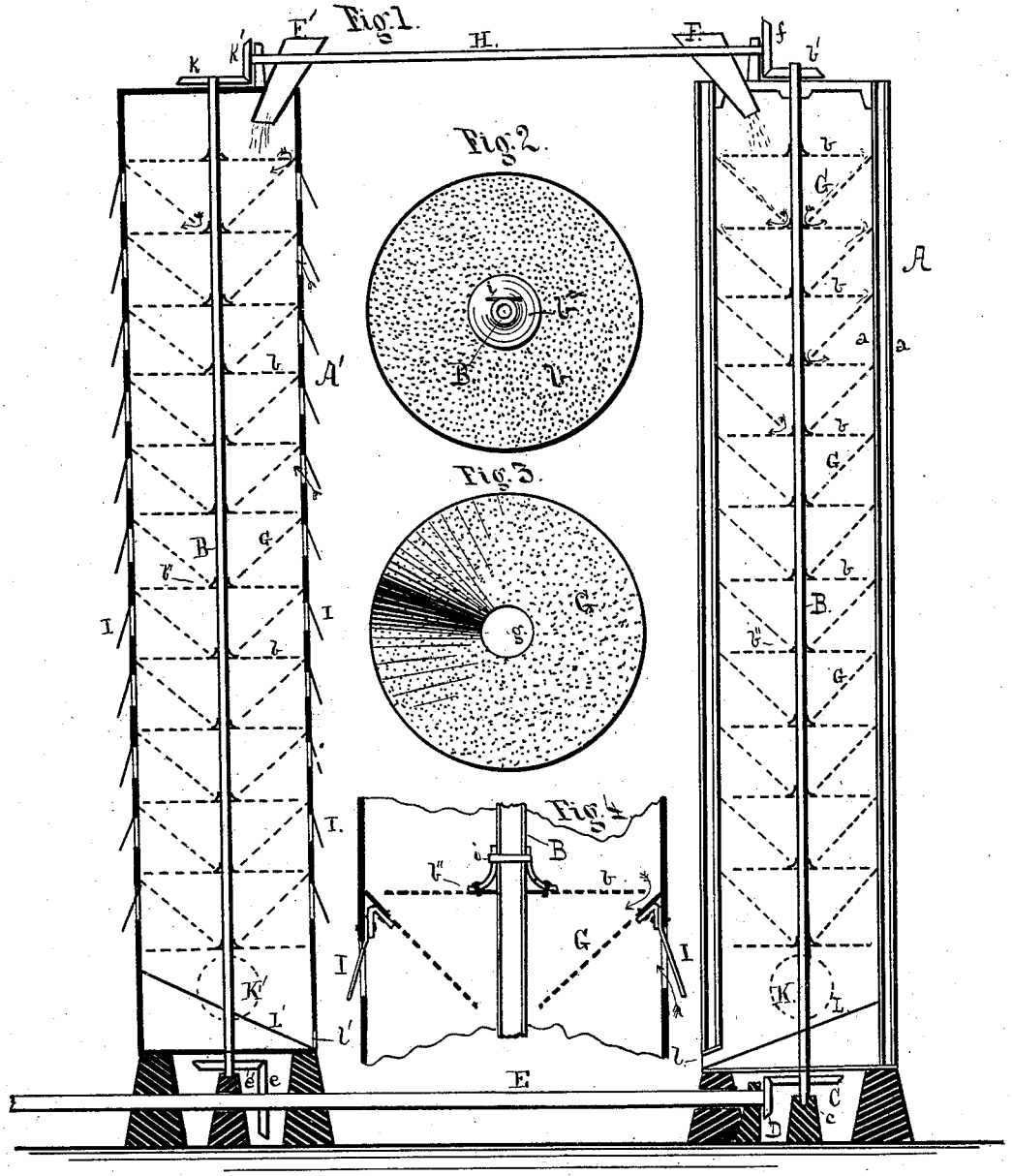
J. G. ROBERTS & S. E. WORRELL.

Machine for Drying Grain, &c.

No. 211,432. Patented Jan. 14, 1879.

Fig. 1.



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IMPROVEMENT IN MACHINES FOR DRYING GRAIN, &c.

Specification forming part of Letters Patent No. **211,432**, dated January 14, 1879; application filed October 8, 1878.

To all whom it may concern:

Be it known that we, JOHN G. ROBERTS, of Springfield, in the county of Sangamon and State of Illinois, and STANLEY E. WORRELL, of Hannibal, in the county of Marion and State of Missouri, have invented certain new and useful Improvements in Machines for Drying Grain, &c.; and we hereby declare the same to be fully, clearly, and exactly described as follows, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical sectional view of the device; and Figs. 2, 3, and 4, enlarged views, in detail, of certain parts of the device, similar letters of reference indicating corresponding parts.

This invention relates to apparatus for drying grain or similar substances; and it consists in certain details of construction and combinations of parts, as hereinafter described and claimed.

Heretofore the drying of grain or malt has generally been effected by submitting the material to heat in pans, or by passing it over heated plates or through hollow conveyers, and finally spreading it out to cool. These methods, however, do not thoroughly and evenly dry the material, and frequently injure or deteriorate the product, besides being in themselves expensive, owing to the enormous loss of heat by radiation. In the device hereinafter described these difficulties are obviated and certain advantages secured, which will at once be apparent.

In the accompanying drawings, A represents a tower, preferably cylindrical in cross-section, and having double walls *a a* to obstruct the passage of heat. In the center of the tower is mounted a tubular shaft, B, having its bearing in a block, *c*, and provided respectively at its upper and lower ends with gear-wheels *b'* C. Upon the shaft B are mounted at intervals a number of flat perforated disks, *b b*, being firmly secured in a horizontal position by means of bell-shaped castings *b''*, which are firmly bolted to the disks and are attached to the shaft by means of keys *i*.

Within the tower A are a number of funnel-shaped hoppers, G, open at their apices and finely perforated, as shown. One of these hoppers is bolted to the interior walls of the tower just under each of the disks *b*, as fully illustrated in detail in Fig. 4.

At the upper end of the tower a suitable inlet-chute, F, is provided.

The tower A' is furnished internally with a shaft and system of disks and hoppers similar in all respects to those above described; but the tower itself differs from the tower A in that its walls are perforated, as shown, the openings being provided on the outside with overlapping shutters I I, the function of which will be hereinafter referred to. The walls of the tower A' are preferably made of metal in order to afford increased facility for conducting heat.

At the bottom of either tower is an inclined floor, L L', and outlet-chute *l l'*. K K' represent pipes for introducing hot or cold air into the towers. Upon a main driving-shaft, E, are mounted gear-wheels *e* D, which, meshing with similar wheels *e'* C, communicate motion to the shafts within the towers, at the top of which a similar series, *k k' f b'*, are arranged to drive the shaft H. The latter is the elevator-shaft, and is furnished with a series of buckets, (not shown in the drawings,) for carrying up the material discharged at *l*, and delivering it into the hopper F'.

The operation of the device is as follows: Motion being communicated to the shaft E, and a current of hot air being forced into the tower A through the pipe K, the grain or other material to be dried is delivered through the hopper F, whence it falls upon the uppermost disk, *b*. The centrifugal force caused by the rotation of the disk causes the material delivered thereupon to traverse its upper surface evenly and regularly to the circumference, being all the time subjected to the currents of hot air rising through the perforations in the disk. Upon reaching the circumference of the latter the material falls upon the uppermost hopper G, and is delivered by it upon the next disk at a point near the shaft. The material thus traverses the tower, being constantly agitated and subjected to currents of hot air rising through the perforations in the disks and hoppers, and finally finds its exit at *l*. Here it falls into a suitable bin, whence it

is raised to the top of the tower A′, and is delivered into the hopper F′. The material traverses this tower in a manner similar to that described, except that it is subjected to currents of cold air, or air of the natural temperature, entering through the lateral openings. The grain being delivered hot into the tower A′ causes a natural upward draft of air, which, being hotter than the outside air, will not descend under the overhanging shutters I, through which latter the outer air rushes to take the place of the ascending current.

If desired, artificially-cooled air may be forced through the pipe K′. The material finally finds exit at *l′* thoroughly dried, and at a temperature which will admit of its immediate storage or shipment.

It will be observed that the rate of descent of the material may be readily regulated by altering the speed of rotation of the disks, as may be desired.

Having thus described our invention, what we claim as new, and desire to secure by Letters Patent, is—

1. In a device for drying and cooling grain, a pair of towers having their walls built, respectively, as shown—the one to conduce to and the other to obstruct the passage of heat—and mechanism, substantially as specified, for causing the material to gradually traverse such towers while subjected to currents of cooled or heated air, as set forth.

2. In combination with the tower A, the tower A′, constructed as described, and having series of rotating perforated horizontal disks and stationary hoppers, substantially as specified.

3. The tower A′, having overlapping shutters I, in combination with the hoppers G and rotating horizontal disks, as described.

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