

2 Sheets—Sheet 1.

No. 507,659.

Patented Oct. 31, 1893.

Fig:1.

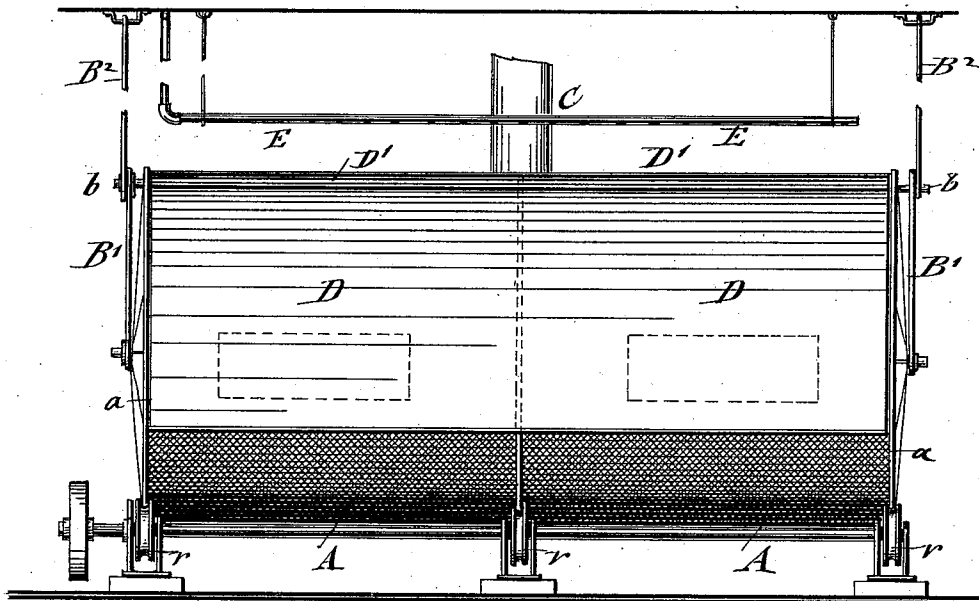
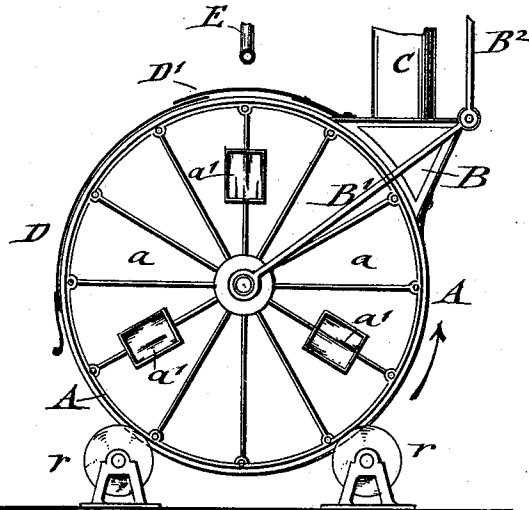


Fig: 2.



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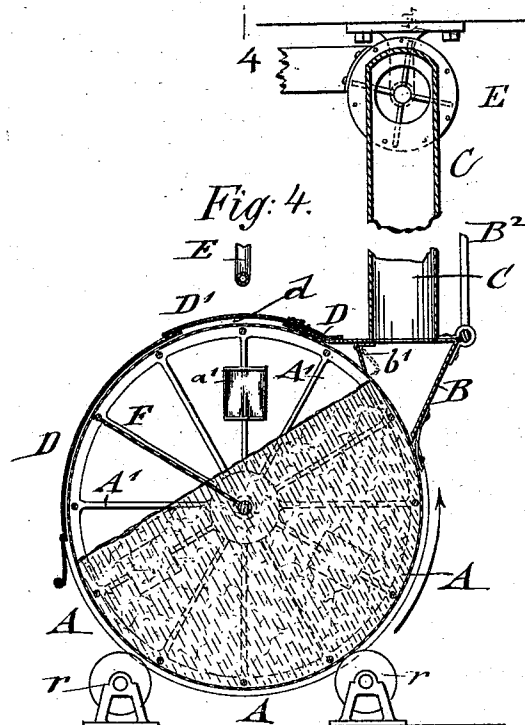
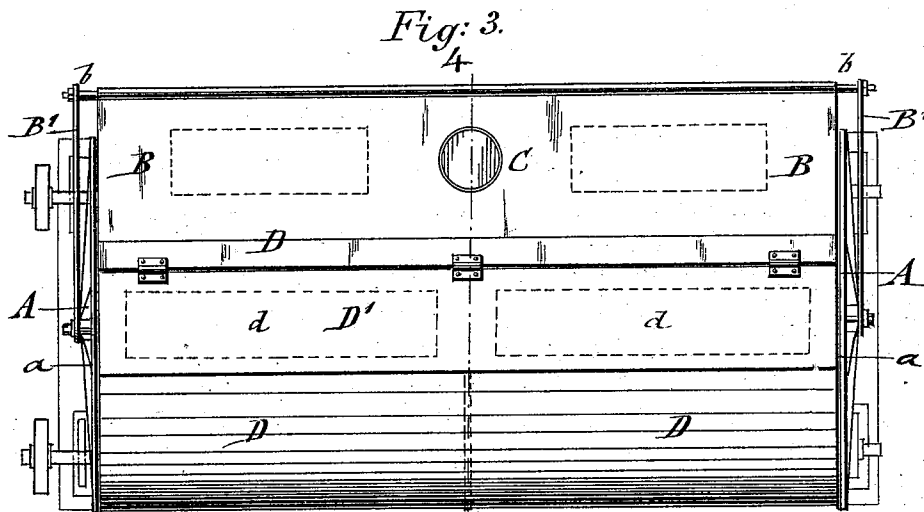
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PNEUMATIC MALTING.

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PNEUMATIC MALTING.

SPECIFICATION forming part of Letters Patent No. 507,659, dated October 31, 1893.

Application filed December 31, 1892. Serial No. 456,884. (No model.)

To all whom it may concern:

Be it known that I, GOTTFRIED KNOCHE, a citizen of the Empire of Germany, and a resident of New York city, in the county and State of New York, have invented certain new and useful Improvements in Pneumatic Malting, of which the following is a specification.

This invention relates to certain improvements in pneumatic malting in which the germinating of the moistened grain takes place in a drum which is slowly and continuously rotated on its axis so that the air is drawn over the surface of the barley in the drum and gradually the entire body of barley subjected to the action of the air current; and the invention consists first of a process of pneumatic malting by subjecting the grain while it is continuously rotated to the action of an air current that is drawn through the surface-layers of the grain over and parallel with the surface of the grain.

The invention consists, secondly, of a pneumatic malting apparatus, the novel features of which will be fully described hereinafter and finally pointed out in the claims.

In most of the pneumatic malting apparatuses heretofore in use, the air is forced from the center in radial direction through the body of the grain, while according to my invention the air-current is drawn continuously over and through the surface-layers of the grain. As the surface-layers of grain are shifted continuously by the rotating of the body of the grain around the axis of the rotary drum in which the germinating takes place, the air-current strikes new layers of grain. The course of the air-current parallel to the surface of the grain has the advantage that the air acts in its initial condition on the grain without being changed by passing through the grain, while in the constructions heretofore in use, the air-current while passing through the body of the grain is changed as regards temperature and moisture, as it touches the surface of the grain in a direction nearly at right angles to it and exerts no effective influence on the surface layers.

For carrying out my invention one form of pneumatic malting apparatus is shown in the accompanying drawings, in which—

Figure 1, represents a front-elevation;

Fig. 2, a side-elevation of the same; Fig. 3, a plan-view, and Fig. 4, a vertical transverse section of my improved malting apparatus taken on line 4 4 Fig. 3.

Similar letters of reference indicate corresponding parts.

Referring to the drawings A represents a drum which is made with solid heads and of a cylindrical body of perforated sheet-metal or strong wire gauze. The drum A is rotated on its axis by any suitable power-transmitting mechanism. The heads *a* of the drum A are provided with small windows *a'*, preferably three, by which the condition of the grain in the drum can be readily inspected and samples removed from the drum.

The drum A is supported on grooved rollers *r* for the projecting rims of the heads and of an intermediate reinforcing spider-frame A' shown in Fig. 4. The drum is provided with suitable openings in its circumference which openings are closed by hinged doors, so that the drum can be readily charged with grain and the germinated grain be discharged from the same.

To the ends of the shaft of the drum A are loosely applied radial arms B', which are connected to pivots *b b* at the apex of a triangular box B which is closed at the outer sides and open at the inner side toward the drum. The drum B is suspended by rods B² from the ceiling or other suitable point of support, said rods being also connected to the pivots *b b*. The center of the box B is connected by a flue C with a suction-fan E or other suitable suction-apparatus. A flexible cover D is attached to the upper part of the box B and extended over top and front parts of the drum A, so as to close, together with the box B, that portion of the drum which is located above the grain in the drum.

The flexible cover D is made of a suitable air and water-tight material and is drawn into the openings of the drum by the suction of the fan, so as to tightly close the perforated drum as far as it extends over the same.

The top part of the cover D is provided with openings *d* and with a hinged auxiliary portion D' that closes the openings in the cover, so as to permit, when opening the auxiliary cover D', the sprinkling of water over the contents of the drum. This is accom-

plished by a perforated water-pipe E that is suspended vertically above the axis of the drum, as shown clearly in Figs. 2, 3 and 4.

The lower end of the cover D is preferably weighted by means of a suitable rod, so that the cover is retained in proper position on the drum.

To the top plate of the box B is hinged a downwardly-inclined lid *b'*, that serves to reduce the width of the open side of the box, so that the area of the draft-opening above the grain in the box corresponds to some extent to the area of the suction-flue C and produces thereby a uniform current of air through the surface-layers of grain in the drum.

My improved malting apparatus is used as follows: The grain to be malted is charged into the drum by placing the doors vertically below the sprinkling pipe and then opening the ends to my cover D' so that the required quantity of grain can be supplied. The required quantity of water is then supplied by the sprinkling pipe. The surplus water is passed off through the bottom of the drum. The auxiliary cover D is then closed and the drum rotated slowly in the direction of the arrow shown in Figs. 1 and 2. By rotating the grain in the drum the entire body of the same shifts continuously, the surface assuming an inclination as shown in Figs. 2 and 4. Simultaneously with the slowly-rotating motion of the drum, a current of air is drawn over the surface-layers of the grain by the suction-fan, the opening above the inclined surface of the grain being made only large enough so that the air is compelled to pass below the cover D over and through the surface-layers of the grain toward the box B and suction-flue C. In this manner the air enters into the drum at the lower end of the cover, passes parallel with the surface of the grain and permeates the surface-layers of the same, so as to produce the proper ventilation of these layers while the germinating of the same proceeds. A perforated radial partition F is arranged in the drum shown in Fig. 4, which partition serves for turning over every particle of grain while the drum passes through one entire rotation on its axis F. The rotating of the drum and the ventilating of the surface-layers of the grain are continued until the entire body of grain has evenly germinated. After the germination of the grain is completed the same may be dried by passing heated air in the same manner over the surface of the grain. The air supplied to the germinating drum may be either cool, or moistened, or slightly heated or compressed as required by the temperature of the atmosphere and the different changes of condition of the grain during the germinating operation. The quantity of air drawn through the drum may be regulated by opening the inclined lid *b'* more or less in the box B and by changing the position of the box B higher or lower relatively to the germinating drum A. When the germinating and drying of the

grain are completed the same is discharged and a new charge of grain placed in the drum, which is moistened and treated as before described.

Having thus described my invention, I claim as new and desire to secure by Letters Patent—

1. The process herein described of germinating and drying grain, which consists in subjecting the body of the grain to a rotary motion and at the same time conducting an air-current in a direction parallel with and through the continually changing surface-layers of the grain, so as to ventilate the surface-layers only, while the remaining part of the grain is not acted upon by the air-current, substantially as set forth.

2. The pneumatic malting apparatus herein described which is composed of a rotary drum having closed heads and a perforated body, an air-tight flexible cover extending over the top and front parts of the drum, a suction-box located adjacent to the drum at the upper end of the flexible cover, said box being connected with a suction-fan, so that a current of air is drawn over and through the surface layers of the grain in the drum, substantially as set forth.

3. A pneumatic malting apparatus, consisting of a rotary cylindrical drum having closed heads and a perforated body, a suction-box open at that side adjacent to the drum and provided with an adjustable lid so as to increase or decrease the open part of the drum, a suction-fan connected with said box and an air-tight flexible cover extending from the upper edge of the suction-box over the top and front parts of the rotary drum, substantially as set forth.

4. A pneumatic malting apparatus, consisting of a rotary perforated drum, a suction-box, supported by radial arms on the ends of the shaft of the drum, suspension rods for said box, a suction-fan connected with the top part of the suction box, an air tight cover extending over the top and front parts of the drum, said cover being provided with openings and a hinged auxiliary cover extending over said openings located below the sprinkling pipe, substantially as set forth.

5. A pneumatic malting apparatus consisting of a rotary perforated drum provided with closed heads and a fixed radial perforated partition, a suction-box open at the side adjacent to the drum, a suction fan connected with the suction box and an air tight flexible cover extending from the upper edge of the suction-box over the top and front parts of the drum, substantially as set forth.

In testimony that I claim the foregoing as my invention I have signed my name in presence of two subscribing witnesses.

GOTTFRIED KNOCHE.

Witnesses:

PAUL GOEPEL,
CHARLES SCHROEDER.