J. G. & M. WHITE.

PROCESS FOR DRYING MALT.

No. 184,942. Patented Nov. 28, 1876.

Fig. 1.

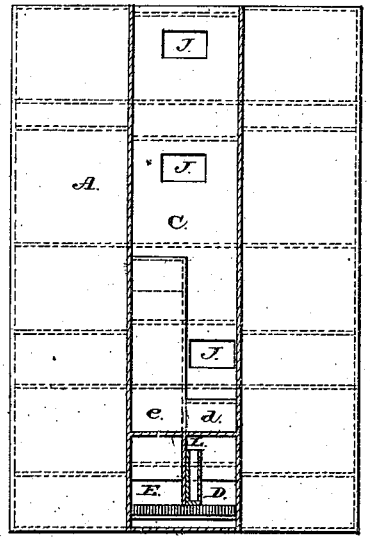


Fig. 2.

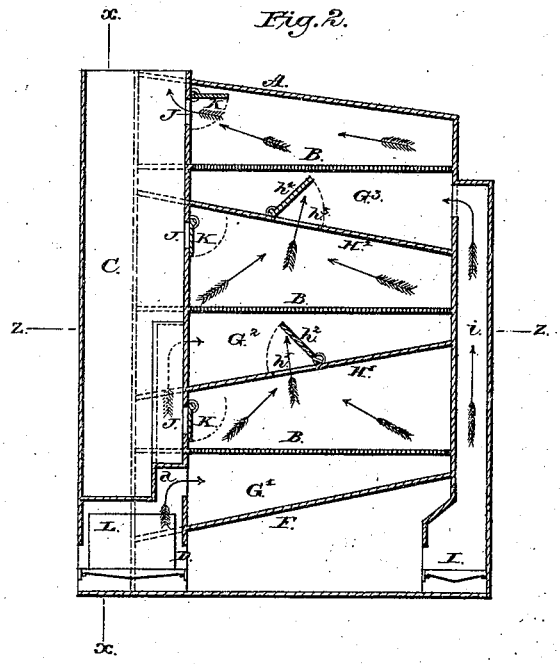
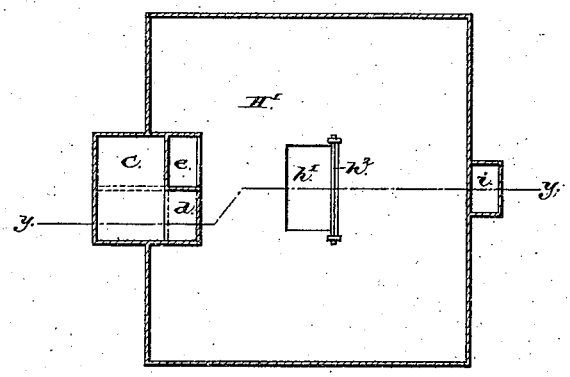


Fig. 3.



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IMPROVEMENT IN PROCESSES FOR DRYING MALT.

Specification forming part of Letters Patent No. **184,942**, dated November 28, 1876; application filed January 18, 1876.

To all whom it may concern:

Be it known that we, JOHN G. WHITE, of the city and county of Albany, and State of New York, and MATTHEW WHITE, of the city, county, and State of New York, have invented a new and useful Process for Drying Malt, of which the following is a full and exact description.

Our invention consists in subjecting the saturated malt, in which the process of germination has been carried to the degree required for the purposes of brewing, to the direct action of currents of superheated steam, while in a quiescent state upon perforated kiln-floors.

The object of our invention is to arrest the process of germination, and to effect the drying of the malt and the conversion of its starch into sugar, without injury to its saccharine matter, in a more certain, expeditious, and perfect manner than has been accomplished heretofore, to increase the quantity of malt produced from a given quantity of grain, and to improve the quality of the malt by preserving its sugar uninjured.

In the accompanying drawing, which forms a part of this specification, Figure 1 is a vertical section of our improved kiln at the line *x x;* Fig. 2, a vertical section at the line *y y;* and Fig. 3, a horizontal section at the line *z z.*

As shown in the drawing, A represents a kiln having three drying-floors arranged in successive stories. It may be constructed of any material suitable for the purpose, and of any convenient or desirable form and size. B, the drying-floors made of perforated sheet-iron, earthen tiles, or any other kind of perforate floor suitable for the purpose; C, a ventilating-flue, the lower part of which is used for the purpose of forming the furnaces D and E, and their respective flues *d* and *e*; F, a ceiling, placed beneath the lower drying-floor for the purpose of forming the heat-chamber G^1, into which the heated air from the furnace D is conveyed through the flue *d;* H^1, a ceiling interposed between the first and second drying-floors for the purpose of forming the heat-chamber G^2, into which the heated air from the furnace E is conveyed through the flue *e.* In the ceiling H^1 one or more openings, h^1, are made for forming a communication between the lower drying-room and the heat-chamber G^2, which openings are provided with the dampers h^2 for controlling such communication. H^2, a ceiling interposed between the second and third drying-floors for forming the heat-chamber G^3, into which the heated air from the furnace I is conveyed through the flue *i.* The ceiling H^2 is also provided with one or more openings, h^3, for forming a communication between the second drying-room and the heat-chamber G^3, and which are controlled by the dampers h^4. One or more openings, J, are made into the ventilating-flue C, near the ceiling of each drying-room, each one of which is governed by its damper K; L, a steam-generating tank, placed in the furnace D for supplying steam to the heat-chamber G^1.

By our process the drying is effected in the following manner: The wet malt, &c., is spread upon the perforated drying-floors from six to ten inches deep. The steam from the generator L passes up the flue *d* into the heat-chamber G^1, and by commingling with the heated air from the furnace D becomes superheated, and in this condition passes through the perforated floor B and permeates through the wet grain, evaporating in its passage through it the moisture contained therein, which rises in the form of saturated steam, the opening J of the first drying-room being closed by its damper K, and the opening h^1 presenting the only escape for this steam. It passes through this opening into the heat-chamber G^2, where it takes up the heated air from the furnace E, and again becomes superheated, and passes through the second perforated floor, evaporating the moisture in the grain on that floor; and this operation is, in a like manner, continued and repeated from story to story until the upper drying-room is reached. From the grain on this floor the saturated steam is allowed to escape out of the opening J into the ventilating-flue C—from thence into the atmosphere.

When it is unnecessary to use all of the drying-rooms, any of the upper rooms may be thrown out of use by closing the dampers over the openings in the ceiling of the upper room to be used, and by raising the damper K from

the outlet J of that room, thereby permitting the steam to escape and terminating the operation at that room.

It is manifest that these kilns can be constructed with a greater number of drying-rooms than the one herein shown and described; and we find by experience that in the upper drying-rooms, where the steam is used after many repeated reheatings, the drying is effected with the greatest rapidity.

When this process is used for drying malt the time, fuel, and labor required, as compared with the common and well-known method, where the steam is allowed to escape into the atmosphere from each drying-floor, is reduced nearly fifty per cent., and, in addition to this saving, the malt, by being kept from contact with the dry parching heat commonly used, is thoroughly dried without having the saccharine matter contained in the grain injured or destroyed. The danger of discoloration is entirely avoided, and the grain, instead of being shriveled up, is full and plump. From this it is manifest that both the quantity and quality of the malt is enhanced.

Instead of superheating the steam in the manner herein described, our invention also includes the use for this purpose of superheated steam generated in a boiler, either mixed or unmixed with the saturated steam evolved from the wet grain. Our invention also contemplates supplying an additional quantity of steam generated in a boiler independent of the furnaces of the kilns, the steam from which may be conveyed into the heat-chambers by means of pipes having suitable valves to govern the supply to each chamber.

We claim as our invention—

1. The process for drying malt and arresting its germination, as herein set forth, consisting of subjecting the saturated malt while in a quiescent state upon a perforated kiln-floor, to the direct action of currents of superheated steam, in the manner and for the purpose herein specified.

2. The kiln A, having chambers beneath its perforated floors, in combination with means for supplying saturated steam and heated air for producing superheated steam, in the manner and for the purpose herein specified.

3. The kiln A, having chambers beneath its perforated floors for producing superheated steam in the manner herein described, in combination with one or more furnaces for supplying said chambers with heated air, in the manner and for the purpose herein specified.

4. The combination of the lower chamber G^1 of the kiln A, with a steam generator, and one or more furnaces for supplying said chamber with saturated steam and heated air for producing superheated steam in said chamber, in the manner and for the purpose herein specified.

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