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R. L. DOWNTON.

APPARATUS FOR TREATING FLOUR.

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Fig. I.

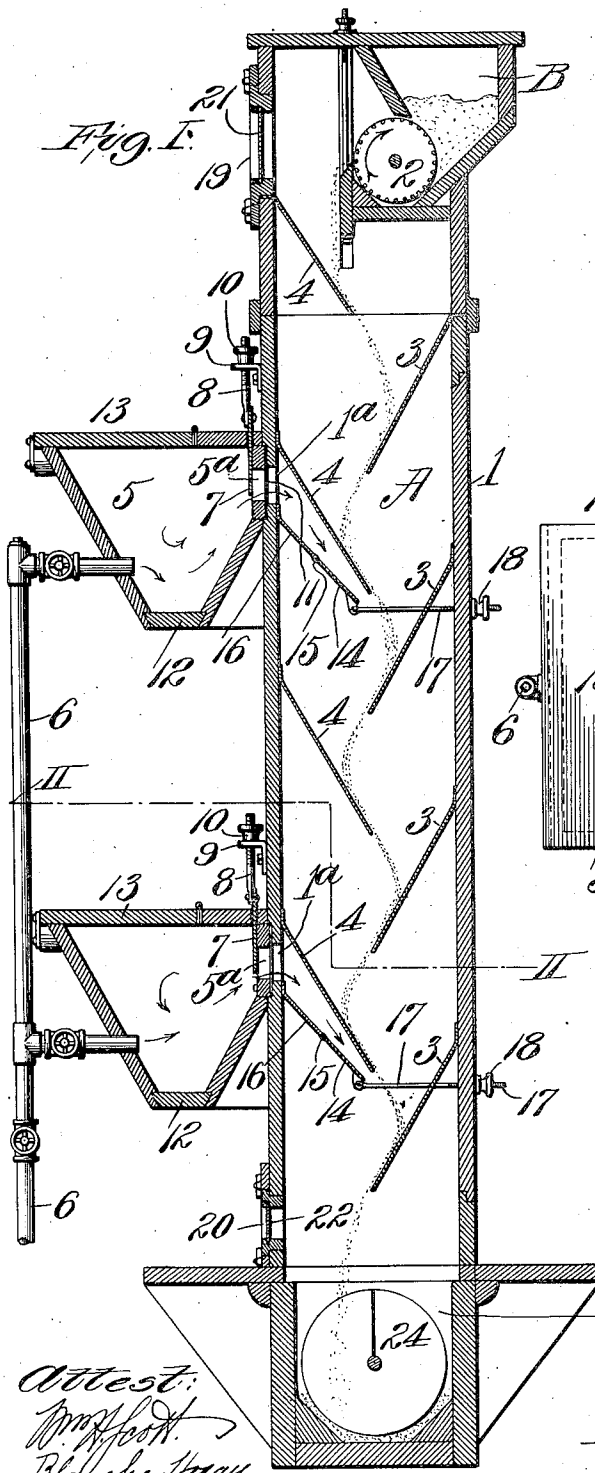
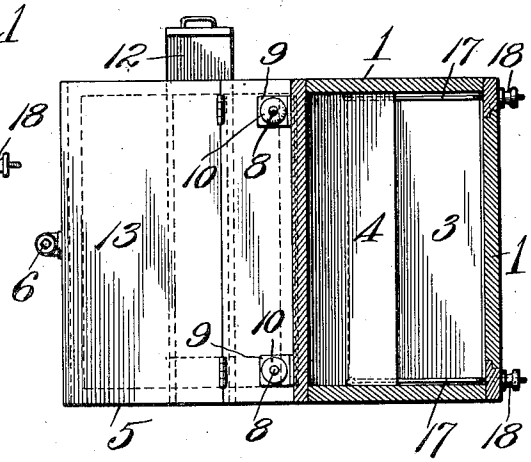


Fig. II.



Attest:
W. M. Scott
Blakeslee Hyan

Inventor:
R. L. Downton,
by Wright Bros
Attys

UNITED STATES PATENT OFFICE.

ROBERT L. DOWNTON, OF MAPLEWOOD, MISSOURI, ASSIGNOR OF ONE-HALF TO JAMES W. S. DOWNTON, OF MAPLEWOOD, MISSOURI.

APPARATUS FOR TREATING FLOUR.

No. 833,708. Specification of Letters Patent. Patented Oct. 16, 1906.

Application filed March 2, 1906. Serial No. 303,772.

To all whom it may concern:

Be it known that I, ROBERT L. DOWNTON, a subject of the King of Great Britain, residing at Maplewood, in the county of St. Louis, and State of Missouri, have invented certain new and useful Improvements in Apparatus for Treating Flour, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to an apparatus for use in whitening and aging flour by subjecting it to the action of a chemical gas without any deterioration of the flour.

It is customary at the present time in treating flour to pass into a semi-inclosed chamber a gas known as "peroxid of nitrogen" or "nascent oxygen," which has the effect of bleaching or whitening and aging it. I find that when this gas enters the flour in volume directly from a pipe or tube the flour close to the point of entry of the concentrated gas is subjected to a stronger action than the flour at a greater distance, with resultant deterioration of the flour, owing to an uneven bleaching action taking place. To avoid this action, I cause the flour to fall in a thin sheet within a treating-chamber and cause the gas to enter said chamber in a thin sheet to meet and thoroughly mingle with every particle of the flour while it is falling in the chamber. I provide one or more gas-receiving chambers, into which the gas is first injected and from which it is permitted by a controllable gate or valve to pass into the chamber through which the flour passes to produce the bleaching or whitening and aging effect. I also provide for the flour moving in a zigzag or indirect descent, whereby as it moves from one way to another in passing through the chamber in which it is treated better opportunity for the gas to mingle with the flour is afforded.

It will be readily seen that by spreading the flour into a thin sheet and by spreading the gas into a corresponding thin sheet opposite the flour to be treated a more uniform action will accrue and a quicker bleaching action will result, as well as a controllable one. This operation may be readily rendered visible to the operator at any and all of the ways from which the flour falls. The tumbling of the flour from the ways has the effect of thoroughly mixing the gas with the flour, and this is done in a more simple manner than when a mechanical agency is used inside the bleaching-chamber to coöperate with gravity.

Figure I is a vertical cross-section taken through my apparatus. Fig. II is a horizontal section taken on irregular line II II, Fig. I.

1 designates the casing of my apparatus, which contains a flour-receiving chamber A and at the upper end of which is a flour-feed chamber B, into which the flour is introduced. The flour is fed from the chamber B into the chamber A by a rotary feeder 2 or by any other suitable form of feeder. In the receiving-chamber A is a series of inclined flights 3, located one below another and extending from one of the side walls of the casing 1. Opposing the flights 3 are inclined flights 4, which are diagonally disposed relative to the flights 3 and so located that flour flowing from one of the flights 3 will be discharged onto the facing flights 4, to be discharged therefrom onto the next lowermost flight 3 and continue a similar course throughout the two series of flights. It will be seen that the flour is confined within the chamber A between the casing-walls and that while it is descending through said chamber it will constantly move in a zigzag or indirect course, whereby its flow is retarded and also whereby the gas introduced into the said chamber in the manner to be hereinafter explained will have a better opportunity to mingle with the flour.

5 designates gas-receiving chambers located at one side of the casing 1 and to which the bleaching or aging gas is conducted from a source of supply through a pipe 6. Communication between the chambers 5 and the flour-receiving chamber A is provided by ports 1^a and 5^a, through which the gas injected into the chambers 5 passes to the flour-receiving chamber. The ports 1^a and 5^a extend approximately the full width of the flour-receiving chamber A, and therefore the gas which passes through said ports is caused to enter the flour-receiving cham-

ber in a sheet corresponding in width to the sheet of flour descending through the chamber in order that it will be of sufficient volume while entering the chamber in a thin sheet to contact with each and every particle of descending flour.

The volume of gas permitted to enter the flour-receiving chamber from the gas-receiving chambers is regulated by controlling-gates 7, located adjacent to the ports 1^a and 5^a and adapted to be so adjusted as to permit flow of gas through the ports in sheets to their full capacity or to partially shut off the flow of gas, so that it will enter the flour-receiving chamber in a sheet of very thin volume or in volume less than the full capacity of the ports. The gates 7 may be regulated by any suitable means, such as the rods 8, extending to the exterior of the chambers 5 and through brackets 9 and provided with thumb-nuts 10. As the gas, which may be peroxid of nitrogen, nascent oxygen, or any other gaseous body capable of whitening or bleaching and aging flour, enters the gas-receiving chambers 5 it flows therefrom past the gates 7, regulated as desired by the operator, and enters the flour-receiving chamber A in thin sheets. Immediately upon the gas entering the flour-receiving chamber in the form of a sheet, as stated, it quickly spreads within said chamber and mingles with the descending sheet of flour flowing in the zigzag or indirect course down the flights 3 and 4, whereby every particle of flour is quickly and efficiently acted upon by the gas and becomes bleached or whitened and aged. As the particles of flour travel down the flights they are tumbled over and over, thereby affording an opportunity for the gas touching every side of each particle. It will be readily understood that the operator may readily govern the inflow of gas to the flour-receiving chamber at any time by the gates 7, and whenever by observation of the condition of the flour being treated the flour shows that the inflow of gas is insufficient the gates may be opened more widely, whereas if, on the other hand, the condition of the flour shows that the inflow of gas is too great the gates may be partially closed to lessen the volume of gas entering the flour-receiving chamber.

I have found it very desirable to prevent any impurities present in the gaseous body to which the flour is to be subjected from passing into the flour-receiving chamber A from the gas-receiving chambers 5, and to prevent such passage of the impurities I locate the ports 1^a and 5^a, through which the gas passes, at approximately the tops of the gas-chambers and preferably above the termination of the gas-conveying pipes leading into said gas-receiving chambers, and as a further precautionary measure I provide filters 11, preferably in the form of sheets of coarse bolting-cloth, that serve to exclude the passage of impurities through the ports into the flour-receiving chamber. The impurities I refer to are often in the form of small flakes of rubber that become detached from rubber tubing where such is used as a gas-conducting pipe, and in other instances where metal pipes are used the impurities are in the form of metallic specks or flakes. The filters also serve to arrest passage of moisture that may be carried with the gas. To permit opening of the gas-receiving chambers from time to time to remove the impurities that may become deposited therein, I provide at the bottoms of said chambers gates 12, that may be readily opened to discharge the impurities. The gas-receiving chambers are also preferably provided with doors 13, located at the tops thereof, through which access may be gained to the interior of the chambers when desired.

For the purpose of causing the gas to flow into contact with the flour descending through the flour-receiving chamber in a thin sheet I mount beneath the flights 4, that extend downwardly in the flour-receiving chamber opposite to the gas-inlet ports 1^a and 5^a, valves 14, that are swingingly connected at 15 to suitable supports, preferably in the form of brackets 16, attached to one of the walls of the casing 1. The valves 14 are adapted to be adjusted relative to the flights in juxtaposition thereto by means of regulating-rods 17, that are fitted to the valves and extend to the exterior of the casing and have applied to them adjustment-nuts 18. 19 and 20 are sight-openings located, respectively, in the upper and lower ends of the casing 1 and in which are seated transparent plates 21 and 22, preferably of glass. These sight-openings serve to permit of a view being obtained to the interior of the casing in order that the flour feeding and bleaching actions may be constantly observed. At the bottom of the casing of the apparatus is a trough 23, into which the flour descends after it has been bleached and from which it is discharged by a suitable conveyer 24.

I claim—

1. In an apparatus for treating flour, the combination of a casing having a flour-receiving chamber therein, a gas-receiving chamber having communication with the chamber in said casing, a filter located at said point of communication, and a gas-conducting pipe leading into said gas-receiving chamber at a point below the point of communication between said chambers, substantially as set forth.

2. In an apparatus for treating flour, the combination of a casing having a flour-re-

ceiving chamber, a gas-receiving chamber having communication with said flour-receiving chamber, a gas-conducting pipe having communication with said gas-receiving chamber at a point below the point of communication between said gas-receiving chamber and flour-receiving chamber, a flight located interior of said flour-receiving chamber in proximity to the point of communication between said chambers, and a regulating-valve located in proximity to said flight, substantially as set forth.

ROBERT L. DOWNTON.

In presence of—
BLANCHE HOGAN,
NELLIE V. ALEXANDER.