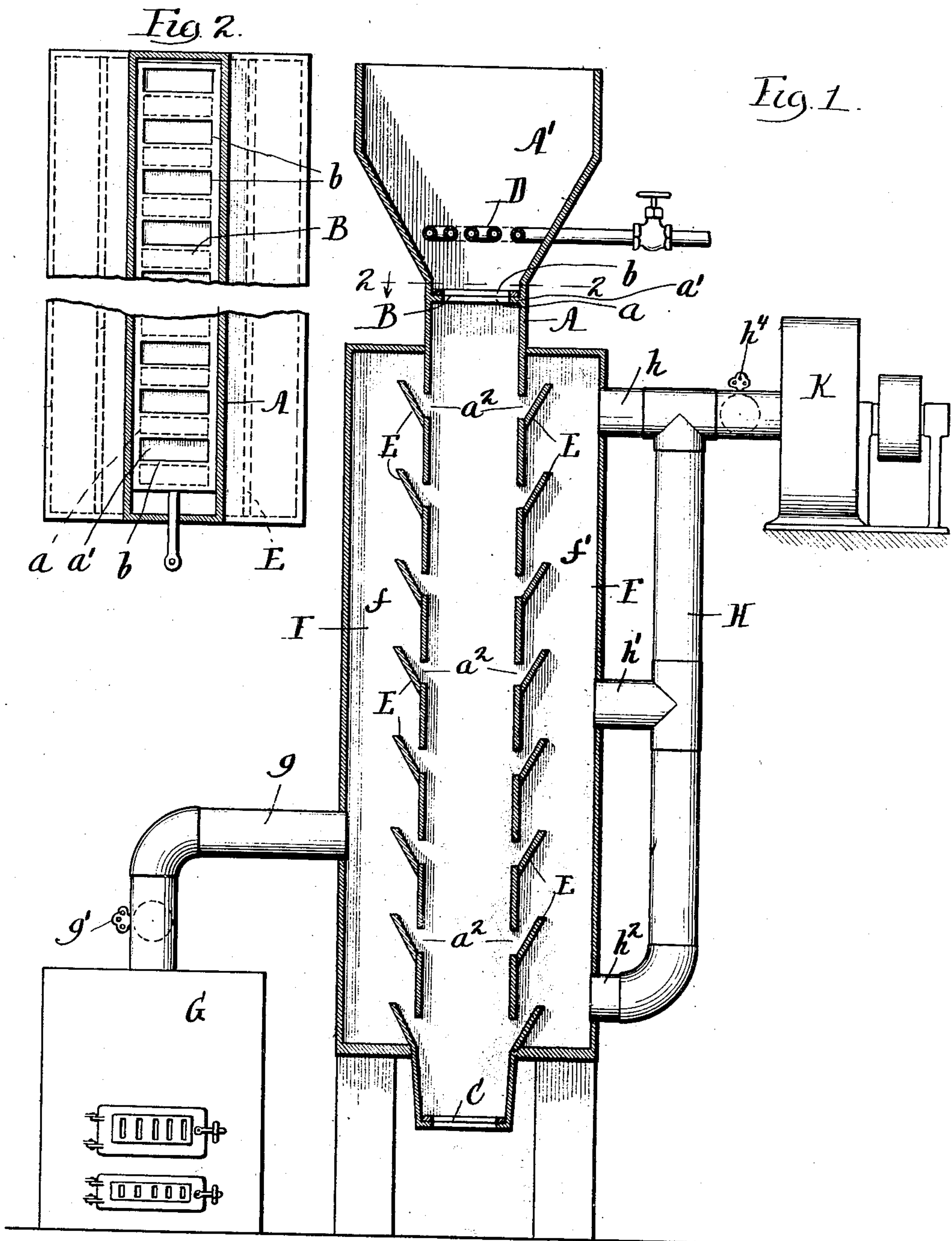


No. 890,644.

PATENTED JUNE 16, 1908.

W. L. HARVEY & W. TWEEDALE.
APPARATUS FOR BLEACHING GRAIN.

APPLICATION FILED SEPT. 24, 1902.



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WILLIAM L. HARVEY AND WILLIAM TWEEDALE, OF CHICAGO, ILLINOIS.

APPARATUS FOR BLEACHING GRAIN.

No. 890,644.

Specification of Letters Patent.

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Application filed September 24, 1902. Serial No. 124,618.

To all whom it may concern:

Be it known that we, WILLIAM L. HARVEY and WILLIAM TWEEDALE, citizens of the United States, and residents of Chicago, Cook county, Illinois, have jointly invented certain new and useful Improvements in Apparatus for Bleaching Grain, of which the following is a full, clear, and exact description.

This invention has relation to apparatus designed for the bleaching of grain that has become discolored and thereby render the same more marketable and the object of the invention is to provide a novel construction of apparatus whereby the more effective bleaching of the grain shall be accomplished.

The invention consists in the features of improvement hereinafter described, illustrated in the accompanying drawing and particularly defined in the claims at the end of the specification.

Figure 1 is a view in vertical section (parts being shown in elevation) through a grain bleaching apparatus embodying our invention. Fig. 2 is a view in horizontal section on line 2—2 of Fig. 1.

The stack A is preferably formed of wood or like material best adapted to resist the action of the sulfur or other bleaching fumes. The opposite side walls of the stack are provided, from top to bottom with a series of inlet and outlet ports a^2 for passage of the bleaching transversely through all parts of the stack and the grain contained therein. Each of the ports a^2 is protected by an inclined guard-plate E which extends upwardly and outwardly from the lower edge of the port. By this arrangement ample port area may be provided for the passage of bleaching fumes through the stack, but any discharge of grain from the ports is prevented even though the stack may be quite compactly filled. By arranging the guard plates E on the outside of the stack, the interior thereof is left free and unobstructed and there is no danger of the grain banking in the stack.

The upright grain stack A, may be of any suitable height and width but is preferably quite narrow, as indicated in the drawings. At the upper end is provided a hopper A' extending the entire width of the stack into which the grain to be bleached is delivered. At the bottom of the hopper is located a valve B of suitable construction. As shown, this valve B is a slide-valve of the grid-iron type, i. e. it is provided with a series of open-

ings b adapted to register to a greater or less extent with a series of openings a of the transverse diaphragm a' whereon the valve B rests. This valve serves to control the admission of grain from the hopper into the grain stack A and at the bottom of the stack is preferably placed a similar valve C that controls the discharge of bleached grain from the apparatus.

The casing F, which is preferably of wood or other suitable material, forms the fume supply and exhaust chambers upon opposite sides of the stack and preferably coextensive therewith in height and width. A pipe g connects the supply chamber f with a furnace G, wherein the sulfur fumes are generated. The exhaust chamber f' , on the opposite side of the stack is connected to an exhaust pipe H, preferably by means of a series of branch pipes h, h', h^2 extending from top to bottom of the stack. A suitable suction-fan contained within a fan-casing K, effects the movement of the bleaching fumes through the stack and the withdrawal of the same from the exhaust chamber f' . The supply and exhaust pipes g and H are preferably provided with control-valves g' and h^4 respectively.

The moisture necessary for the effective bleaching of the grain is supplied at the top of the grain stack A, and preferably by means of a coil of pipe D located in the lower portion of the hopper A' which is provided with perforations and into which steam is admitted from a suitable source of supply.

In operation, the valves B and C are preferably so adjusted that the grain quite compactly fills the stack but will be slowly fed by gravity through the same in order to retain the grain in the stack a sufficient time for thorough treatment. The grain may of course, be retained within the stack any desired length of time by completely closing the valve C, but as before stated, this valve is preferably so adjusted that there will be a slow movement through the stack, and so that the latter may be compactly filled with grain. This mode of operation is permissible since, when the suction-fan is started, the sulfur or other bleaching fumes are drawn from the generator G successively through the fume supply chamber f , the grain stack A and the exhaust chamber f' , and the fumes traverse all portions of the stack and grain contained therein by reason of the arrangement of the series of supply

and exhaust ports a^2 which extend throughout all portions of the stack. Heretofore, bleaching fumes have been supplied at the bottom of a stack through which the grain falls freely and the fumes escape at the top. With such arrangement, the stack must be quite high in order that the grain be treated for a sufficient length of time. It is not feasible with such an arrangement, to fill the stack completely full of grain and permit only a slow, restricted flow of grain since the treatment by the fumes supplied at the bottom only could not well penetrate the solid mass of grain. With the present improvements however, the narrow constructions of the vertical grain stack A interposed between the supply and exhaust chambers f and f' and connected therewith by a series of inlet and outlet ports a^2 extending through all portions of the stacks, permits the effective distribution of the bleaching fumes to all portions of the grain, and the ready traverse of the fumes transversely through the narrow grain stack. The stack may therefore, be compactly filled with grain, the flow of grain may be slow and restricted by the valve C, and the grain effectively treated without necessitating a stack of great height. The ports a^2 in the sides of the stack afford ample area for the distribution of bleaching fumes to all portions of the mass of grain within the stack, and at the same time the guard plates E prevent the escape of grain, even though the stack may be completely filled. Moreover, by arranging the guard plate E on the outside of the stack, there is no danger of the grain banking in the stack. In order to bleach grain with sulfurous fumes the grain must be dampened and would easily bank in the stack if its interior was not unobstructed. The arrangement of suction-fan and exhaust pipe connected to the exhaust chamber by a series of branch pipes extending from the top to the bottom thereof, effectively draws the bleaching fumes through all portions of the grain stack.

By supplying the moisture necessary to the efficient bleaching of the grain at the top of the stack, all parts of the grain are thoroughly moistened for treatment by the bleaching fumes. Moreover, with this arrangement the grain is quite thoroughly dried by the time it reaches the bottom of the stack and little or no subsequent treatment is necessary to condition the grain for the market. The arrangements of supply and exhaust ports extending throughout the stack which permits restricted slow flow of the grain, materially assist in thus drying the grain.

The grain by the present improvement, is thus thoroughly supplied with the necessary moisture at the top of the stack, is at once brought in contact with the bleaching fumes which traverse the stack at all points, and

is effectively bleached and also dried as it moves slowly down through the stack.

It is obvious that the details of structure may be varied without departure from the essentials of the invention.

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

1. A grain bleaching apparatus comprising a narrow, vertical grain stack having a series of inlet and a series of exhaust ports in opposite sides thereof arranged to permit the transverse passage of bleaching fumes through all portions of the stack, in combination with fume supply and exhaust chambers arranged respectively over said inlet and exhaust ports and on opposite sides of the stack, a delivery pipe for admitting bleaching fumes to said supply chamber, an exhaust pipe having a plurality of branches connected at different points to said exhaust chamber and a suction-fan connected to said exhaust pipe.

2. A grain bleaching apparatus comprising a narrow, vertical grain stack the interior of said stack being unobstructed and its opposite side walls having a series of inlet and outlet ports arranged to permit the passage of bleaching fumes transversely through all portions of the stack, inclined guard-plates extending upwardly and outwardly from the lower edges of said ports, fume supply and exhaust chambers arranged respectively on opposite sides of said stack and over said inlet and exhaust ports, means for delivering bleaching fumes to said supply chamber, an exhaust pipe for withdrawing the fumes from said exhaust chamber and valve mechanism at the bottom of the stack for restricting the flow of grain throughout, whereby said stack may be maintained filled with grain.

3. A grain bleaching apparatus comprising a vertically disposed grain stack having openings in the sides thereof and provided at its top with a hopper, a perforated pipe within said hopper for moistening the grain therein, valve mechanism for controlling the flow of grain through said stack, a fume chamber arranged opposite the openings of said stack, a pipe for delivering bleaching fumes to said fume chamber at one side of said stack, and an exhaust pipe and suction fan for drawing the bleaching fumes through said grain stack and fume chamber.

4. An apparatus for bleaching grain comprising a vertically disposed grain stack A having openings a^2 in the opposite sides thereof, a casing F having fume admission and exhaust chambers f and f' at opposite sides of said stack, a pipe g for delivering bleaching fumes to the admission chamber f , an exhaust pipe H provided with a plurality of branches h, h' etc., for withdrawing the fumes from the exhaust chamber f' , a suction fan connected to said exhaust pipe,

valve mechanism at the top and bottom of said grain stack for controlling the flow of grain therethrough, a hopper at the top of said grain stack and a steam pipe for admitting steam to said hopper.

5. A grain bleaching apparatus comprising a narrow vertically disposed grain stack having a series of inlet and exhaust ports in the opposite sides thereof respectively and arranged at different points from the top and the bottom of the stack to permit the transverse passage of bleaching fumes through all portions of the stack, in combination with means for supplying bleaching fumes to said inlet ports, means at the top of the stack for moistening the contained grain and valve mechanism at the bottom of the stack for restricting and controlling the flow of grain through the same whereby said stack may be maintained substantially full of grain.

6. A grain bleaching apparatus comprising a narrow, vertical grain stack having an unobstructed interior and having inlet and exhaust ports in the opposite sides thereof arranged at different points from top to bottom of the stack and arranged to permit the transverse passage of bleaching fumes through all parts of the same, in combination with fume supply and exhaust chambers arranged respectively on opposite sides of said stack and over said inlet and exhaust ports, means for delivering bleaching fumes to said supply chamber, means at the top of said stack for supplying moisture to the contained grain and valve mechanism at the bottom of said stack for restricting the flow of grain therethrough.

7. A grain bleaching apparatus comprising a narrow, vertical grain stack having an unobstructed interior and a series of inlet

and exhaust ports in the opposite sides thereof at different points from top to bottom of the stack arranged to permit the transverse passage of bleaching fumes through all portions of the stack, inclined guard-plates extending upwardly and outwardly from the lower edges of said inlet and exhaust ports, fume supply and exhaust chambers arranged respectively on opposite sides of said stack and extending from said inlet and exhaust ports, means for supplying bleaching fumes to said supply chamber and valve mechanism at the bottom of the stack for controlling and restricting the flow of grain through the same, whereby the stack may be maintained full of grain, substantially as described.

8. A grain bleaching apparatus comprising a narrow, vertical grain stack having an unobstructed interior and a series of inlet and exhaust ports in the opposite side walls thereof arranged at different points from the top to the bottom of the stack to permit the transverse passage of bleaching fumes through all portions of the stack, inclined guard-plates extending upwardly and outwardly from the lower edges of said ports, means for supplying bleaching fumes to said inlet ports, means in the top of the stack for moistening the contained grain, and valve mechanism at the bottom of the stack for restricting and controlling the flow of grain through the same, whereby said stack may be maintained full of grain, substantially as described.

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