

No. 625,651.

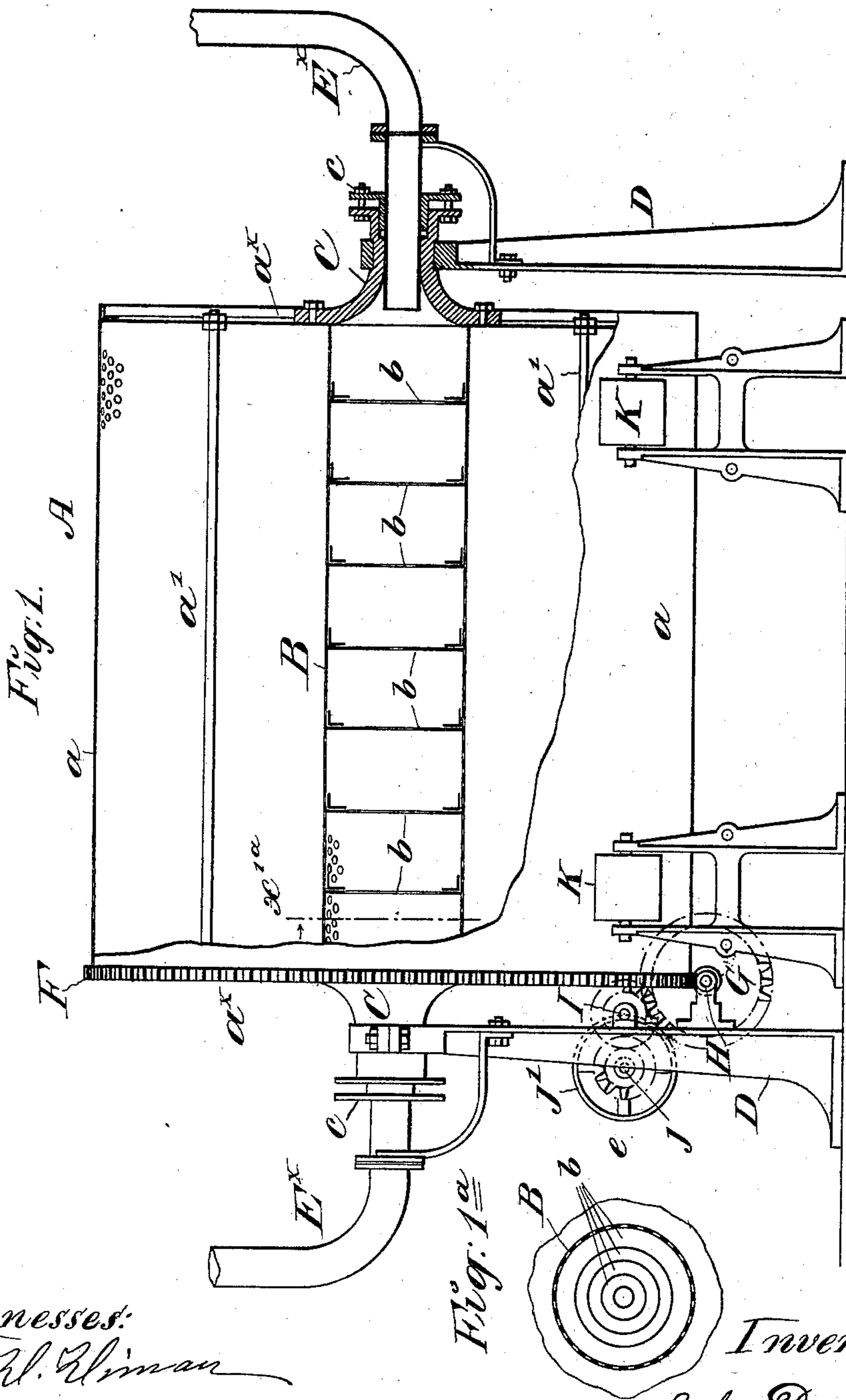
Patented May 23, 1899.

J. DECLERCO.
MALTING APPARATUS.

(Application filed Sept. 3, 1898.)

(No Model.)

2 Sheets—Sheet 1.



Witnesses:
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Inventor:
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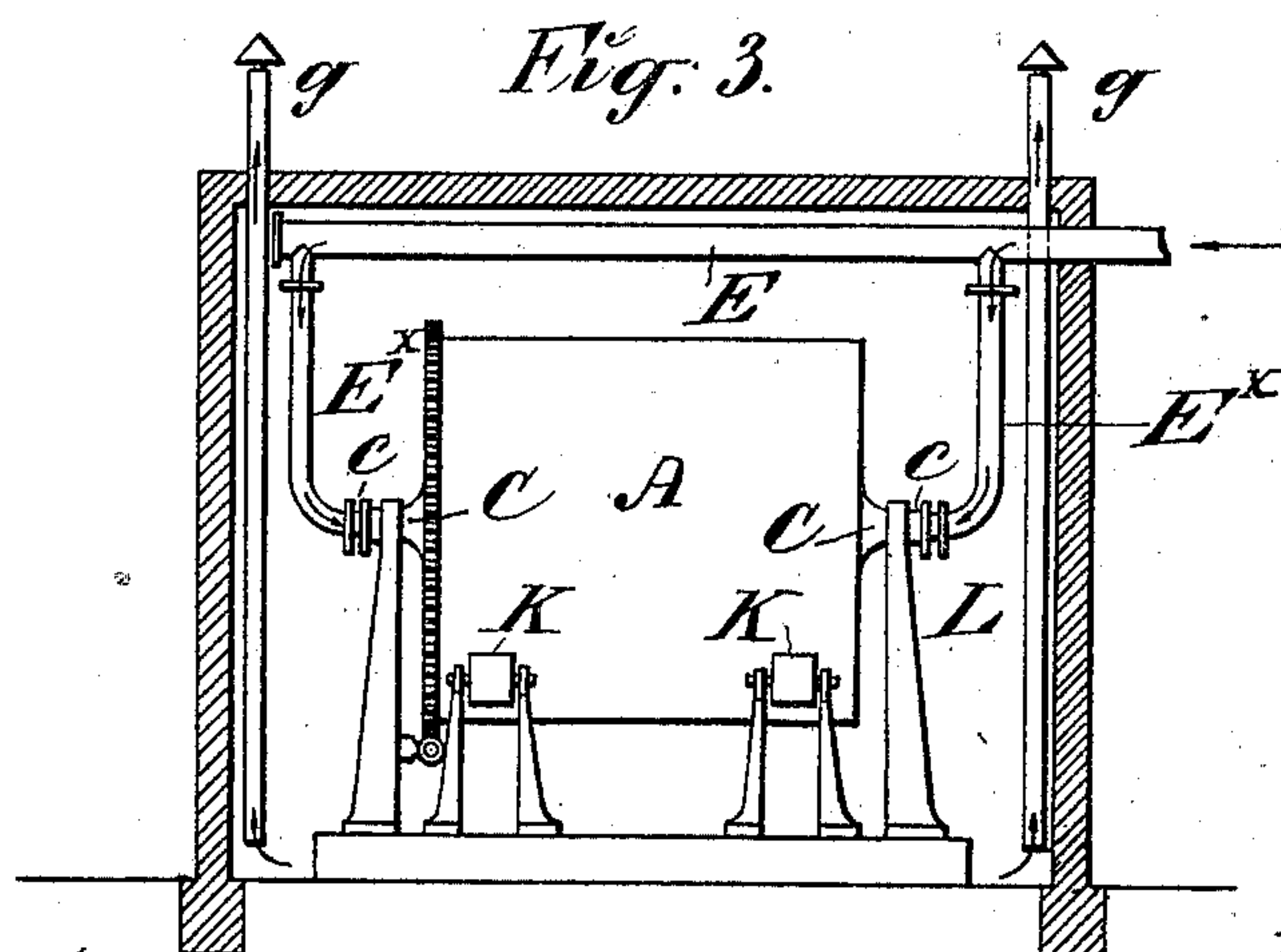
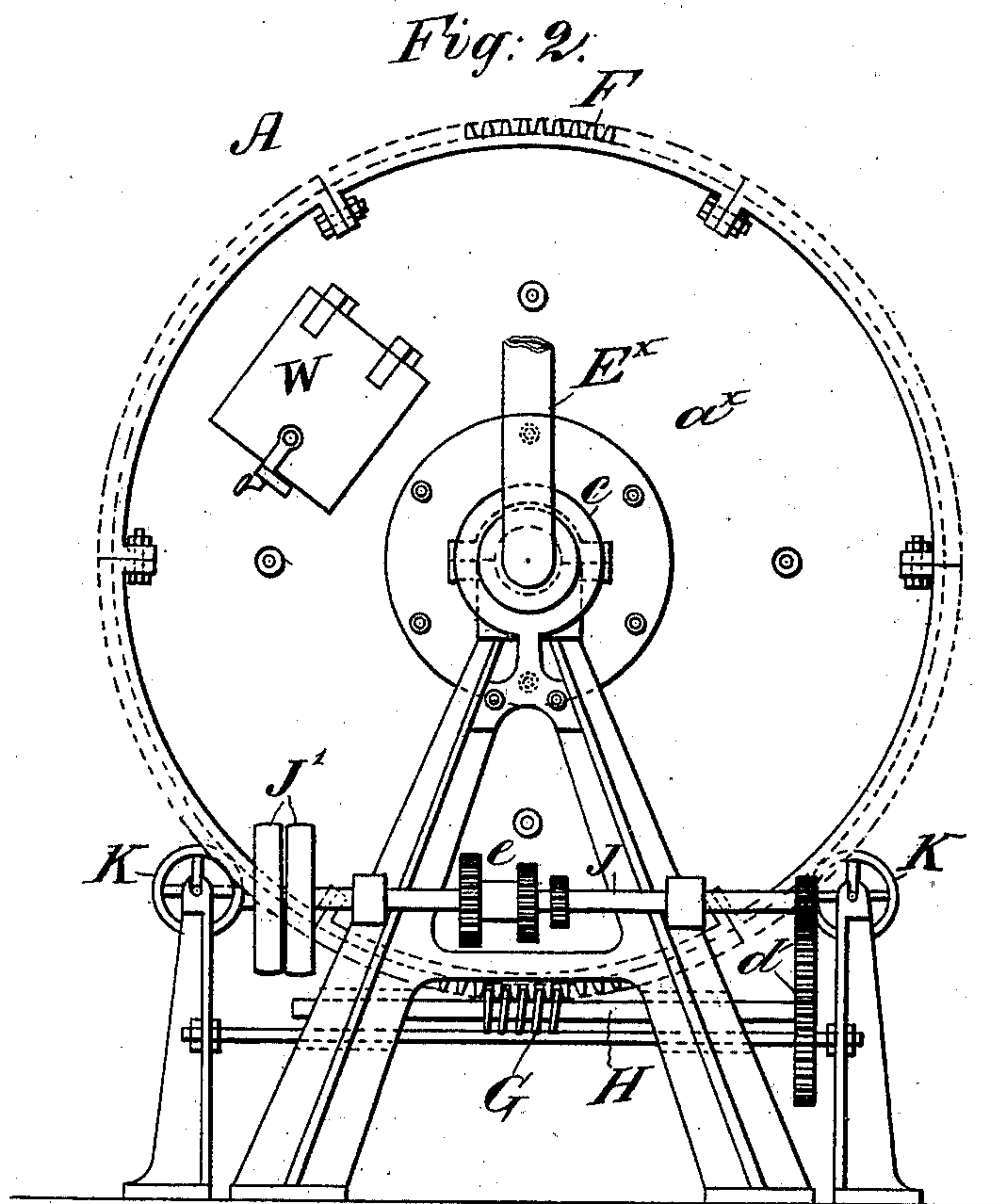
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(Application filed Sept. 3, 1898.)

(No Model.)

2 Sheets—Sheet 2.



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UNITED STATES PATENT OFFICE.

JULES DECLERCQ, OF ROUBAIX, FRANCE.

MALTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 625,651, dated May 23, 1899.

Application filed September 3, 1898. Serial No. 690,237. (No model.)

To all whom it may concern:

Be it known that I, JULES DECLERCQ, dyer, citizen of the Republic of France, residing in Roubaix, (Nord,) France, have invented a new and useful Improved Malting Apparatus, which is fully set forth in the following specification.

This invention relates to an apparatus for use in malting grain of all kinds, it being adapted to successively carry out the operations of germination under the action of moist air at a graduated temperature, also the drying and treatment usually effected in a malt-kiln, and, lastly, the polishing of the grain.

The object of the invention is to provide for a thorough and uniform diffusion of hot or warm air through the grain in the slowly-rotating drum of the apparatus, so as to produce malt of uniform quality and to provide against condensation of moisture in the grain.

In the accompanying drawings, which illustrate an embodiment of the invention, Figure 1 is a side elevation of the apparatus, partly in vertical axial longitudinal section. Fig. 1^a is a section at line $x'x$ in Fig. 1, and Fig. 2 is an end elevation showing the apparatus as seen from the left in Fig. 1. Fig. 3 is a general side elevation of the apparatus, on a small scale, inclosed in a chamber, the walls of this latter being represented in section.

The apparatus consists in general and essentially of a relatively large drum with a perforated or foraminous peripheral wall and rotatively mounted, and within this large outer drum is an inner perforated cylinder or tube of relatively small size concentric with the drum and open at its ends to the hollow journals of the drum. Gearing is provided for driving the drum. The grain is admitted through a suitable door W, Fig. 2, in the drum, and air, either moist, dry, warm, or hot, is admitted, as circumstances may require, to the grain in the drum through the hollow journals and the inner perforated cylinder.

A represents the drum, the periphery a of which is of perforated sheet metal, preferably sheet-iron, and the heads or ends a^x , of metal, preferably sheet-iron, secured to the part a by angle-irons and rivets in a well-known way. The heads a^x are tied together for strength by tie-rods a' . At the axis of the drum A is

fixed concentrically therewith a cylinder or tube B, also by preference of perforated sheet metal. This tube B is open at its respective ends to hollow or tubular journals C, on which the drum revolves. These journals are mounted in a suitable supporting-frame D, and the air from any source is admitted to the drum through these journals by branch pipes E^x , Fig. 3, from a main pipe E. The branch pipes E^x pass through stuffing-boxes c to the journals, so as to permit the latter to rotate about the pipes without undue leakage.

The air admitted to the tube B passes to the drum through the perforated peripheral wall of the tube and is uniformly distributed to the drum by means of baffle-partitions b in the cylinder, which have in them openings of different sizes, the partition at the center having the smallest opening and the openings gradually increasing in size toward the ends of the cylinder, as seen in Figs. 1 and 1^a. The air being admitted to both ends of the tube B, the plates or partitions b deflect it outward into the grain and in such a manner that it acts uniformly on all of the grain in the drum as the latter rotates. This tube B should not exceed in diameter about one-fifth the diameter of the drum A to attain the best results.

To rotate the drum the following mechanism is employed: On the end of the drum A is a circular toothed rack F, with which gears a worm or screw G on a shaft H, driven from a shaft I through the medium of gear-wheels d . The shaft I is driven from a main driving-shaft J at different rates of speed through the medium of suitable change-wheels e in a well-known way. On the shaft J are tight and loose pulleys J'. K are rolling supports for the heavy drum. These take off the weight to a considerable extent from the journals and also prevent distortion of the loaded drum, which may be caused by throwing the entire weight on the axis thereof. Owing to this gearing described the drum is enabled to receive a very slow rotary movement of from two to three revolutions per hour only during the process of germination, this continuous rotary motion, however slow, being sufficient to produce within the bulk of the grain a displacement which insures a thorough germinating of all the grains under treatment, and it absolutely prevents the

mass from "felting." The rate of the rotary speed must be greater when the time for proceeding to the ungerming operation has been reached—that is to say, when the radicals
5 are to be broken off and removed. This change of speed is effected by the change wheels or gear above described.

I will now explain the manner in which all the malting operations may be effected with
10 this single apparatus.

I must first of all state that this apparatus is placed in a chamber L, Fig. 3, which is closed, and, if so required, heated to prevent condensation taking place. This chamber
15 is provided with ventilating-chimneys *g*, enabling the air, carbonic-acid gas, vapor, or the like to be discharged. The chamber L contains ordinary inspection and controlling apparatus, such as a thermometer, hygrometer, and the like. The pipes terminating in
20 the journals of the drum lead from the outlet of a fan or the like, serving to convey moist air either moderately hot or very hot and dry, according to circumstances. After
25 the first phase of the germinating operation, which lasts from seven to nine days, is completed the germinated grain must be dried, as is done at the present time in malt-kilns. Without the grains being displaced slightly—
30 heated air is passed through the fan, whereby a desiccation at a low temperature takes place, and this constitutes the first part of the malt-kiln treatment. To effect the second part of the kiln treatment, it is necessary
35 that hotter and drier air be supplied to impart flavor to the malt. This very hot air supplied in abundance dries the grain. The radicals become separated, are reduced to dust or powder, and drop out through the perfora-
40 tions of the drum. It will be understood that owing to the perforations provided in the outer cylinder the more or less hot or more or less moist or dry air flows with facility through the mass of constantly-agitated
45 grains in the drum and passes out together with the gases, which are set free. Lastly, at the end of the operation the drum is ro-

tated at its highest speed. At the same time the air passing through in the mass of grain is kept drier and hotter. The grain rubbing
50 against each other and against the inner walls of the drum become polished and are freed from all dust particles and germs that may still adhere thereto.

In the drawings it has not been deemed
55 necessary to show all the perforations in the foraminous peripheral wall *a* of the drum and in the tube B; but these parts will be made, by preference, of perforated metal. Only a part of the teeth of the gearing are shown; but
60 they are all full gears.

The drum A and tube B will be, by preference, cylindrical in form, as shown; but this form is not essential to the invention. They
65 might be polygonal in cross-section, for example.

It has been said that the tube B should be small in order to get the best results, and it may be explained that this is because the grain in the cylinder should only be sufficient
70 to fill it, say, about two-thirds full; but obviously it must always cover the tube B or the air passing out at the crown of the tube would be wasted.

Having thus described my invention, I
75 claim—

The combination with the rotating drum A, having a perforated peripheral wall and axial inlets at its opposite ends for air under pressure, of the relatively small, perforated tube
80 B in the axis of the drum A and open at its ends to the respective air-inlets, said drum having in it apertured baffle-partitions, the apertures in the respective partitions decreasing in diameter in proportion to their
85 distance from the ends of the drum, substantially as set forth.

In testimony whereof I have signed this specification in the presence of two subscribing witnesses.

JULES DECLERCQ.

Witnesses:

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ALFRED C. HARRISON.