

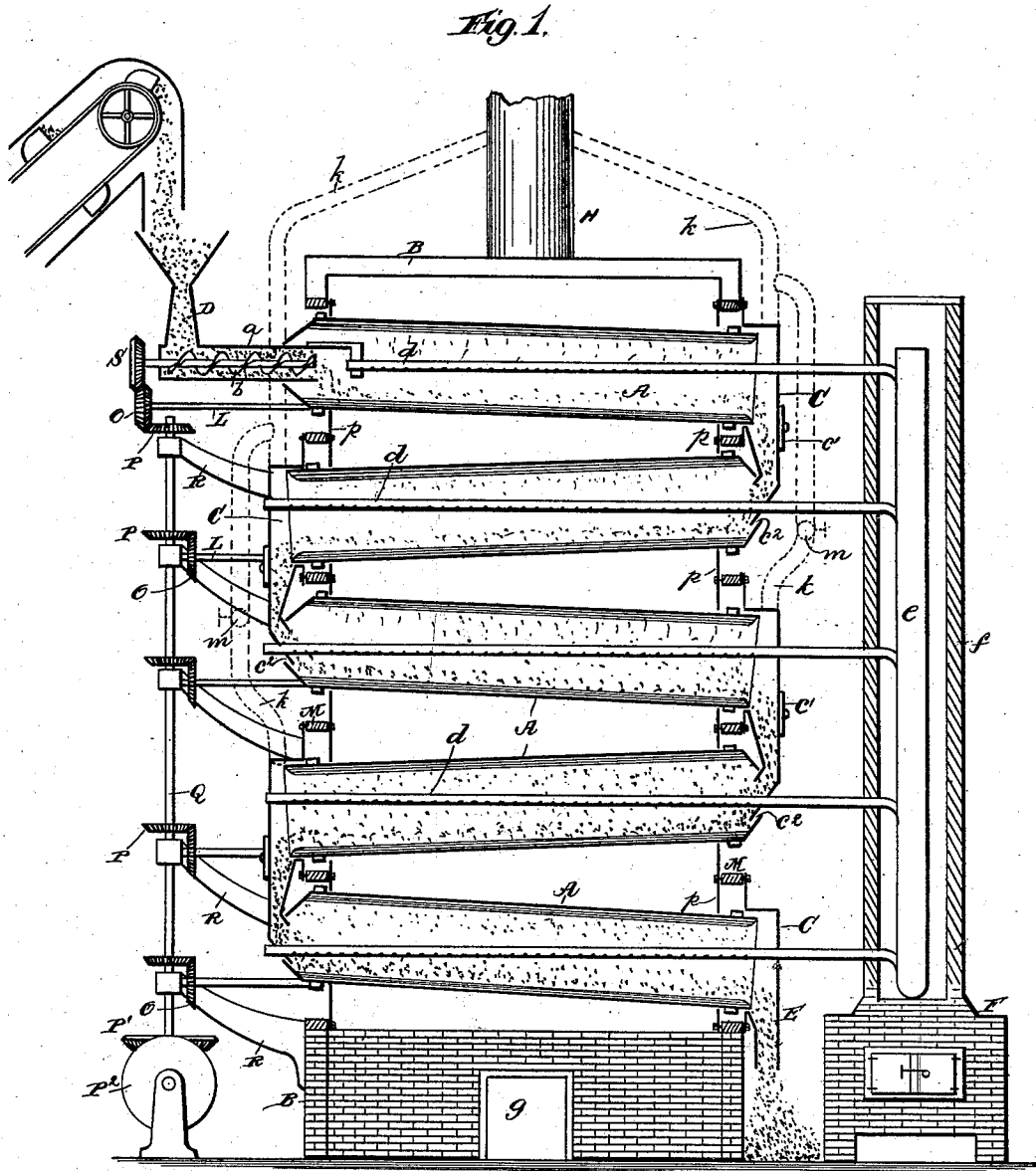
(No Model.)

2 Sheets—Sheet 1.

F. W. WIESEBROCK.
APPARATUS FOR DRYING GRAIN.

No. 267,813.

Patented Nov. 21, 1882.



Witnesses.

Phot. Everett.

J. A. Rutherford

Inventor.

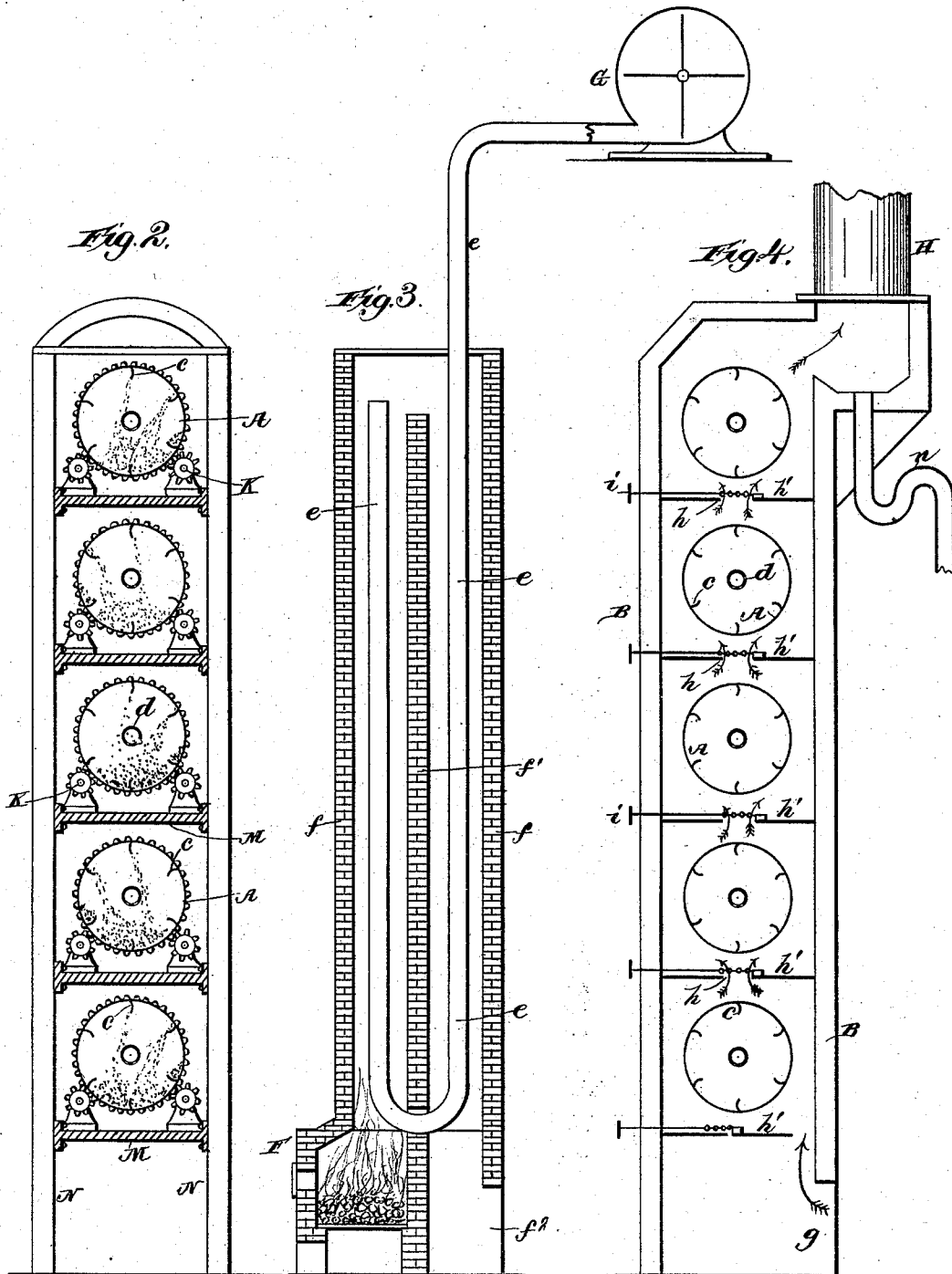
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By *James L. Norris.*
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Robert Covatt,
J. A. Parkerford

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UNITED STATES PATENT OFFICE.

FREDERICK W. WIESEBROCK, OF NEW YORK, N. Y.

APPARATUS FOR DRYING GRAIN.

SPECIFICATION forming part of Letters Patent No. 267,813, dated November 21, 1882.

Application filed March 14, 1882. (No model.)

To all whom it may concern :

Be it known that I, FREDERICK W. WIESEBROCK, a citizen of the United States, residing at New York, in the county and State of New York, have invented new and useful Improvements in Apparatus for Drying Grain, &c., of which the following is a specification.

This invention relates to improvements in that class of apparatus for drying grain and other like material in which the material to be treated is subjected to the action of heat while being passed through a series of communicating rotary drying-cylinders.

My invention consists in the combination of a housing or casing, a series of inclined rotary drying-cylinders having their ends extended outside the housing or casing, each cylinder having a spout-cap provided with a dampered ventilating flue or pipe, blast-pipes, and mechanism for rotating the cylinders located outside the housing or casing.

Other features of the invention will be hereinafter described, and pointed out in the claims.

The invention is clearly illustrated in the accompanying drawings, in which Figure 1 is a vertical longitudinal section of my improved drying apparatus. Fig. 2 is an end view; Fig. 3, a vertical section through the furnace, showing the blast-flues and fan; and Fig. 4 is a central vertical section.

Like letters indicate like parts.

Referring to the drawings, the letter A denotes the rotary drying-cylinders, the ends of which project beyond the housing B. This housing may be constructed of brick or other suitable material in any approved manner. The drying-cylinders are arranged one above the other, and alternately incline slightly in opposite directions, as shown in Fig. 1. These cylinders are preferably formed of metal, and any convenient number may be employed.

Each drying-cylinder A is provided with a spout-cap, C, by means of which it communicates with the adjoining cylinder. These spout-caps are so arranged in connection with the inclined positions of the cylinders that the grain or other material, as it passes through the cylinders alternately in opposite directions, is constantly carried downward from the hopper D to the discharge-spout E at the lower end of the bottom cylinder. The feed-hopper D com-

municates by a horizontal pipe, *a*, having a screw-conveyer, *b*, with the upper end of the top cylinder. Within the cylinders are curved flanges or wings *c c*, which are so arranged upon the inner walls of said cylinders as to lift portions of the grain contained therein and carry it partly upward with the rotation of the cylinders, so as to agitate the mass of grain and expose it more thoroughly to the action of the heated currents of air passing through and around said cylinders.

In each rotary drying-cylinder is a horizontal perforated blast-pipe, *d*, which communicates with a vertical hot-air pipe, *e*, that is arranged in a heating chamber or chimney, *f*, above the furnace F. This heating chamber or chimney *f* is provided with a vertical partition, *f'*, which extends nearly to the closed top, a passage being afforded at the top of the partition for exit of smoke and other products of combustion, which ascend on one side of the partition and descend on the other, so as to finally escape through an opening, *f''*, at the back of the furnace and near the ground. The curved or bent pipe *e*, which is arranged in the heating-chamber on each side of the partition *f*, passes through the lower part of said partition, and communicates above with a fan, G, by means of which heated air may be forced into the drying-cylinders at pleasure. By this manner of arranging the pipe *e* a large surface is afforded for heating the air passed through said pipe. Heated air may also be conducted through the opening *g* into the space surrounding the drying-cylinders.

The housing B, in which the cylinders are inclosed, is provided with horizontal fixed partitions *h* and horizontal slidable partitions *h'*, which latter are adjusted, by means of the rods or handles *i*, so as to regulate and control the passage of heated currents in contact with the exterior surfaces of said drying-cylinders, as shown in Fig. 4.

The spout-caps C at the ends of the cylinders are each provided with a ventilating-pipe, *k*, (shown in dotted lines, Fig. 1,) all of said pipes connecting with a chimney or stack, H, for the purpose of permitting the escape of heated air-currents laden with moisture absorbed from the grain. These pipes *k k* are provided with dampers *m*, that may be manipulated so as

to confine the air within the respective cylinders for such lengths of time as will be sufficient to enable it to absorb moisture to its fullest capacity before being permitted to escape, thus effecting a large economy in the quantity of fuel ordinarily required. By this arrangement of a dampered ventilating pipe or flue for each cylinder, which provides for the escape of the moisture absorbed from the grain, I obviate all liability of its coming in contact with the exterior of the cylinders, and also prevent the formation of acid gases that might be generated by its contact with the gaseous products of combustion, and thus have an injurious effect upon the grain or other material being dried. This construction also results in an economy of fuel, as the condensation of moisture, which would be liable to counteract the effect of the fire-gases, is thereby effectually prevented. In order to prevent the return of the condensed moisture to the drying apparatus, the chimney H is made to project at the back, and is provided with a trap, *u*, as shown in Fig. 4. The spout-caps C are provided with openings for the passage of the blast-pipes *d*, and they also have doors *e'*, for permitting access to the spouts and cylinders, and openings *e''*, through which the contents of the cylinders may be inspected without opening said doors.

The drying-cylinders A are caused to revolve by means of the pinions or spur-gears K, which are attached to the horizontal shafts L on each side, the inner ends of said shafts being supported in bearings located upon cross-bars M, that are arranged between the pillars N N, as shown in Fig. 2. These pinions K engage with ring-gears on the adjacent ends of the cylinders, the opposite ends of which are supported and rotate upon suitable rollers, which, however, are not shown. The shafts L, to which the pinions K are attached, are provided at their opposite ends with bevel-gears O, that mesh with similar gears, P, secured to a vertical shaft, Q, that is journaled in the projecting bearings or arms R, attached to the housing. The vertical shaft Q is provided near its lower end with a bevel-gear, P', that meshes with a similar gear, P², on a horizontal shaft, that may be provided with a differential pulley for regulating and varying the speed of the cylinders at pleasure. The gear O on the upper horizontal shaft, L, meshes with a gear, S, on the shaft of the conveyer-screw *b*, thereby operating the latter at the same rate of speed that is imparted to the rotary drying-cylinders.

In order to protect the gearing from the effects of the heat, as well as to prevent the escape of the same from the space surrounding the drying-cylinders, metal plates *p* are attached to the inner sides of the iron cross-bars M, and arranged to fit around the cylinders without impeding their rotation. The framing of the spout-caps is attached to the outer sides of the cross-bars M in such a manner as

to prevent the escape of heat or the access of cold air. By means of the doors in these spout-caps access may be had for the purpose of lubricating the gearing and rollers when required.

By extending the ends of the rotary drying-cylinders so as to project beyond the walls of the housing I am enabled to arrange the operating mechanism in such a manner as to be unaffected by the heated currents of air circulating within the housing or chamber. The advantage of this construction will be apparent.

In operating the apparatus the grain or other similar material to be dried is conveyed into the hopper D by any suitable means, and passes direct to the horizontal conveyer-pipe *a*, whence it is fed by the screw *b* into the upper rotary drying-cylinder, A, being therein subjected to the great degree of heat which is naturally accumulated in the upper portion of the apparatus. By the rotation of this inclined cylinder the grain is gradually passed to the upper spout-cap, C, and through the same to the lower cylinders and spouts successively, being finally discharged through the spout E at the lower end of the bottom cylinder. In passing successively through these cylinders the grain is raised and agitated by the wings *c c*, so as to expose it thoroughly to the heated air, which absorbs the moisture from the grain, and in its ascent through the pipes *k k* to the chimney H removes said moisture from the apparatus. This moisture is finally intercepted and prevented from returning to the apparatus by means of the trap *n*, as before described. When drying such material as cannot be exposed safely to a high temperature immediately upon its entrance to the apparatus, I may regulate the degree of heat to be passed by the blast-pipes, or may introduce to the lower cylinder a cold blast, so as to temper the heat according to circumstances.

It is obvious that the openings *g* and *f*² may be connected by means of a suitable pipe or flue, so as to cause the heat that might otherwise escape to be passed into the space within the housing and be thus further utilized.

It is also apparent that the employment of a fire within the furnace may be dispensed with and blasts of cold air, instead of hot air, be introduced to the housing. In drying malt, for instance, it is advisable to introduce cold air into the upper cylinder at first, and afterward apply heat moderately; otherwise the result would be the production of gloss malt.

What I claim is—

1. The combination, in a grain-drier, of the housing B, with the series of inclined rotary drying-cylinders A, having their ends extended outside of the housing in which the body or main portion of each one of the cylinders is located, the spout-caps C, located outside of the housing and connecting the ends of the cylinders, and each provided with a dampered ventilating pipe or flue, blast-pipes *d*, and mechanism for rotating the cylinders, also located

outside of the housing, said members being constructed and organized substantially as described.

2. In a grain-drier, the combination, with a housing inclosing a series of drying-cylinders, of the horizontal adjustable heat-regulating partitions *h'*, arranged between said cylinders, substantially as described.

3. In a grain-drier, the combination of a housing having a suitable chimney, a series of rotary drying-cylinders arranged in said housing and inclined alternately in opposite directions, with their ends projecting beyond the walls of the housing, a series of cap-spouts connecting the ends of said cylinders and provided with suitable doors and openings for giving access to the cylinders, adjustable partitions arranged between said cylinders for regulating the passage of heat on the outer sides thereof, pipes connecting the spout-caps and chimney and provided with dampers for controlling the escape of air and moisture, a fur-

nace having a heating-chamber and a vertical blast-pipe provided with horizontal branch pipes communicating with the interior of the drying-cylinders, and mechanism for rotating the drying-cylinders, located on the exterior of the housing, all substantially as shown and described.

4. The combination, with the housing inclosing a series of communicating drying-cylinders, of the fixed partitions *h* and the horizontal slidable partitions *h'*, operated by rods *i*, said partitions being located between the drying-cylinders, substantially as and for the purpose set forth.

In testimony whereof I have hereunto set my hand in the presence of two subscribing witnesses.

FREDERICK W. WIESEBROCK.

Witnesses:

ADAM E. SCHATZ,

CHARLES E. BEVINGTON.