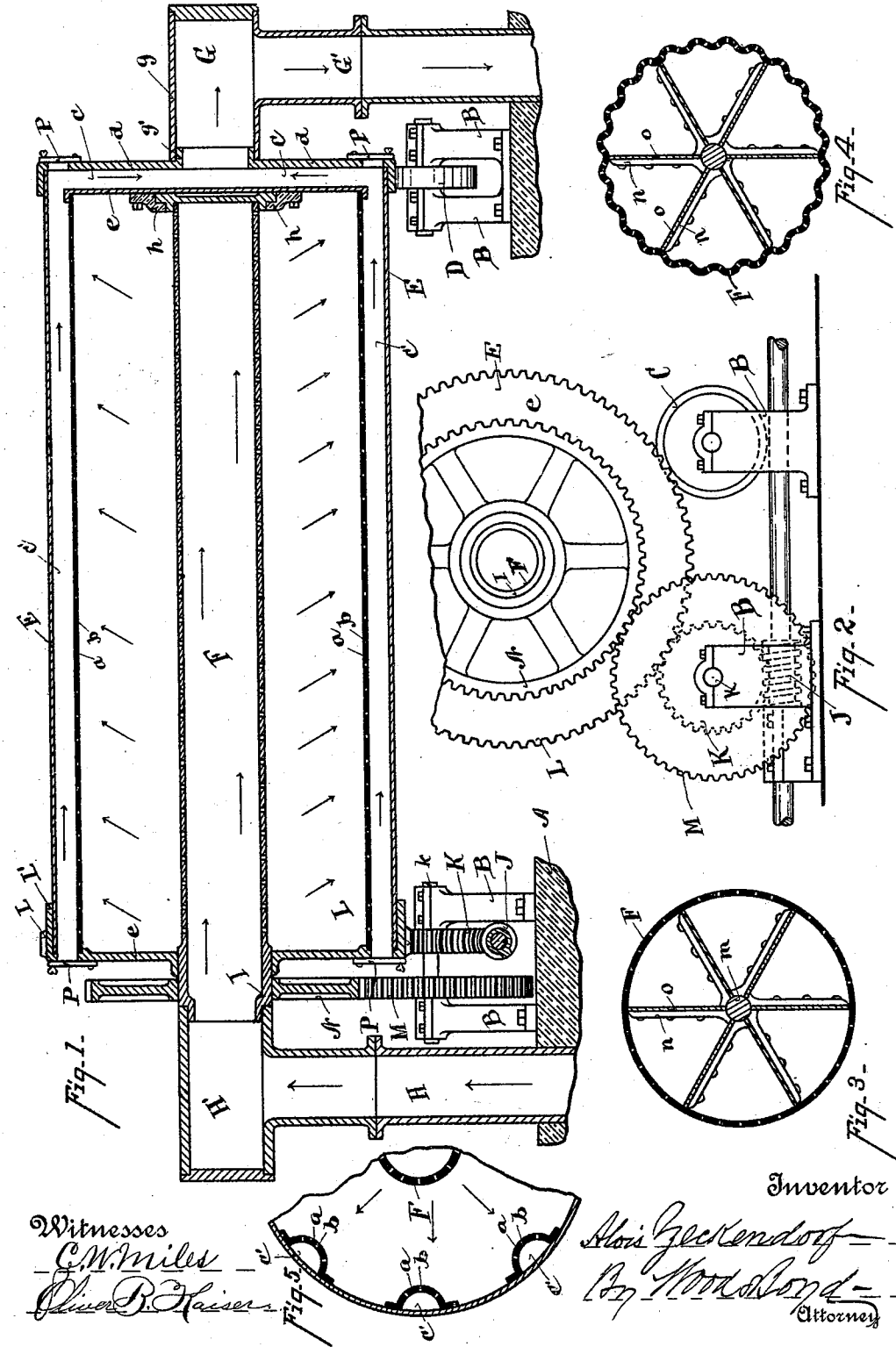
(No Model.)

A. ZECKENDORF.

MALTING APPARATUS.

No. 549,473. Patented Nov. 5, 1895.



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ALOIS ZECKENDORF, OF RIVERSIDE, ASSIGNOR OF ONE-HALF TO WILLIAM F. POTTHOFF, OF CINCINNATI, OHIO.

MALTING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 549,473, dated November 5, 1895.

Application filed February 9, 1895. Serial No. 537,824. (No model.)

To all whom it may concern:

Be it known that I, ALOIS ZECKENDORF, residing at Riverside, in the county of Hamilton and State of Ohio, have invented certain new and useful Improvements in Malting Apparatus, of which the following is a specification.

The object of my invention is to provide a malting apparatus which is so operated that the sprouting of the growing corn or barley or other cereals will take place uniformly throughout the mass of the charge.

Another object of my invention is to provide better means for circulating air through the charge, and hence maintaining the charge at the same uniform temperature.

Another object of my invention is to provide two concentric cylinders between which the charge of grain is placed, the inner cylinder being perforated for delivering air to the charge, and driven at a faster speed than the outer cylinder, so as to more uniformly distribute the heated air throughout the charge, and also to prevent the sticking of the grain upon the inner cylinder and growing into the perforations.

The features of my invention will be more fully set forth in the description of the accompanying drawings, making a part of this specification, in which—

Figure 1 is a longitudinal central vertical section of my improvement. Fig. 2 is an end elevation of the cylinder and driving-gears. Fig. 3 is an end elevation of a modified form of inner cylinder. Fig. 4 is another modification of the inner cylinder. Fig. 5 is a broken sectional end view of the outer and inner cylinders.

A represents the bed of the machine, to which the frame-pieces B are anchored.

C D represent frictional rolls, upon which the outer cylinder E is journaled.

F represents the inner cylinder.

a represents semicircular tubes attached to the inner periphery of the outer cylinder. They are provided with perforations *b* to receive the air from within the cylinder. These tubes or passages are connected to the space *c* at the end of the outer cylinder. This outer cylinder is provided with two heads *d e*, to form the said chamber or space *c*, and the entire series of passages *c'* around the inner periphery of the drum have a continuous connection with the said space or chamber *c*, so that the air is carried out through the hollow axis G, which is formed in the cylinder *g*. *g'* represents an annulus on the head *d*, fitting into the said cylinder *g*. Cylinder *g* is connected to an off-take pipe G'. The air is supplied to the malting apparatus through the pipe H by means of a pump or pressure-blower. This connects with the cylinder H', which forms a journal-bearing for the hub I of the inner cylinder F, the outer end of which is turned down to shoulder against said cylinder, preventing any lateral motion. The said inner cylinder may likewise be journaled on the heads of the outer cylinder E.

h represents an annular journal secured upon the inner head of the large cylinder. A similar bearing may be secured to the opposite head of said cylinder, if desired.

The inner cylinder F is provided with separate air-chambers or a series of air-tubes and air-perforations all around its periphery delivering air into the charge surrounding said cylinder.

I have shown the following means for driving each of said cylinders. J represents a worm-shaft driving the worm-gear K, which is mounted upon shaft *k*. Said gear K likewise meshes with the ring-gear L, attached to the outer cylinder, preferably by the ring L', secured to the outer periphery of the cylinder E. M represents a second gear keyed to the shaft *k* and meshing with the gear N, secured to the hub of the inner cylinder F, which is the preferred form of construction. Said cylinder F, however, may be keyed upon a shaft *m*, as shown in Fig. 3, and the gear N secured to said shaft. The method of constructing the driving-gear is not material; but it should be so proportioned that the inner cylinder is driven from one-half to twice as fast as the speed of the corresponding portions of the outer cylinder. When air is delivered to the charge through the inner cylinder between it and the outer cylinder, it escapes upward through the charge more rapidly than in other directions because of the less resistance of the charge of grain. In order to obviate this and to more uniformly

supply the air to other portions of the charge, I prefer to provide a series of partitions running longitudinally through the entire length of the inner tube, and this is accomplished in the following manner: Between the shaft *m* and the periphery of said cylinder are attached a series of arms *n*. O represents a series of partitions attached to the arms, dividing said cylinder F into a series of longitudinal distributing-chambers. As these partitions communicate with the cylinder H′ at one end and the opposite end of said cylinder is closed, the air is divided and supplied to these different compartments, so that each compartment is delivering its proportion of air throughout the entire mass of the grain.

I do not wish to limit myself to the method of making the longitudinal partitions of the inner cylinder, as shown in the drawings, as any method of construction may be employed which will form such compartments or dimensions.

In order that the semicylindrical tubes or passages *c′*, which carry the air off from the outer cylinder, may be readily cleaned out, I provide the caps P at each end of the cylinder, which may be removed and the passage cleaned out when desired. In order to assist in the agitation of the grain in the cylinder, I sometimes employ the corrugated inner cylinder F, as shown in Fig. 4, which more effectually prevents the grain from sticking in the tubes in the periphery of said cylinder. In order to prevent the gases generated by the growing grain from permeating the building, the passages *c′*, cylinder G, and pipe G′ are provided, so that the air may be delivered out of the building. Of course the usual manholes are provided to obtain access into the outer cylinder. The grain is steeped in the usual manner. It is then put into the annulus between the two cylinders, filling the same about three-fourths full. The cylinders are then started to revolve slowly, the outer cylinder making one complete revolution, say, once in about forty-five minutes. The periphery of the inner cylinder will travel about twice as fast as the abutting surface of the outer cylinder. This will constantly change the relation of the inner cylinder to the abutting charge and prevent the growing grain from sticking thereto and keep the perforations free. This allows the air to be constantly passed through the different perforations within the inner cylinder, and as the cylinder revolves the grain is constantly changing its position in the larger cylinder.

A material advantage is obtained by using the passages *c′*, as the air is kept from escaping too rapidly and the perforations for supplying air are utilized for forcing the air out of the escape-pipe G′, thereby more evenly distributing the air as well as carrying off the deleterious gases. By means of the distributing-chambers O of the inner cylinder the air is more uniformly supplied to the charge and is prevented from escaping too rapidly through the top portions of the cylinder F, where the resistance to the escape of the charge is least. The operation of the cylinders is continued until the grain has grown to the proper degree.

The temperature of the growing grain is regulated by regulating the heat of the current of air supplied to the malting-drum.

I claim—

1. In a malting apparatus, the combination of an outer revolving cylinder having a chamber in one end and provided upon its periphery with perforated longitudinal tubes or channels closed at one end and communicating at the other end with said chamber, an inner perforated cylinder centrally arranged within the outer cylinder, said cylinders being mounted in independent bearings, means for supplying a current of air to said inner cylinder, and separate driving mechanism for each of said cylinders for driving them at different speeds, substantially as described.

2. In a malting apparatus, the combination of an outer revolving cylinder having a chamber in one end and provided upon its periphery with perforated longitudinal tubes or channels closed at one end and communicating at the other end with said chamber, an inner perforated cylinder centrally arranged within the outer cylinder, said cylinders being mounted in independent bearings, an air supply connected to one end of said inner cylinder, an air exit connected with said chamber, and driving mechanism for driving said cylinders at different speeds, substantially as described.

3. In a malting apparatus, the combination of an outer revolving cylinder having a partition in one end forming a chamber and provided upon its periphery with perforated longitudinal tubes or channels closed at one end and communicating at the other end with said chamber, an inner perforated cylinder centrally arranged within the outer cylinder and journaled at one end in said partition and at the opposite end having an independent bearing outside of said outer cylinder, means for supplying air to one end of the inner cylinder, means for discharging air from said chamber, and mechanism for driving said cylinders at different speeds, substantially as described.

In testimony whereof I have hereunto set my hand.

ALOIS ZECKENDORF.

Witnesses:
W. R. WOOD,
W. F. POTTHOFF.