

No. 677,787.

Patented July 2, 1901.

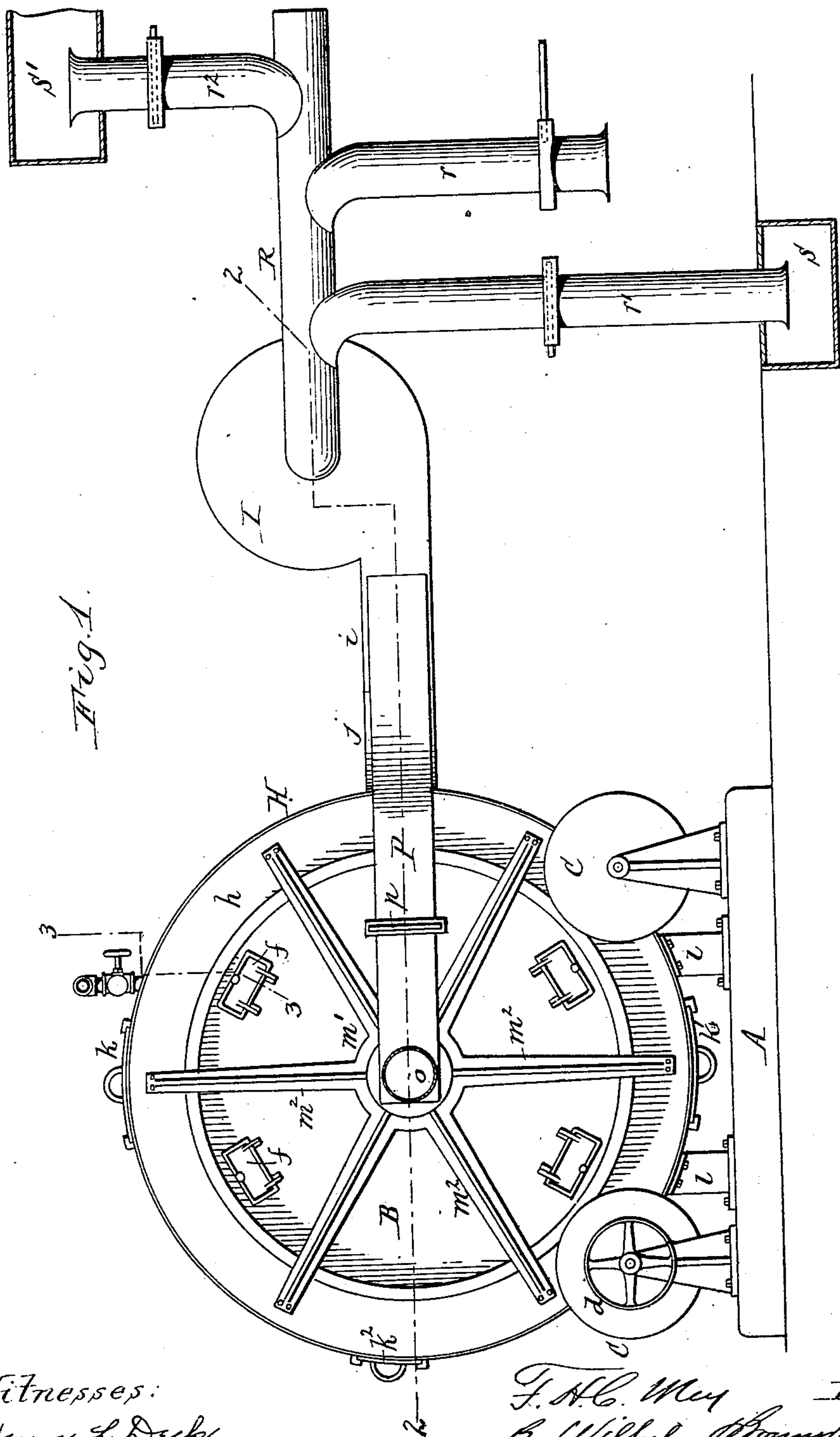
F. H. C. MEY.

MALTING AND DRYING APPARATUS.

(Application filed Aug. 14, 1900.)

3 Sheets—Sheet 1.

(No Model.)



-Witnesses:

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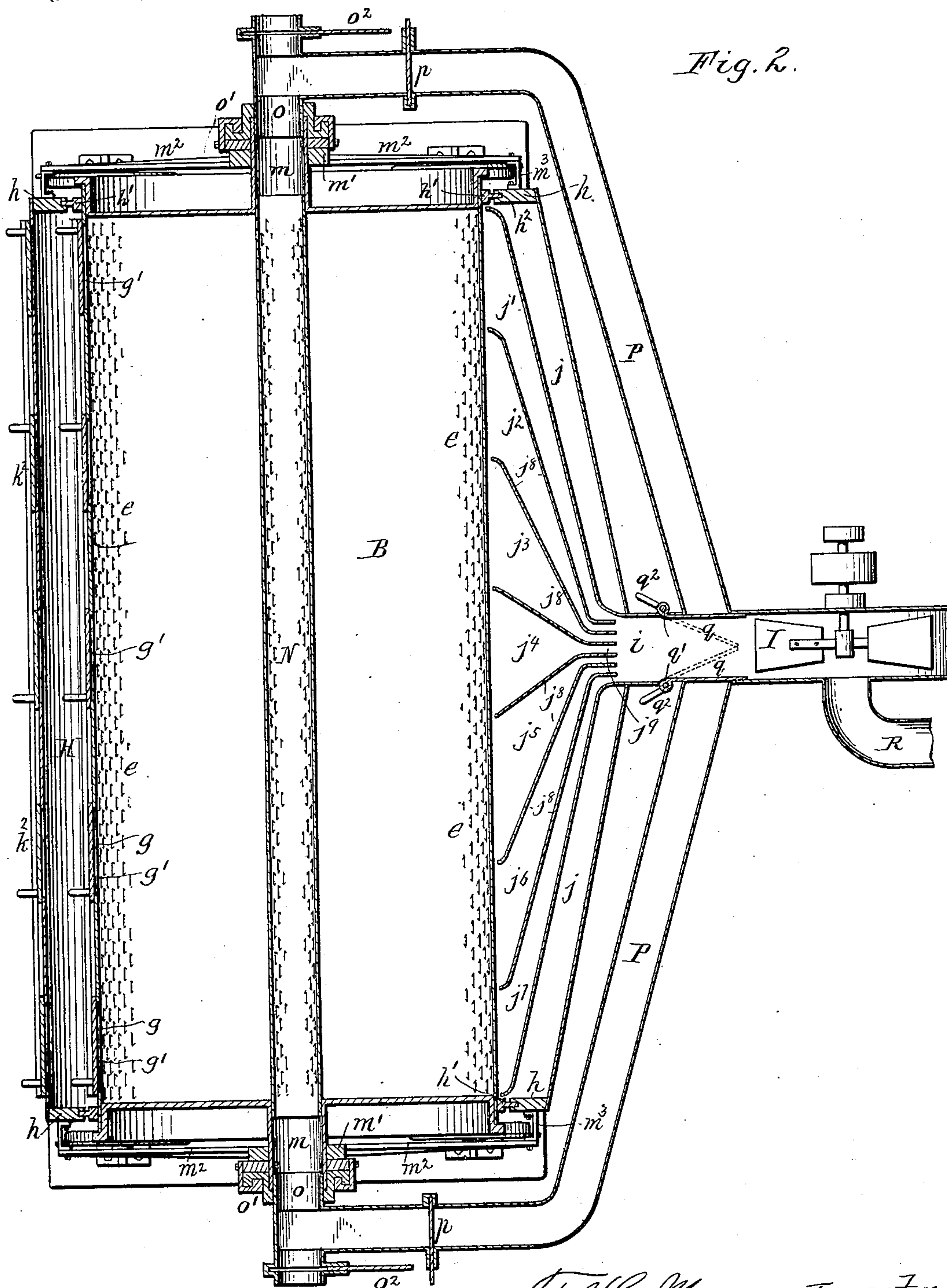
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MALTING AND DRYING APPARATUS.

(Application filed Aug. 14, 1900.)

3 Sheets—Sheet 2.

(No Model.)



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UNITED STATES PATENT OFFICE.

FREDERICK H. C. MEY, OF BUFFALO, NEW YORK.

MALTING AND DRYING APPARATUS.

SPECIFICATION forming part of Letters Patent No. 677,787, dated July 2, 1901.

Application filed August 14, 1900. Serial No. 26,836. (No model.)

To all whom it may concern:

Be it known that I, FREDERICK H. C. MEY, a citizen of the United States, residing at Buffalo, in the county of Erie and State of New York, have invented new and useful Improvements in Malting and Drying Apparatus, of which the following is a specification.

This invention relates to an apparatus which is designed more particularly for germinating and drying barley in the manufacture of malt, but which may be used for drying a variety of other substances.

My apparatus belongs to that class of driers which consist of a perforated drum having suitable means for slowly rotating it and connected with a fan or air-propelling device, whereby an air-current is maintained through the drum for carrying off moisture and the gases evolved during the germinating stage.

One of the objects of my invention is to provide the drum with means for evenly distributing the air-current from end to end of the drum, so that the grain in all portions of the drum is uniformly subjected to the action of the current.

Another object of my invention is to provide the apparatus with convenient and efficient spraying devices for moistening the contents of the drum and which permit the supply of water to be varied in different portions of the drum, as may be required by the uneven growing of the grain.

In the accompanying drawings, consisting of three sheets, Figure 1 is an end view of my improved apparatus, partly in section. Fig. 2 is a horizontal section thereof in line 2 2, Fig. 1. Fig. 3 is a fragmentary longitudinal section in line 3 3, Fig. 1. Fig. 4 is a transverse central section of the apparatus.

Like letters of reference refer to like parts in the several figures.

A is the bed or foundation of the horizontal malting and drying drum B, which latter is supported at opposite ends on rollers C, journaled in standards rising from the bed. The drum is slowly rotated by any suitable driving mechanism. In the construction shown in the drawings the machine is driven by a belt running around a pulley *d*, secured to the shaft of one of the rollers C, said roller driving the drum by its frictional contact therewith. The body or cylindrical wall of

the drum is provided over its entire surface with air slits or perforations *e*, while its imperforate heads are provided with inspection-openings, which are closed by doors *f*. The drum is provided in its wall with a longitudinal series of combined feed and discharge openings *g*, which are closed by slides or doors *g'*, guided in suitable ways arranged at the longitudinal edges of said openings, as shown in Figs. 2 and 4.

H is an annular air-chamber which surrounds the drum and extends from end to end thereof. This air-chamber is closed on all sides except its inner side, which is open, so that the chamber communicates with the interior of the drum through the air slits or perforations of the latter. In order to form a tight joint between the drum and the end walls *h* of the air-chamber, the drum is provided with projecting annular ribs or flanges *h'*, which fit into corresponding grooves *h''*, formed in the inner edges of said end walls, as shown in Figs. 2 and 3.

I is a fan or other air-propelling device having its spout *i* connected with one side of the air-chamber H, whereby an air-current is created through the chamber of the drum communicating therewith. The portion of the chamber with which the fan-spout *i* connects is preferably enlarged or bulged outwardly to form a spout *j*. This spout is widest at the middle of the chamber and gradually decreases in width toward the ends of the same and is of the same depth as the fan-spout, as shown in Figs. 1 and 2. The spout *j* of the air-chamber is divided into a number of separate air channels or passages *j'* to *j''*, which lead from the delivery end of the fan-spout *i* toward the middle and end portions of the drum, so as to divide the incoming air-current and distribute the same throughout the length of the air-chamber and the drum. These air-passages are formed by vertical walls or partitions *j'''*, which extend vertically from the top to the bottom of the chamber-spout *j*. As shown in Fig. 2, the outer portions *j''''* of these partitions are substantially parallel with the side walls of the fan-spout *i*, while their remaining portions diverge toward the cylindrical wall of the drum, so that the air-passages formed by the same gradually widen or flare toward the

drum. The partitions j^8 terminate in close proximity to the drum, and the channels formed between the same open into the portions of the annular air-chamber H and above and below the partitions, so that the divided air-current is free to distribute itself throughout the circumference of the air-chamber and enter the perforated drum on all sides thereof.

The air-chamber is provided in its top and bottom with a longitudinal series of feed and discharge openings, which are closed by slides or doors $k k'$, and in its front side with a longitudinal series of inspection-openings closed by doors k^2 . This series of inspection-doors extends from end to end of the air-chamber, and the series of filling and discharge doors g' of the drum also extends throughout the length of the drum, so that upon bringing the doors of the drum opposite the inspection-doors of the air-chamber the grain in any portion of the drum can be conveniently examined. The air-chamber is rigidly supported at opposite ends by standards l , secured to the bed A. The heads of the drum B are provided with hollow trunnions m , which turn in hubs or bearings m' , carried by radial arms or spiders m^2 . The outer ends of these spiders are rigidly connected with the end walls of the air-chamber H by brackets m^3 , as shown in Figs. 2 and 3.

N is a perforated air-discharge pipe for moisture and gases arranged axially in the drum and communicating at its ends with the hollow trunnions m , in which said pipe is secured. $o o$ are stationary exit-pipes connected with the trunnions m by annular union-joints o' , of any suitable construction, which permit the drum to turn relatively to said pipes. These pipes are open at both ends and each is provided at its outer end with a slide or damper o^2 .

P P are auxiliary air pipes or conduits leading from opposite sides of the fan-spout i to the exit-pipes o , respectively, and connected to the latter on the inner sides of their dampers o^2 . Each of the pipes P is provided with a valve or damper p .

q represents valves which control the passage of the air from the fan-spout into the air-pipes P P. These valves may be of any ordinary construction, but preferably consist of horizontally-swinging wings arranged in the fan-spout i and pivoted at their inner ends to the side walls of the spout by upright pins q' , the valves having arms q^2 for operating them. When these valves are closed, as shown by full lines in Fig. 2, they cover the adjacent ends of the air-pipes P, while when they are opened to the position shown by dotted lines in said figure their free ends close against each other and bridge the fan-spout, thereby preventing the passage of the air into the chamber H, but allowing the same to enter the pipes P.

R is the inlet-pipe of the fan-case i , connected with the eye thereof. This pipe is closed at its outer end and preferably pro-

vided with three branch or supply pipes $r r' r^2$, each having a valve or damper r^3 . The pipe r opens into the atmosphere and supplies the apparatus with cold air or air at the ordinary prevailing temperature. The pipe r' is connected with a flue or chamber S, containing moistened air, and the pipe r^2 with the hot-air flue S' of a furnace or other heater. (Not shown in the drawings.) By providing the fan with these several branches the temperature and the degree of humidity of the air passed through the apparatus can be properly regulated to suit the nature of the material under treatment. The quantity of moist air supplied to the apparatus is regulated by opening the damper of the moist-air branch r' more or less, and the air is tempered as required by properly adjusting the dampers of the hot and cold air branches $r r^2$.

T is a perforated spray or sprinkling pipe arranged lengthwise in the upper portion of the air-chamber H for supplying the necessary moisture to the contents of the drum in malting. This spray-pipe extends throughout the length of the drum and consists of a number of independent sections t' to t^5 of suitable length, each of which is supplied from a main water-pipe t^6 by an independent branch pipe t^7 , which is provided with a valve or stop-cock t^8 . In malting in such drums it is found that the grain in some portions of the drum requires more or less moisture than that in other portions. The temperature of the air near the air-inlets of the drum, especially when hot air is supplied, is higher than in those parts of the drum which are remote from the air-inlets. The grain therefore dries and grows more rapidly and requires more water near the air-inlets than remote from the same. By providing the apparatus with the sectional spray-pipe T and furnishing each section of the pipe with an individual stop-cock the supply of water to the different portions of the drum can be nicely regulated as may be required to obtain the best results.

The operation of the machine is as follows: The drum is filled with the material to be treated by turning the same so as to bring its feed and discharge openings g under the feed-opening in the top of the air-chamber H and then opening the feed-doors g' and k for admitting the grain, the doors being again closed after loading the drum. The dampers o^2 of the exit-pipes o are next opened, the dampers p of the auxiliary air-pipes P are closed, and the valves q in the fan-spout are adjusted to the position shown by full lines in Fig. 2, so as to direct the air-current from the fan into the air-chamber H. When the machine is used for malting, the grain is steeped in a well-known manner before being fed into the drum, and the germinating operation is conducted in a manner common to this class of machines, the drum being rotated only from time to time during this stage of the process for turning the grain. Upon setting the fan I in motion the air blast or

current produced by the same is divided and distributed throughout the length of the air-chamber H by the partitions j^8 and diffused throughout the circumference thereof, so that
 5 the current passes inwardly from all portions of said chamber through the perforated drum and through the mass of grain in the same. After permeating the grain the air-current laden with the gases evolved during the germination of the grain enters the axial discharge-tube N, whence it escapes through the exit-pipes o into the atmosphere. The material in the drum is sprinkled when necessary by bringing the feed and discharge doors
 10 g' of the drum under the sprinkler-pipe T and then opening said door and the proper stop-cocks t^8 of said pipe. When the germination of the grain is completed, the same is dried by directing hot air through the drum, this
 20 being done by closing the dampers of the cold and moist air branches r r' of the fan-case and opening the damper of the hot-air branch r^2 . If desired, the course of the air-current through the drum may be reversed for more
 25 thoroughly drying the material. This is done by closing the dampers o^2 of the exit-pipes o , opening the dampers p of the auxiliary air-pipes P, swinging the valves q to the dotted position shown in Fig. 2, and opening one of
 30 the doors k or k^2 of the air-chamber H. The air from the fan-case is now directed laterally into and through the pipes P and inwardly through the exit-pipes o into the perforated axial pipe N of the drum, whence it
 35 escapes into the drum and passes in all directions toward the periphery of the drum, the air finally entering the surrounding air-chamber H and escaping through the open door k or k^2 thereof into the atmosphere. The
 40 air thus permeates the grain in the drum in the reverse direction to that in which it was first passed through the drum, thereby effecting a thorough drying of the same. After drying the material the same is discharged
 45 from the drum by turning the latter so as to bring its feed and discharge doors g' into register with the discharge-doors k' of the air-chamber and then opening said doors.

By providing the air-chamber H with the
 50 herein-described means for distributing the air throughout the length of the drum and with the sectional spray-pipe T the grain in all portions of the drum is treated uniformly during the germinating and drying stages and
 55 an even product is obtained.

While I prefer to employ a blast-current, as herein described, a suction-current may be used, if desired.

I claim as my invention—

60 1. The combination with a perforated rotary drum, of an air-chamber applied to the outer side of the drum and communicating at its inner side with the interior thereof, said chamber being provided with a central air-

inlet and having internal partitions which
 65 lead from said inlet and diverge as they approach the periphery of the drum for distributing the incoming air-current throughout the length of the drum and an air-propelling device connected with the inlet of
 70 said air-chamber, substantially as set forth.

2. The combination with a rotary malting-drum provided with inlets and means for inducing air-currents through the same, of a longitudinal series of sprinkler-pipes arranged along the drum, branch pipes connecting each sprinkler-pipe with a water-supply pipe, and a regulating-cock arranged in each branch pipe, whereby the supply of water to different parts of the drum can be
 80 regulated, substantially as set forth.

3. The combination with a perforated rotary drum having an axial air-discharge tube, of stationary air-exit pipes arranged at the ends of the drum in line with its axial tube
 85 and connected with the latter by union-joints and provided with valves or dampers, an air-chamber applied to the outer side of the drum and communicating at its inner side with the interior thereof, a fan-case having
 90 its discharge-spout connected with said air-chamber, auxiliary air-pipes leading from said discharge-spout to said air-exit pipes, respectively, and connected with said pipes on the inner side of their dampers, a damper
 95 arranged in each of said auxiliary air-pipes, and a valve arranged in said discharge-spout for directing the air from the fan either into said air-chamber or into said auxiliary air-pipes, substantially as set forth. 100

4. The combination with a perforated rotary drum having an axial air-discharge tube, of stationary air-exit pipes arranged at the ends of the drum in line with its axial tube and connected with the latter by union-joints
 105 and provided with valves or dampers, an air-chamber applied to the outer side of the drum and communicating at its inner side with the interior thereof, a fan-case having its discharge-spout connected with said air-chamber, auxiliary air-pipes leading from said discharge-spout to said air-exit pipes, respectively, and connected with said pipes on the inner side of their dampers, a damper
 110 arranged in each of said auxiliary air-pipes, and a pair of swinging valves pivoted in said spout and arranged to close the adjacent ends of said auxiliary air-pipes when moved against the sides of the discharge-spout and to open said pipes and bridge the discharge-
 120 spout when swung inwardly against each other, substantially as set forth.

Witness my hand this 8th day of August, 1900.

FREDERICK H. C. MEY.

Witnesses:

CARL F. GEYER,

CLAUDIA M. BENTLEY.