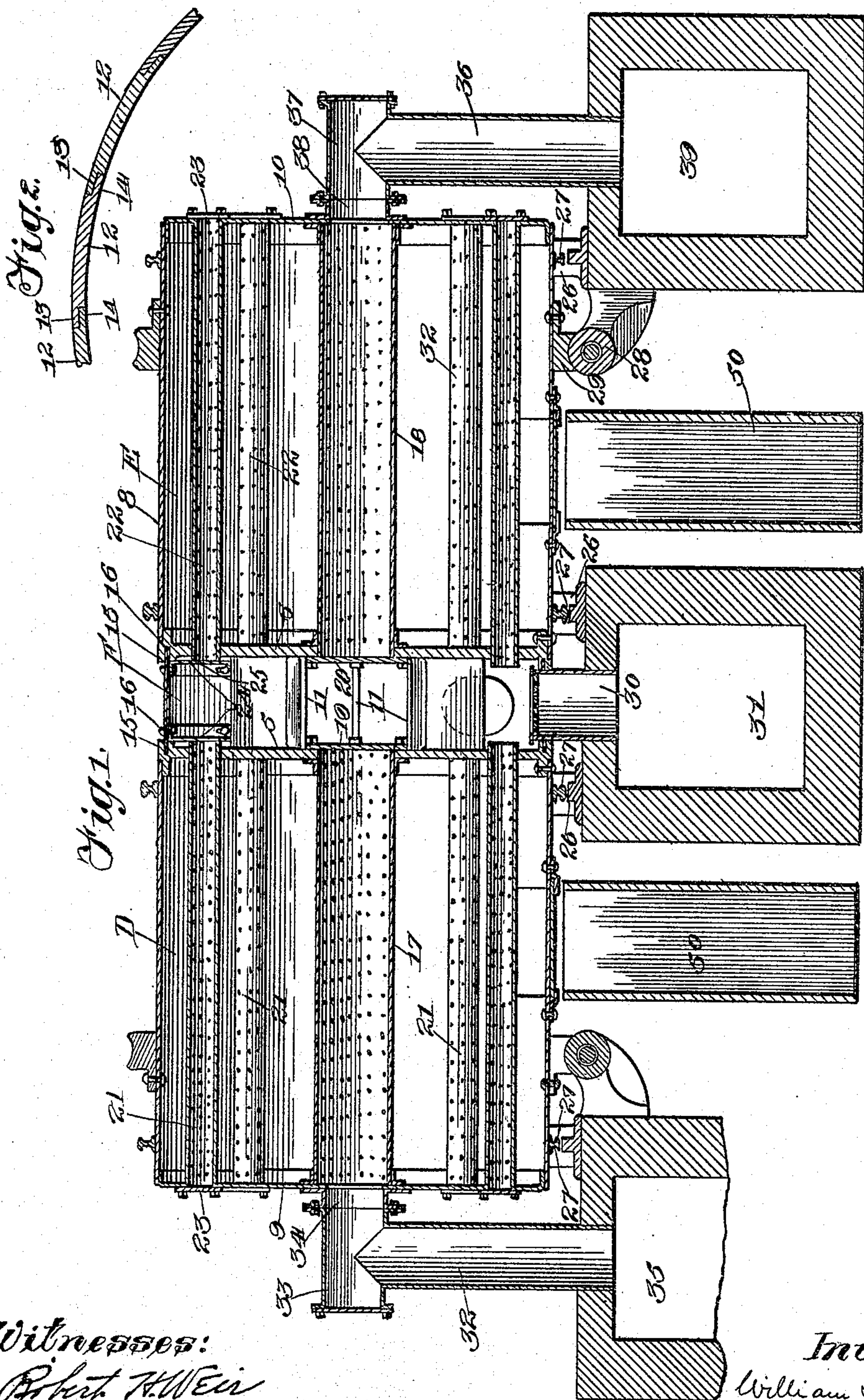


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 APPARATUS FOR DRYING MALT.  
 APPLICATION FILED SEPT. 8, 1903.

937,012.

Patented Oct. 12, 1909.  
 3 SHEETS—SHEET 1.



Witnesses:  
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 O. M. Herrick

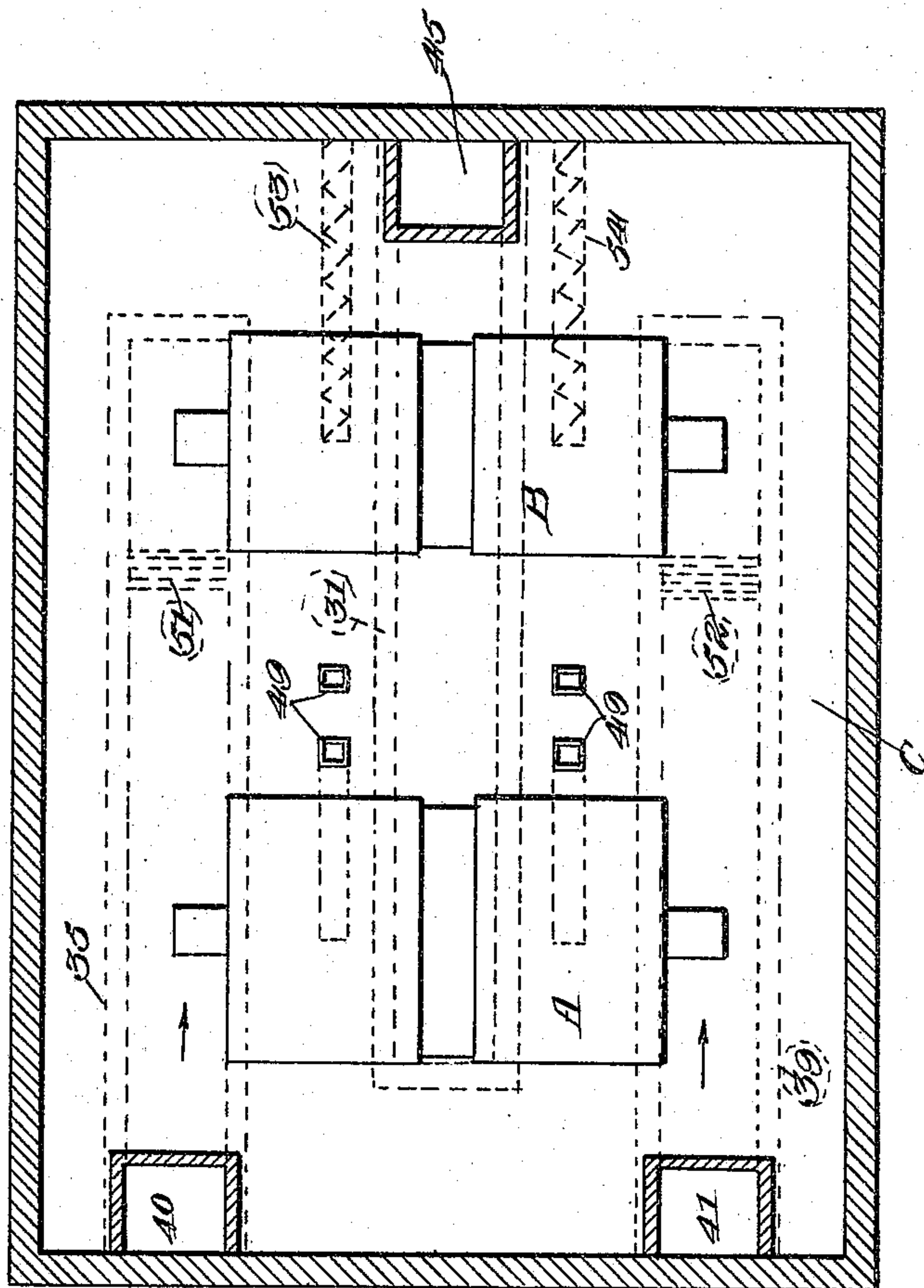
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Fig. 3.



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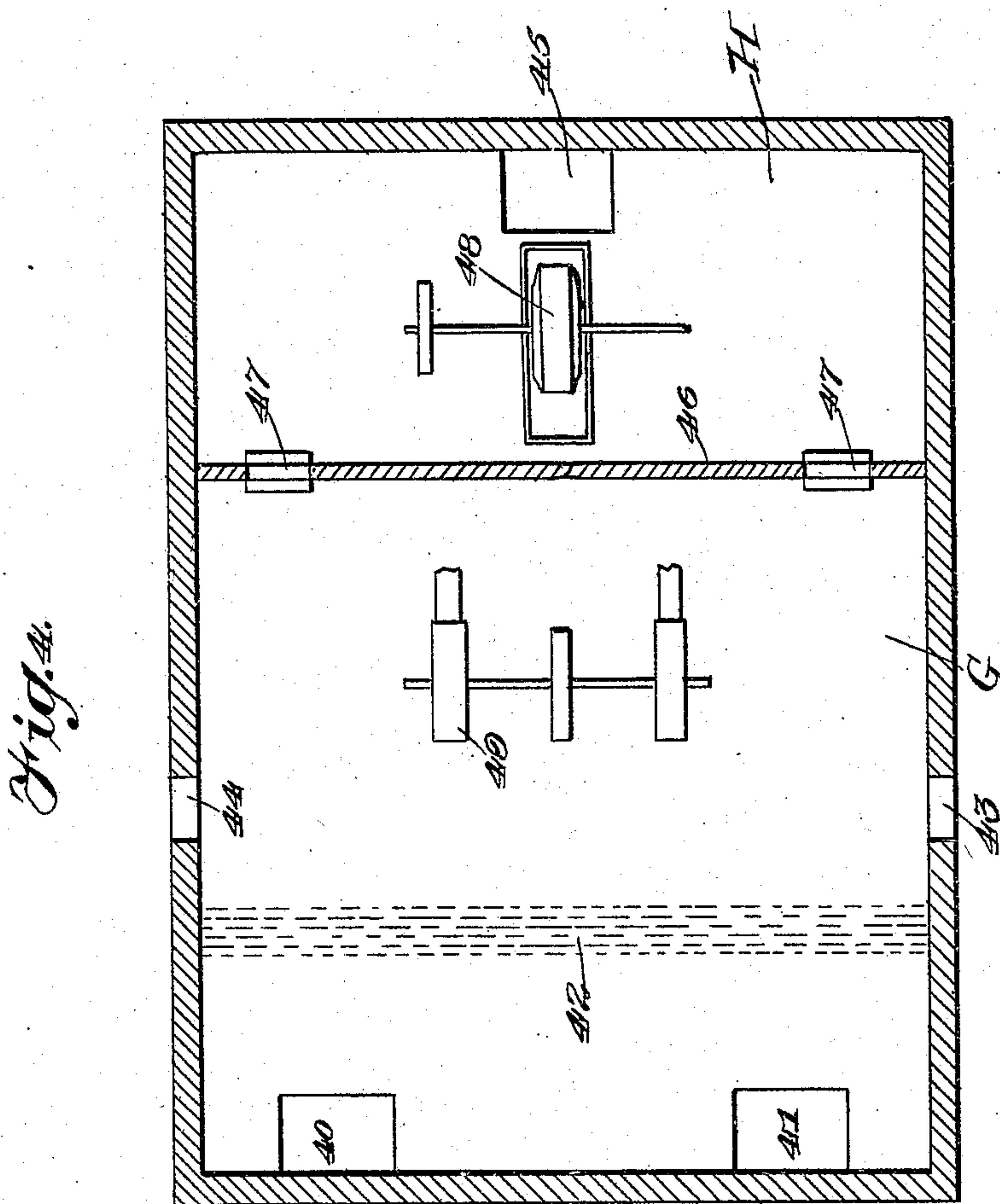
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# UNITED STATES PATENT OFFICE.

WILLIAM H. PRINZ, OF CHICAGO, ILLINOIS.

## APPARATUS FOR DRYING MALT.

937,012.

Specification of Letters Patent.

Patented Oct. 12, 1909.

Application filed September 8, 1903. Serial No. 172,270.

*To all whom it may concern:*

Be it known that I, WILLIAM H. PRINZ, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Apparatus for Drying Malt, of which the following is a specification, reference being had to the accompanying drawings.

My invention relates to apparatus for drying malt, and particularly to apparatus of the general type illustrated and described in my application for patent of even date herewith, (Case A) in which hot air for drying purposes is conducted from suitable air-heating devices to a plurality of malt-containing receptacles in the form of rotatable drums,—fresh heated air being supplied to the different receptacles separately, so that the malt in the finishing-drum is not subjected to the influence of air containing more moisture than that introduced into the withering-drum. In my said application I have illustrated my invention as applied to a perforated drum,—the air being forced through the perforations in the drums in one direction or the other, depending on the direction of the current of air.

My present invention has to do with the embodiment of the general principles set forth in my said application to imperforate drums, in which the air-currents cannot pass through the shells of the drums, but flow through the malt-compartments from end to end.

To this end my invention consists in the features of construction and arrangement of parts hereinafter described and illustrated in the drawings.

What I regard as new is set forth in the claims.

In the accompanying drawings,—Figure 1 is a longitudinal vertical section of one of the drums; Fig. 2 is a sectional detail of the central part of the casing of the drum which forms the shell of the intermediate compartment; Fig. 3 is a horizontal section of the lower floor of a building adapted to contain the drying-apparatus; and Fig. 4 is a horizontal section of the floor above that shown in Fig. 2.

It should be understood that my improved drying-apparatus or kiln consists of a greater or less number of withering and finishing drums, each of which is rotatably mounted and is caused to rotate slowly by

suitable driving-mechanism. The shells of the drums are imperforate, and each drum is divided into a plurality of malt-compartments separated by intermediate compartments,—the latter being non-rotary. Each compartment is provided with suitable means for distributing air therethrough,—such air-distributing devices being in communication with a series of air-tunnels, through certain of which fresh hot air is supplied; the air laden with moisture taken up from the malt being taken out through other of said tunnels. Both the withering and finishing drums are supplied through the same tunnels; and auxiliary heating-devices are provided between the withering and finishing drums, so as to further heat the air supplied to the finishing-drums. A fan, or other equivalent mechanism, for maintaining a circulation of air through the drums is provided; also suitable means for first heating the air.

Referring to the drawings for a detailed description of my improved apparatus,—A indicates one of the withering-drums and B one of the finishing-drums, which, as shown in Fig. 3, are arranged side by side in a suitable room C, which is preferably on the first floor of the building. Each of the drums A—B is divided by intermediate heads 5—6 into three compartments,—D—E indicating the end or malt compartments, and F the intermediate compartment, the latter being non-rotary.

7—8 indicate the casings or shells of the compartments D—E, which are imperforate,—their inner ends being secured to the heads 5—6, and their outer ends to heads 9—10 of the drums, as shown in Fig. 1.

11 indicates a series of plates, which are placed between the heads 5—6 and are rigidly secured thereto, to brace and hold said heads in position.

The casing of the compartment F is composed of a series of overlapping matched plates 12, each having upper and lower tongues 13—14 at its opposite ends, respectively. The side edges of the plates 12 fit loosely between annular flanges 15—16 carried by the heads 5—6, as shown in Fig. 1. By this construction the plates 12 are free to move outward slightly under stress of the air-pressure in the compartment F,—thus insuring a substantially air-tight closure by contact with the flanges 15.

17—18 indicate axial perforated conduits



in the compartments D—E, respectively,—their ends being secured to the heads 9—5, 10—6, respectively.

19—20 indicate imperforate covers for the inner ends of the conduits 17—18, which are secured to the heads 5—6, respectively,—thereby tightly closing the inner ends of said conduits.

21—22 indicate perforated air-conduits in the outer portions of the compartments D—E, respectively,—said conduits being secured in the heads of their respective compartments. The inner ends of the conduits 21—22 extend through the heads 5—6 into the compartment F. The outer ends of the conduits 21—22 are closed by swinging caps 23, which may be swung aside for the purpose of cleansing said conduits.

24—25 indicate segmental plates, loosely secured to the upper plates 12 in position to overlie the inner ends of the uppermost conduits 21—22, as shown in Fig. 1. The object of this construction is to close such of the conduits 21—22 as lie above the level of the malt in the compartments D—E. During the rotation of the drum the upper surface of the malt assumes an inclined position,—thus exposing such of the conduits 21—22 as happen to be uppermost in their respective compartments; and the object of the plates 24—25 is to close the inner ends of such exposed conduits, so that the air in its passage through the compartments D—E will be compelled to pass through the malt.

26 indicates a series of supports on which the drum rests,—said supports carrying rollers adapted to be engaged by annular tracks 27 carried by the drum.

28 indicates worms, which engage worm-wheels 29 for driving the drum.

30 indicates a conduit, which communicates with the lower portion of the compartment F and opens into an air-tunnel 31.

32 indicates an air-conduit, which communicates through a T-connection 33 with an extension 34 of the conduit 17. The conduit 32 communicates with a tunnel 35, as shown in Fig. 1.

36 indicates a conduit, which communicates through a T-connection 37 with an extension 38 of the conduit 18. The conduit 36 communicates with a tunnel 39. Said tunnels extend under the room C below the drums A—B, as shown in Fig. 3,—the tunnels 35—39 communicating with flues 40—41, respectively, which extend to a room G on the floor above, in which is placed a heating-coil 42 which extends across said room, so that air flowing through the room will be compelled to pass over said coil.

43—44 indicate openings in the wall of the room G, for conducting fresh air thereto. The coil 42 lies between said openings 43—44 and the flues 40—41.

The tunnel 31 communicates with a flue 45

at the opposite end of the room C,—said flue opening into a room H adjacent to the room G and separated therefrom by a partition 46 having one or more valved openings 47, as shown in Fig. 4. In the room H is provided an exhaust-fan 48, through which air is drawn up through flue 45 from tunnel 31.

49 indicates an elevator, by which malt is transferred from drum A to drum B. Said elevator is preferably of the ordinary bucket type, but any other suitable form of apparatus may be employed.

50 indicates chutes, which deliver malt from the compartments D—E of drum A to the elevator.

51—52 indicate heaters in the tunnels 35—39 between the drums A—B, as shown in Fig. 3.

53—54 indicate conveyers, for carrying off malt from the finishing-drum B.

The operation is as follows: By means of the fan 48 air is exhausted from tunnel 31 through flue 45,—consequently, as said tunnel communicates with compartment F, the air in said compartment passes down into tunnel 31, thereby causing a flow of air from the compartments D—E through the lower conduits 21—22 into compartment F. Under the influence of suction air enters the compartments D—E axially through conduits 17—18, flowing through tunnels 35—39, which are supplied with hot fresh air from room G through flues 40—41. As the air flows in the direction indicated by the arrows in Fig. 3, it first reaches the withering-drum A, but as the capacity of the tunnels 35—39 is greater than the requirements of the drum A, the surplus fresh hot air passes on in said tunnels to heaters 51—52, where it is still further heated,—thence entering drum B in the manner already described, the circulation in both drums A—B being the same. I thus supply both drums with fresh hot air which is provided separately to said drums, although furnished in great part through the same series of conduits.

If desired, the direction of flow of the air may be reversed,—the air being introduced through tunnel 31 and the outer conduits 21—22, and withdrawn through the axial conduits 17—18 and tunnels 35—39. To effect this operation, rooms G—H are rearranged, so that the air passes through the heating-devices 42 to flue 45,—being conducted by said flue to tunnel 31.

My invention is not restricted to the specific details of the constructions described, except in so far as they are particularly claimed.

That which I regard as my invention and desire to secure by Letters Patent is,—

1. A drying apparatus for malt, comprising a plurality of imperforate drums adapted to contain malt, an air-chamber having a



conduit for heating air, means for conducting heated air from said air-chamber to said drums and heating means in said conduit between said drums for supplying air at different temperatures to different drums.

2. A drying-apparatus for malt, comprising a plurality of independently rotatable imperforate malt-holding receptacles, air-heating means, means for supplying separate currents of heated air from said heating-means to said receptacles, and additional means for heating the air supplied to one of said receptacles, substantially as described.

3. A drying apparatus for malt, comprising a plurality of imperforate drums each having a plurality of malt-holding compartments, an air-chamber having means for heating air, means for supplying air from said air-chamber to the compartments in said drums, and additional means for heating the air supplied to certain of said drums.

4. A drying apparatus for malt, comprising a plurality of drums each having a plurality of imperforate malt-holding compartments, means for heating air, means for conducting air from said heating means through the compartments of the different drums, and means for varying the temperature of the air supplied to different drums.

5. A drying-apparatus for malt, comprising a plurality of rotating imperforate malt-holding compartments and stationary compartments communicating therewith, means for heating air, air-conduits communicating axially with said compartments, air-conduits in said malt-holding compartments near the outer walls thereof, and means for supplying separate currents of heated air from said heating-means to said compartments, substantially as described.

6. A drying-apparatus for malt, comprising a plurality of rotating imperforate malt-

holding compartments and stationary compartments communicating therewith, means for heating air, air-conduits communicating axially with said compartments, air-conduits in said malt-holding compartments near the outer walls thereof, an air-tunnel communicating with the stationary compartments, an air-tunnel communicating with the outer ends of the malt-holding compartments, and means for causing separate currents of heated air to flow from said heating-means through the compartments.

7. A drying-apparatus for malt, comprising a plurality of rotating imperforate malt-holding compartments and stationary compartments communicating therewith, means for heating air, air-conduits communicating axially with said compartments, air-conduits in said malt-holding compartments near the outer walls thereof, an air-tunnel communicating with the stationary compartments, an air-tunnel communicating with the outer ends of the malt-holding compartments, means for causing separate currents of heated air to flow from said heating-means through the compartments, and heating-means in said tunnels between certain of said compartments.

8. A drying apparatus for malt, comprising a plurality of independently-rotatable imperforate malt-holding receptacles each having a plurality of malt-holding compartments, an air chamber having means for heating air, a conduit for supplying air from said air-chamber to said receptacles, and means for varying the temperature of the air supplied to certain of said receptacles.

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