

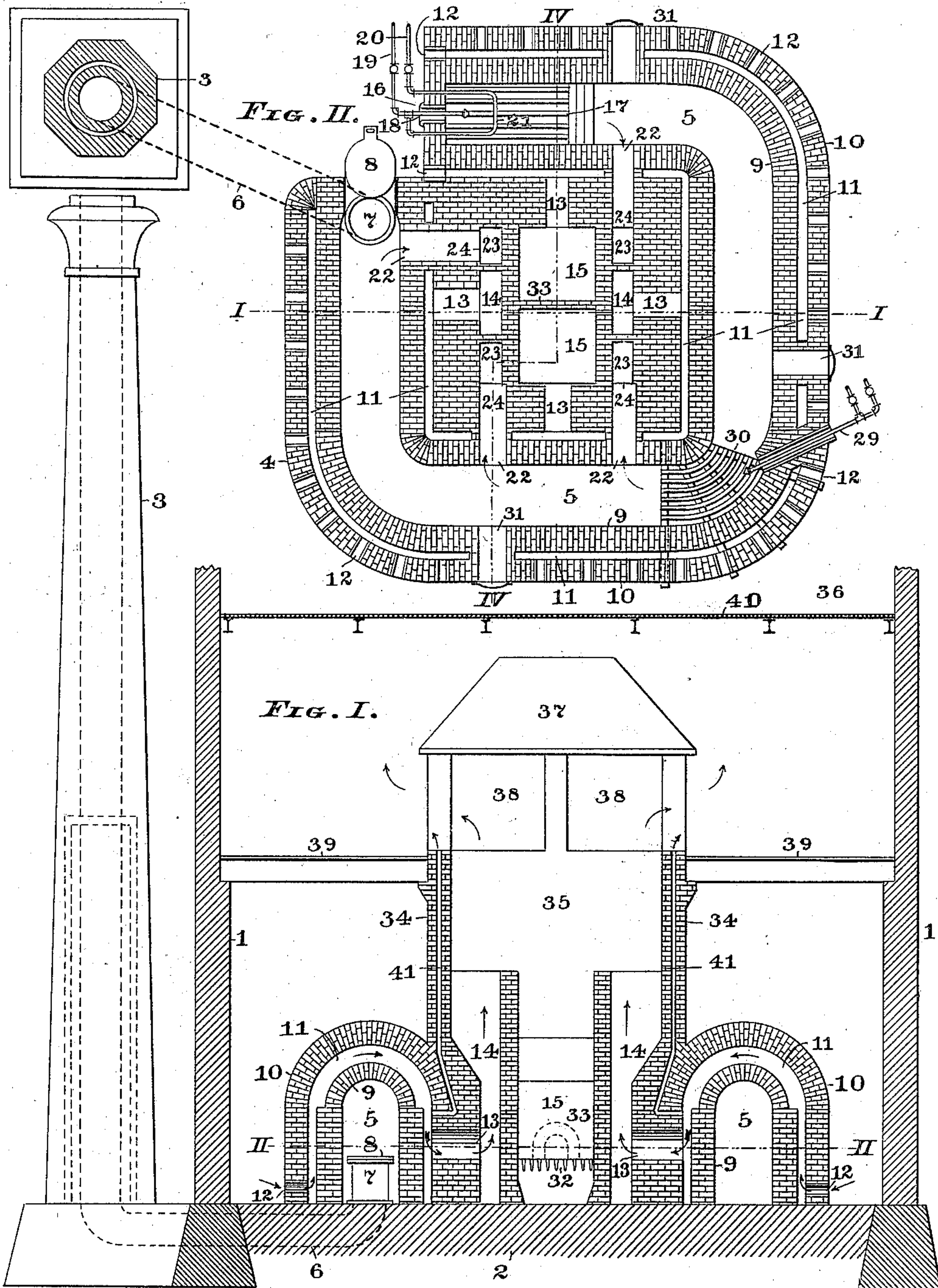
(No Model.)

2 Sheets—Sheet 1.

F. RADEMACHER.  
OIL BURNING MALT KILN.

No. 561,518.

Patented June 2, 1896.



WITNESSES:

Frank Van Hook  
Jas. White.

INVENTOR

F. Rademacher

BY *Amighr. Rrrr.*

ATTORNEYS

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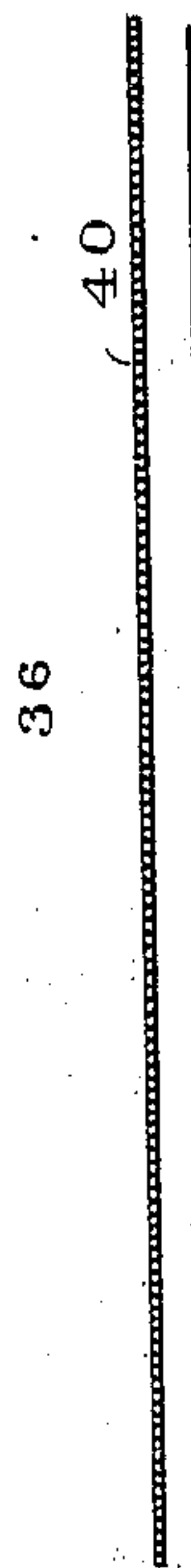


Fig. III.

36

40

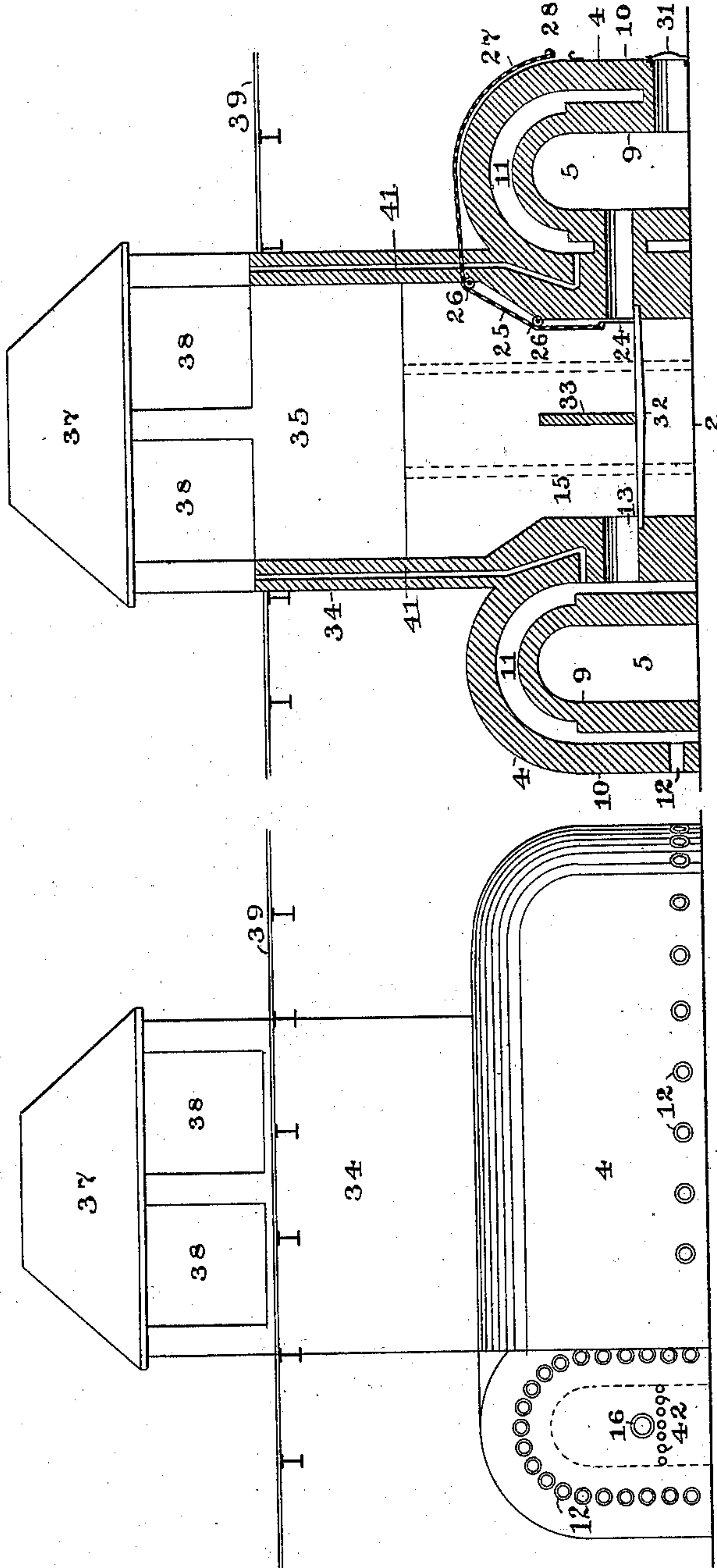


Fig. IV.

36

40

WITNESSES:

*Frank Van Hook*  
 *Jas. W. White*

INVENTOR

*F. Rademacher*

BY

*Amos Bros.*

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# UNITED STATES PATENT OFFICE.

FRANK RADEMACHER, OF LOS ANGELES, CALIFORNIA, ASSIGNOR OF ONE-HALF TO JOSEPH MAIER AND GEORGE ZOBELEIN, OF SAME PLACE.

## OIL-BURNING MALT-KILN.

SPECIFICATION forming part of Letters Patent No. 561,518, dated June 2, 1896.

Application filed December 12, 1895. Serial No. 571,933. (No model.)

*To all whom it may concern:*

Be it known that I, FRANK RADEMACHER, a citizen of the United States, and a resident of the city of Los Angeles, in the county of Los Angeles and State of California, have invented certain new and useful Improvements in Oil-Burning Malt-Kilns, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, which form a part of this specification.

My invention relates to an improved construction of malt-drying kilns, and my invention consists in certain features of novelty hereinafter described and claimed.

Figure I represents a transverse vertical section of my improved kiln, taken on line I I, Fig. II. Fig. II is a horizontal section taken on line II II, Fig. I. Fig. III represents a side elevation of the operating portion of the kiln. Fig. IV represents a vertical section taken on line IV IV, Fig. II.

Referring to the drawings, 1 represents the outer or supporting walls, 2 the bottom of the kiln, and 3 the stack for carrying off the products of combustion.

4 represents the furnace or kiln proper set within the walls 1, the furnace being preferably rounding in cross-section.

5 represents a conduit through which the products of combustion are carried around the furnace of kiln in a circular direction and discharged through a pipe 6 into the stack 3, said pipe being connected with the extreme inner end of the conduit, the body of the pipe being laid beneath the floor-line of the kiln. The inner end of the pipe 6 extends up a short distance into the conduit, as shown at 7, where it may be closed in the form of a hollow pedestal by means of a sliding damper 8. The conduit 5 is inclosed by an inner arched furnace-wall 9 and an outer arched wall 10, there being an arched air-chamber 11 between said walls.

12 represents a series of port-holes through which the outer pure air is admitted to the chamber 11. Said outer air circulates over the inner arched furnace-wall 9 and is discharged through ports 13 into vertical side flues 14 and central flues 15.

16 represents the mouth of the furnace, hav-

ing grates 17 for the support of any suitable material, against which the oil is discharged, and 18 an oil-burner of any approved pattern.

19 represents the oil-supply pipe, and 20 the steam-supply pipe for vaporizing the oil.

21 represents a coil or section of pipe extending into the furnace, by which I superheat the steam before passing it into the injector. I preferably use steam from the main battery of boilers; but steam may be generated in the kiln-furnace, if desired.

22 represents a series of ports having their outer ends connecting with the conduit 5 and their inner ends connecting with vertical intermediate flues 23. Thus when desired the heat may be discharged directly from the conduit into the flues 23, the ports 22 being normally closed by means of dampers 24, which may be raised at will by means of a cable or chain 25, passing over pulleys 26 and extending to the outer side of the furnace, as shown at 27, with a hook 28, to which the end of the chain may be secured, and thus hold the damper in its raised position.

29 represents an extra oil-burner, which is located at some suitable point in the conduit, the purpose of which will be explained hereinafter.

30 represents a grating-surface for the support of fire-brick or other substance against which the burning oil is discharged.

31 represents a series of manholes, by which access may be had to the conduit 5.

32 represents supporting-bars, and 33 a vertical partition resting thereon, said partition dividing the central flues 15.

34 represents the central wall of the kiln, inclosing a central heat-discharging chamber 35, through which the heat from the furnace ascends and is discharged into one or more drying-chambers 36.

The wall 34 is surmounted by a conical hood 37, which prevents the dropping of foreign substances into the chamber 35, the conical top giving direction to the heat-current that passes upward around its base, the heat-current having free passage from the chamber 35 through a series of open spaces 38.

39 represents a floor supported by the central wall 34 and the outer wall 1, said floor affording access to the top of the kiln proper



and serving to catch the sprouts as they fall from the perforated drying-floors above.

40 represents the drying-floors, of which there may be any number desired, according to the capacity of the kiln, said drying-floors being placed one over the other and being perforated in order that the heated air may readily pass therethrough.

41 represents auxiliary flues in the central wall 34, through which a small portion of the heat passes from the chamber 11 directly to the top of the kiln.

42 represents a series of openings in the front of the furnace to supply air to the oil-burner.

The operation is as follows: The damp sprouted malt is placed on the drying-floors, heat being generated in the furnace for drying the same. During the first step of the drying process the damper 8 is kept open, allowing the products of combustion, after throwing off their heat in their passage through the conduit 5, to pass out through the pipe 6 and stack 3. As the furnace becomes heated the air in the chamber 11 is heated and passes through the ports 13 and up through the central chamber 35 and is discharged into the drying-chambers, fresh pure air being supplied to the chamber 11 through the ports 12. It will thus be seen that the first heated air passing to the drying-chambers is an indirect heat, the air coming entirely from the outside of the furnace and being in no way contaminated by injurious products of combustion that might arise from the furnace before combustion is complete, and at the same time affording a slower heat during the first step of the process. After the malt has been dried to a certain condition a greater amount of heat is desirable, and to gain this end I open the dampers 24 and permit the heat-current to pass direct from the conduit 5, through the ports 22, into the flues 23, and thence into the drying-chambers. As the combustion is by this time complete I facilitate the carrying out of the second step by closing the damper 8 a part or all of the way, thus cutting off, if desired, the connection between the conduit and stack and causing all of the heat-current to pass up through the drying-rooms. A greater amount of heat can be generated, if desired, by using the extra oil-burner, and additional burners may be introduced without altering the process.

The ports 13 and 22 increase in size as their distance is increased from the mouth of the furnace, so that although the heat passing through the last ports may not have as high a temperature as that passing through the first ports the greater quantity admitted will compensate for the decrease in temperature.

By the construction of kiln described and the method of operating the same I am enabled to manufacture malt liquors of better quality and pleasanter taste than that produced under the ordinary form of drying. By the use of oil I am enabled to produce at

the proper time a quick heat of the proper temperature to dry the malt in a manner to secure the best results.

I claim as my invention—

1. In a malt-kiln, the combination of a furnace made substantially circular in horizontal cross-section, a circular conduit extending around the furnace, means for creating heat at one end of the conduit, a discharge-stack at the opposite end of the conduit located in close proximity to the mouth of the conduit, suitable malt-drying chambers and means for conveying heat generated by the furnace, to the drying-chambers, substantially as set forth.

2. In a malt-kiln, the combination of a furnace made substantially circular in horizontal cross-section, a circular conduit therein, an air-chamber partly surrounding the conduit, suitable malt-drying chambers, and a series of ports and heat-carrying flues in the center of the kiln for the passage of heat from the air-chamber to the malt-drying chambers, substantially as set forth.

3. In a malt-kiln, the combination of a furnace made substantially circular in horizontal cross-section, a circular conduit therein, suitable malt-drying chambers and a series of ports and flues in the center of the kiln, for the passage of heat from the conduit to the malt-drying chambers, substantially as set forth.

4. In an oil-burning malt-kiln, the combination of a furnace, an oil-burner located therein, a grate-surface located near the mouth of the furnace, a steam-pipe connected with the oil-injector and extending into the furnace, a conduit for carrying off the products of combustion, a discharge-stack, a damper for regulating the passage between the conduit and stack and an extra oil-burner located in the path of the conduit, substantially as set forth.

5. In a malt-kiln, the combination of a series of centrally-arranged vertical flues, a horizontal flue or conduit surrounding the vertical flues, a horizontal air-chamber surrounding the vertical flues and ports arranged along the course of the conduit and air-chamber which connect with the vertical flues, substantially as set forth.

6. In a malt-kiln, the combination of a series of centrally-arranged vertical flues, a horizontal flue or conduit surrounding the vertical flues, a horizontal air-chamber surrounding the vertical flues, and ports arranged along the course of the conduit and air-chamber, which connect with the vertical flues, said ports increasing in area as their distance is increased from the starting-point of the conduit and air-chamber, substantially as set forth.

7. A circular malt-kiln furnace, comprising an inner arched wall containing an arched conduit, an outer arched wall provided with port-holes, and forming an arched air-chamber between the walls of the furnace with



which the said port-holes are connected, and the central wall having a central vertical flue, vertical side flues, ports connecting the air-chamber with the said central vertical flue and with the said vertical side flues, and the discharging-chamber with which the central vertical flues and vertical side flues are connected; substantially as described.

8. A circular malt-kiln furnace comprising an inner arched wall containing an arched conduit, an outer arched wall, provided with port-holes and forming an arched air-chamber between the walls of the furnace with which the said port-holes are connected, the central wall having a central vertical flue, vertical side flues, ports connecting the air-chamber with the said central vertical flue and with the said vertical side flues, and the auxiliary vertical side flues extending from the air-chamber through the central wall, substantially as described.

9. A malt-kiln comprising the outer walls, the bottom, the stack, the circular furnace having separated ends and containing a conduit, vertical intermediate flues, ports connecting the conduit with the vertical intermediate flues, and dampers controlling the

ports, a grate at one end of the conduit, a hollow pedestal at the other end of the conduit, having a damper, and a pipe connecting the pedestal with the stack; substantially as described.

10. A malt-kiln comprising a central wall 34 formed with a central vertical flue 15, with ports 13, leading into the central vertical flue, with vertical side flues 14, with ports 13, leading into the vertical side flues, with vertical intermediate flues 23, with ports 22 leading into the vertical intermediate flues, with a central air-chamber 35, located above the central flue, and with vertical auxiliary side flues 41, and the furnace surrounding the central wall formed with an inner wall 9, containing a conduit 5 connected with the ports of the vertical intermediate flues, with an outer wall 10 provided with port-holes 12, and forming an air-chamber, 11, between the walls of the furnace, with which the port-holes of the vertical side flues, are connected; substantially as described.

FRANK RADEMACHER.

Witnesses:

E. W. LITTLE,  
JAS. E. KNIGHT.