

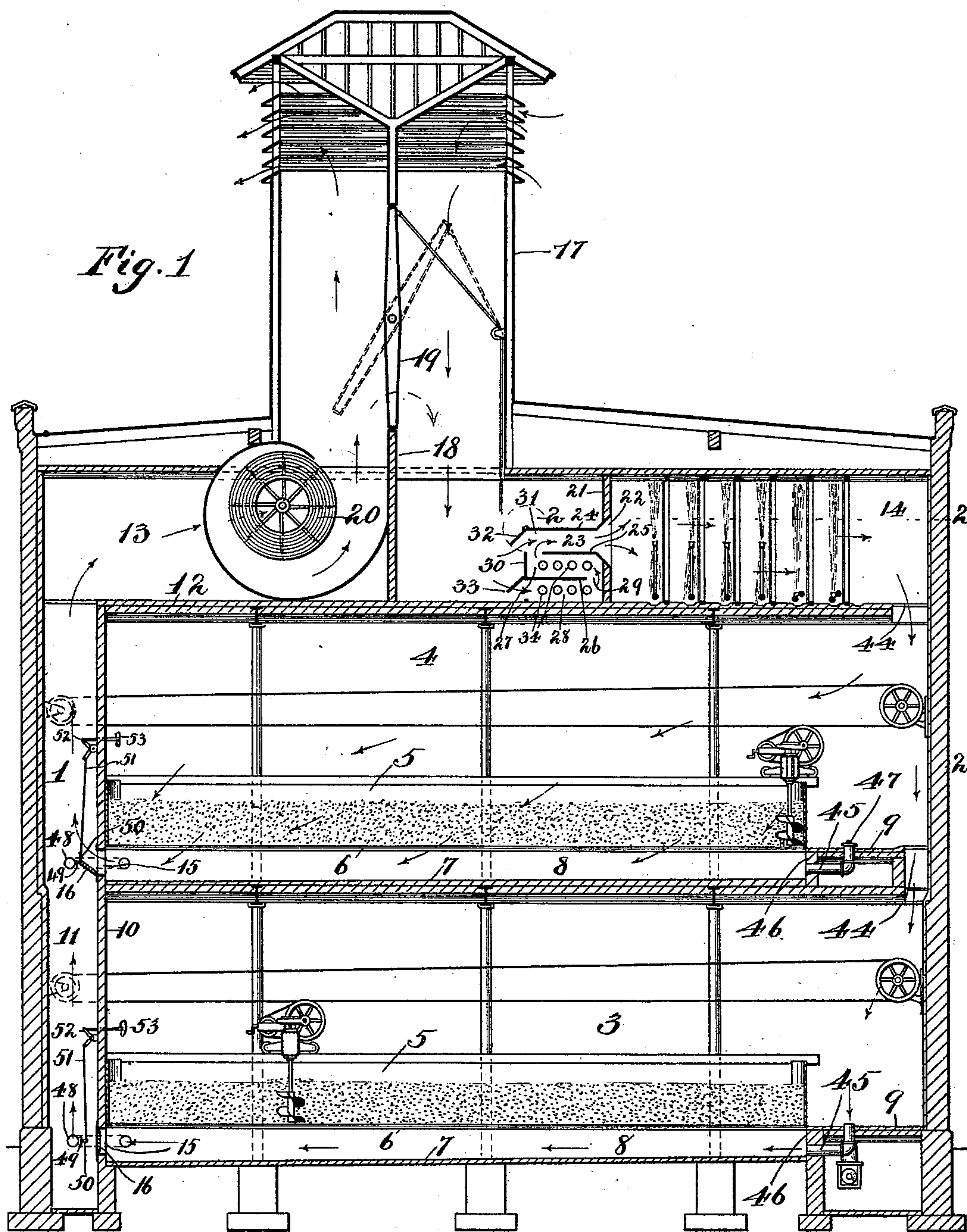
(No Model.)

2 Sheets—Sheet 1.

W. H. PRINZ.  
MALT HOUSE.

No. 587,161.

Patented July 27, 1897.



Witnesses:  
W. C. Corlies  
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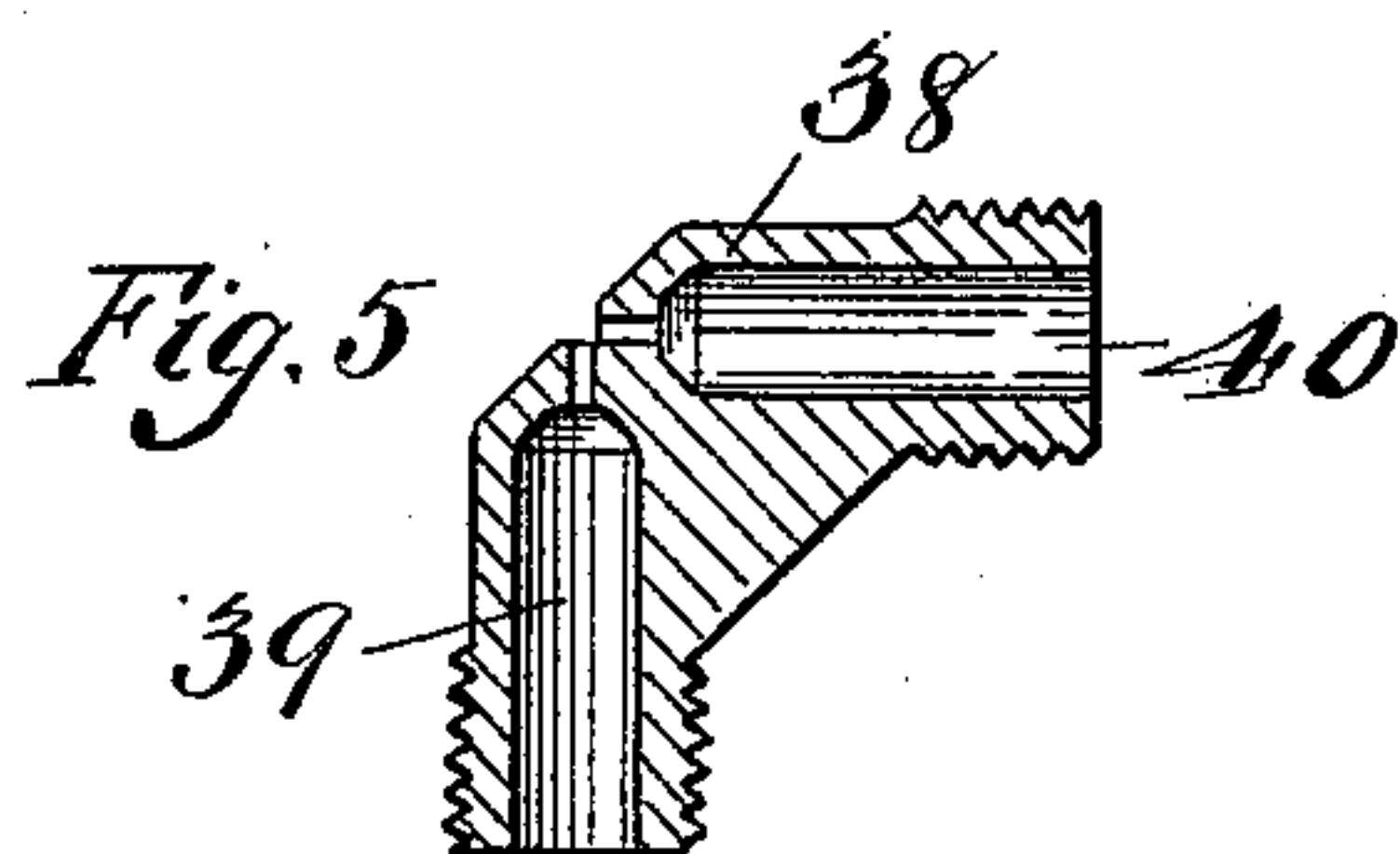
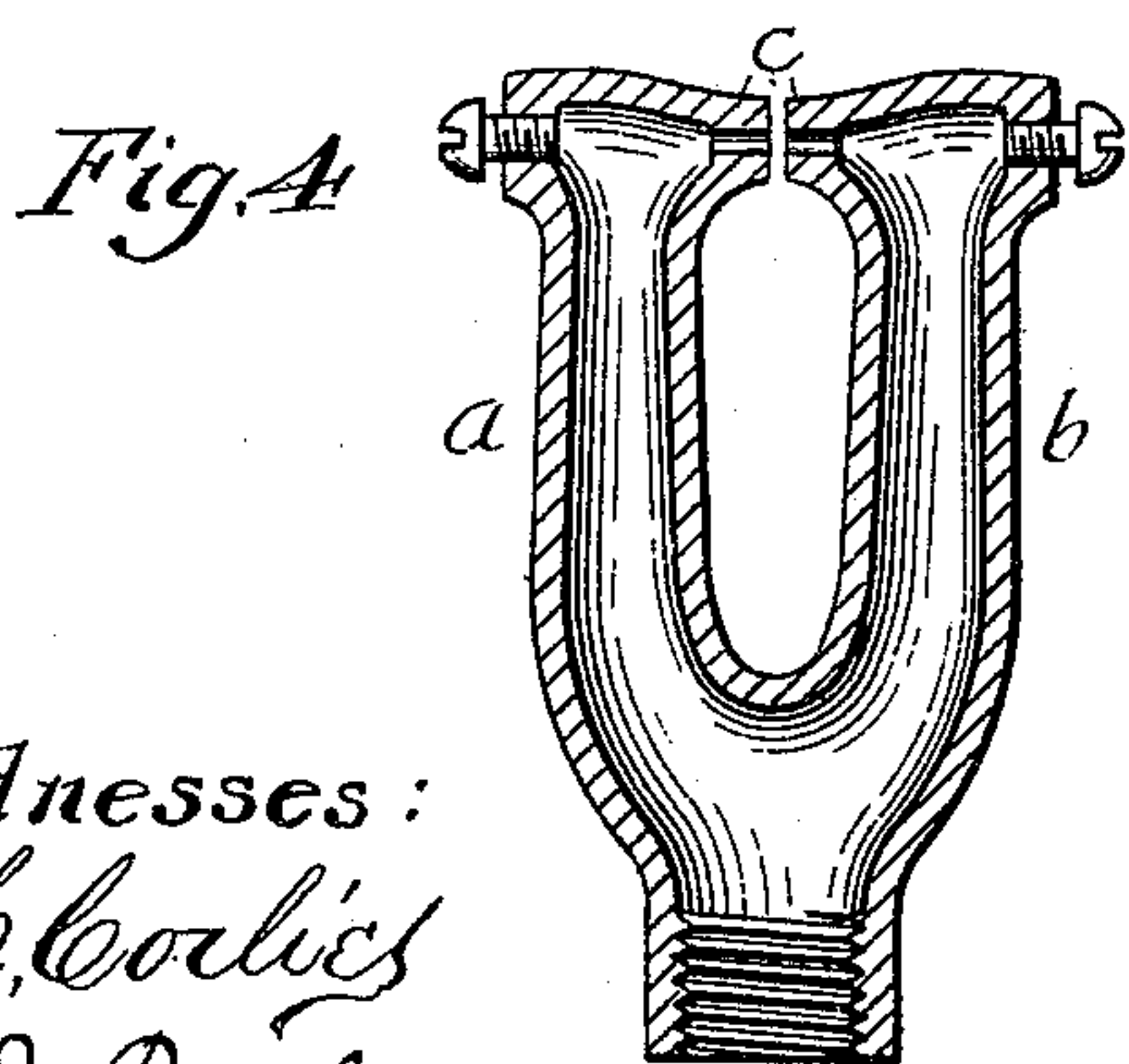
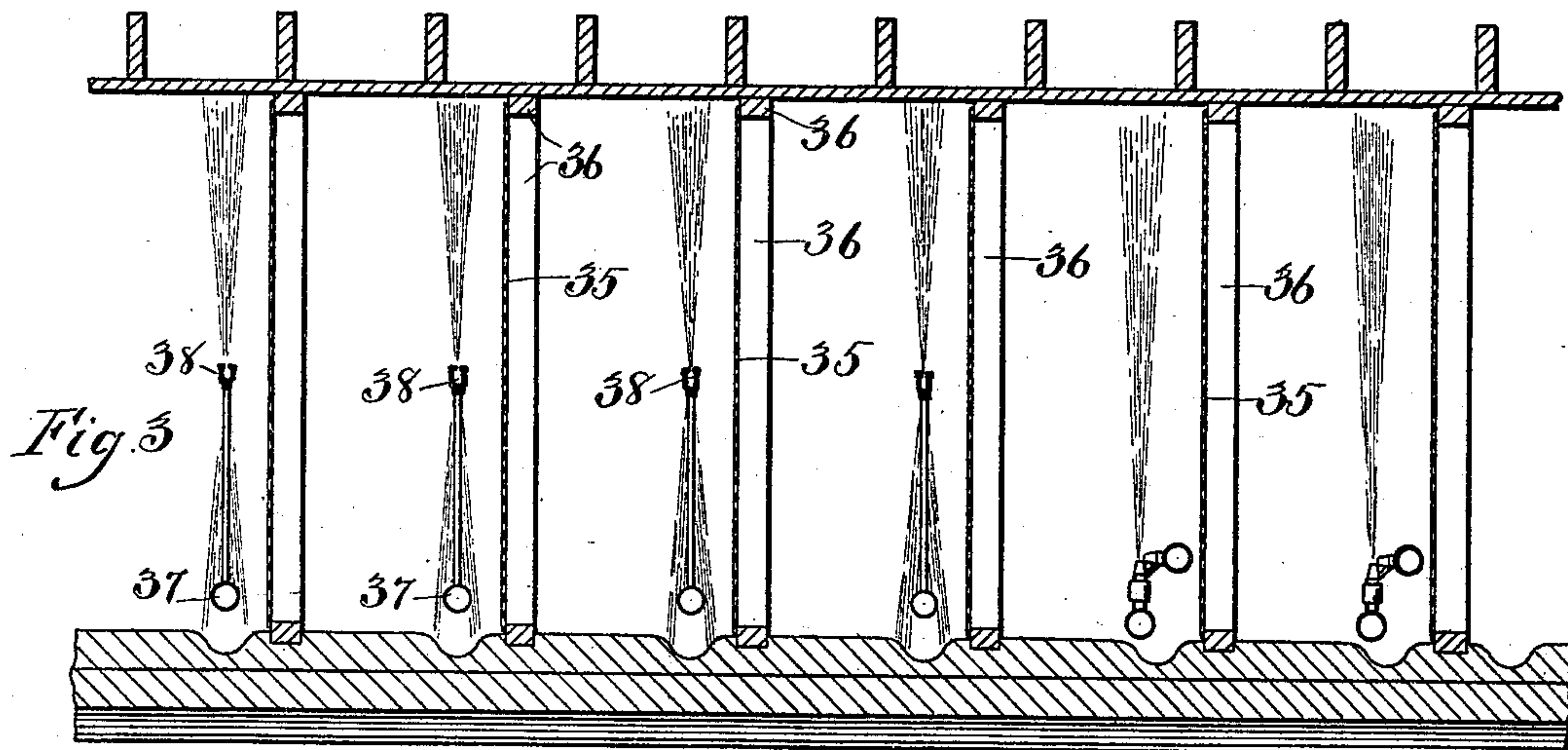
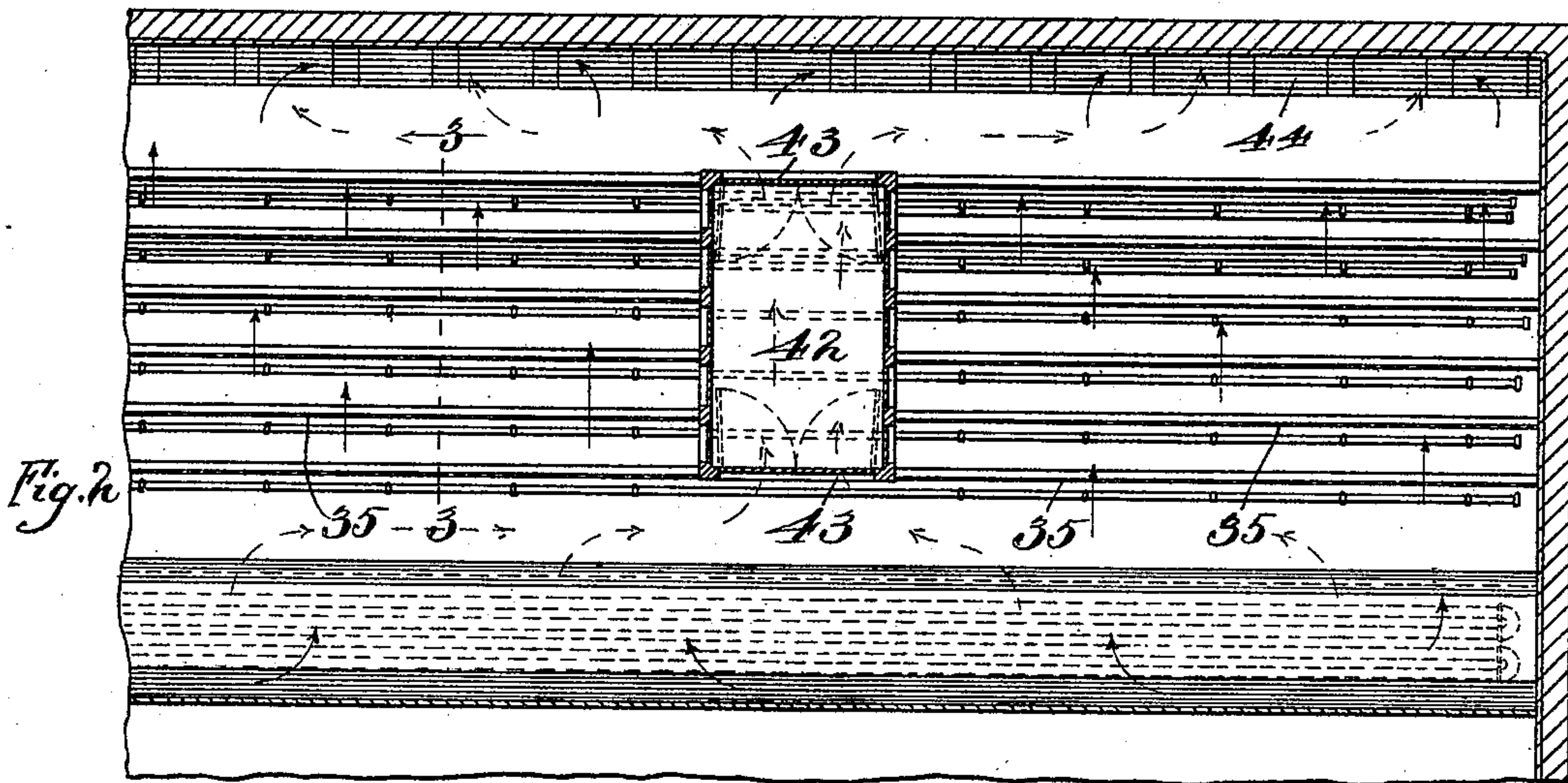
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# UNITED STATES PATENT OFFICE.

WILLIAM H. PRINZ, OF CHICAGO, ILLINOIS, ASSIGNOR TO THE SALADIN  
PNEUMATIC MALTING CONSTRUCTION COMPANY, OF SAME PLACE.

## MALT-HOUSE.

SPECIFICATION forming part of Letters Patent No. 587,161, dated July 27, 1897.

Application filed April 20, 1896. Serial No. 588,318. (No model.)

*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 Malt-Houses; and I do hereby declare the following to be a full, clear, and exact description of the invention, such as will enable others skilled in the art to which it appertains to make and use the same.

My invention relates to a novel construction in a pneumatic malt-house, the object being to provide a malt-house of this description in which means are provided for introducing dry or moist attemperated air and for ventilating the spaces between the compartment-floors with dry or moist air during the suspension of the passage of air through the grain; and it consists in the features of construction and combinations of parts hereinafter fully described and claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a vertical longitudinal section of a malt-house constructed in accordance with my invention. Fig. 2 is a detail horizontal section of the air-attemperator, taken on the line 2 2 of Fig. 1. Fig. 3 is a vertical section through the air-attemperator, taken on the line 3 3 of Fig. 2. Figs. 4 and 5 are detail views of the spray-nozzles I employ in the air-attemperator.

My invention is applied to malt-houses as constructed under the Saladin-Prinz system, in which each germinating-floor of the malt-house is provided with a series of germinating-compartments. The accompanying drawings show this construction, in which 1 and 2 indicate the outer side walls of a malt-house provided with germinating-rooms 3 and 4. Each of said germinating-rooms is provided with germinating-compartments 5, which are provided with perforated floors 6, situated some distance above the floors proper, 7, of said germinating-rooms, so as to leave spaces 8 beneath said compartments 5. A raised floor 9 is provided in front of said germinating-compartments, which is preferably level with the perforated floors thereof. The space beneath said raised floor 9 and said floor 7 is generally utilized for spiral conveyers for transporting the finished malt to the kiln.

A partition 10 divides the germinating-rooms from the outer wall 1, leaving a space 11 between the same which forms an air-shaft for the passage of exhaust-air. Said partition 10 extends upwardly to a floor 12 above the upper germinating-room, on which the suction-chamber 13 and attemperating-chamber 14 are situated. The spaces 8 communicate with said air-shaft 11 through openings 15 in said partition 10, which are adapted to be closed by valves 16.

The suction-chamber 13 and attemperating-chamber 14 are preferably in the uppermost story of the malt-house, and a stack 17 rises from the same, through which fresh air is drawn in and foul air discharged. A partition 18, extending from the floor 12 to the upper end of the stack, divides the suction and attemperating chambers from each other and establishes independent communication between said stack and both of said chambers. A valve 19 in said partition 18 affords means for establishing direct communication between said suction-chamber 13 and attemperating-chamber 14 when desired. A suction-fan 20 in said suction-chamber, communicating at its delivery end with said stack 17, affords the means for causing the passage of the air-currents, as hereinafter described. Said attemperating-chamber 14 is divided from the stack or "fresh-air" chamber, as it may be termed, by a partition 21, having an opening 22 between its ends extending the entire length thereof. An air-duct 23 extends outwardly from said openings 22, being formed by horizontal walls 24 and 25, extending outwardly from said partition 21 on both sides of said opening 22. A horizontal wall 26, mounted between said wall 25 and the floor 12, forms two air-ducts 27 and 28, which are connected by an opening 29 between said wall 26 and the partition 21. A wall or partition 30 extends upwardly from the outer end of said wall 29 to a point opposite the end of the wall 25, leaving an opening 31 between the outer end of said wall 25 and said wall 30 to establish communication between said ducts 23 and 27. A valve 32, hinged at the end of said wall 24, is adapted to close the end of the duct 23, and a valve 33, hinged at the lower end of the wall 30, is adapted to close



the end of the duct 28. Coils of pipe 34 are situated in said ducts 27 and 28, which are adapted to be heated by exhaust-steam during cold weather. Obviously when it is desired to heat the air the valve 32 is closed and the valve 33 opened, so as to cause the air to pass through the ducts 28 and 27, and consequently over the heating-coils 34, before passing into said attemperating-chamber 14; or by partially opening both of said valves 32 and 33 a portion of the air may be caused to pass over the heating-coils 34 and a portion introduced direct into the attemperating-chamber, thus enabling the air to be heated to any desired degree without the necessity of constantly regulating the steam-supply. Heretofore the air-ducts have been made vertical and situated side by side, so as to cause the air to pass alternately upwardly and downwardly through the successive ducts. In my device the heated air is constantly caused to rise from one duct to the next, which obviously serves to economize power.

My attemperator consists of a series of perforated sheet-metal plates 35, secured to a wooden framework 36, which is partially embedded on all sides in the cement floor, walls, and ceiling of the attemperating-chamber. Lines of pipe 37 are situated in front of each of said perforated plates, and spray-nozzles 38 are mounted upon said pipes at intervals along their entire length. The first rows of these spray-nozzles are provided with two branches *a* and *b*, the outlet ends *c* of which are directly opposite each other and divided by a small space in which two streams of water under pressure are directed against each other, thus forming a circular fan-like spray of very finely-divided water particles which are easily evaporated and absorbed by the air. The last rows of spray-nozzles are preferably made as shown in Fig. 5, having two branches 39 and 40, said branch 39 being connected with the water-supply pipe and said branch 40 with a supply of compressed air. The current of compressed air is directed sidewise against the stream of water, thus finely dividing said stream. The air thus introduced is also thoroughly saturated and mixes with the air from the stack.

Heretofore the finished malt has generally been transported to the kiln while saturated with moisture, which required more power in transporting and also hindered the easy passage therethrough of the heated air in the kiln. The effect upon the perforated floors of the kiln of the very moist malt is also very injurious. To overcome these defects, I provide means for passing dry hot air through the malt in the compartments when finished and previous to its transportation to the kiln to wither the same and carry off the surplus moisture. For this purpose I provide a passage 42, extending transversely through the attemperating-chamber 14 at about the middle portion thereof, which is adapted to be closed by doors 43. Obviously when said

doors 43 are opened the air will pass through the passage 42, as offering the least resistance to its passage, and avoid the perforated plates. In its dry condition it will pass through the openings 44 in the floors 12 and 7 into the germinating-rooms and thence through the malt into the spaces 8 underneath the germinating-compartments and thence into the air-shaft 11 through the openings 15 in the partition 10, from which they pass through the suction-chamber to the stack.

During the intervals between the passage of moist air through the malt germination proceeds, and the carbonic-acid gas generated thereby soon fills said spaces 8 and also remains in the grain on account of weight and the absence of any exit, as to suspend the passage of moist air the valves 16 must be closed to shut off the spaces 8 from the suction-chamber. The presence of carbonic-acid gas hinders germination, and to overcome this defect I provide means for ventilating said spaces 8, which consists in establishing communication between said spaces and the germinating-room through pipes 45, passing through the forward end walls 46 of said spaces and through the floor 9. These pipes are adapted to be closed by covers 47. Pipes 48, connecting said spaces 8 with the air-shaft 11, pass through the side walls of said compartments and through the partition 10. Said pipes 48 are adapted to be closed by valves 49, and for purposes of conveniently regulating the latter they are provided with arms 50, connected by rods 51 with bell-crank levers 52, pivotally mounted upon said partition 10. To the other arms of said bell-crank levers handles 53, which pass through said partition 10, are secured. In this manner said valves can be operated from the germinating-rooms. Said pipes 48 should be of the same or a smaller size than said pipes 45, so as to prevent the passage of any air through the malt, which would be the case were the exhaust larger than the supply. The air-currents thus introduced into the spaces 8 will obviously carry off the carbonic-acid gas and promote germination.

In pneumatic malt-houses under the Saladin-Prinz system there are usually five or six compartments or multiples thereof on one floor, according as it is desired to malt in five or six days, and said compartments are usually so loaded that the malt in one out of every five or six thereof is finished each day. Thus when the malt in one compartment is finished the remainder is in the successive stages of germination. Under this system the moist attemperated air is passed through the malt at intervals, according to the judgment of the maltster. Thus when it is desired to pass hot dry air through the finished malt in one compartment to wither the same said air must not pass through the malt in process of germination, and to prevent this the valves 16 are closed in all except the compartment containing the finished malt and



the pipes 45 and 48 in said compartments opened so that the spaces 8 are ventilated during the intervals that the dry air passes through the finished malt, and, vice versa, the valve 16 of the compartment containing the finished malt is closed during the intervals that moist air is passed through the malt in the remaining compartments.

I claim as my invention—

1. In a malt-house, a fresh-air chamber, an air moistening and attemperating chamber, air-ducts establishing communication between said fresh-air chamber and said air moistening and attemperating chamber, situated successively above each other and communicating with each other alternately at opposite sides, heating-coils in the lower of said air-ducts, and valves on the lower and upper air-ducts to regulate the passage of the air and cause the same to pass either directly into said attemperating-chamber through said upper duct or over said heating-coils in said lower ducts, or partially through both.

2. In a malt-house, a fresh-air chamber, air-ducts situated successively above each other at the delivery end of said fresh-air chamber, openings between said ducts situated successively at opposite sides of the walls between said ducts, heating-coils in said air-ducts, valves to regulate the passage of the air therethrough, and an air moistening and attemperating chamber communicating with said air-ducts and comprising a series of perforated plates, spray-nozzles between said plates, and a passage between the ends of said plates and shut off therefrom for permitting the passage of dry air therethrough.

3. In a malt-house, an air moistening and attemperating chamber comprising a series of perforated plates having spray-nozzles between them, and a passage between the ends of said perforated plates and divided therefrom, which is adapted to permit the passage of dry air therethrough.

4. In a malt-house, an air moistening and attemperating chamber comprising a series of perforated plates having spray-nozzles be-

tween them, a transverse passage between the ends of said perforated plates and divided therefrom to permit the passage of dry air through said attemperating-chamber, and doors to shut off said passage.

5. In a malt-house, germinating-compartments provided with perforated floors and air-passages underneath said floors, a suction-chamber, openings between said air-passages and said suction-chamber to permit the exhaust of the air passing through the malt, valves in said openings, and pipes to establish communication between said air-passages and the germinating-room and pipes to establish communication between the said air-passages and said suction-chamber, whereby an air-current is passed through said air-passages to carry off carbonic-acid gas during the suspension of the passage of the air through the malt.

6. In a malt-house, germinating-compartments having air-passages beneath the same, an outlet for said air-passages, means for passing a current of air through the grain in said compartments and through said air-passages, and means for passing an air-current through said air-passages only during the intervals of the suspension of the passage of the air through said malt, to carry off the gases generated during such suspension of the passage of air through the malt.

7. In a malt-house, germinating-compartments having perforated floors, air-passages underneath said perforated floors, pipes establishing communication between said air-passages and the germinating-room independently of said perforated floor, and a pipe establishing communication between said air-passages and an exhaust-chamber, said pipe having a valve therein adapted to be operated from the germinating-room.

In testimony whereof I affix my signature in presence of two witnesses.

WILLIAM H. PRINZ.

Witnesses:

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