

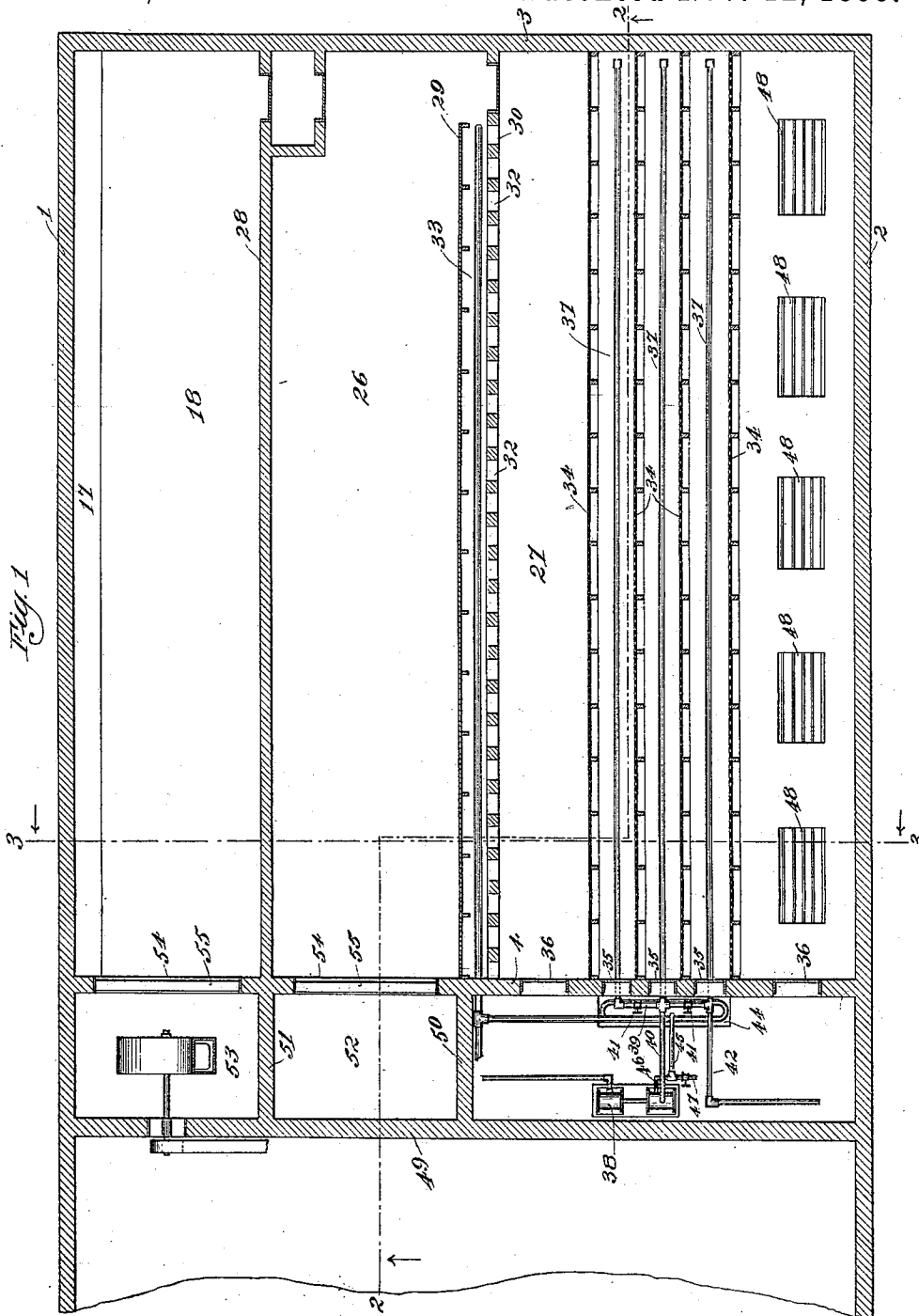
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4 Sheets—Sheet 1.

W. H. PRINZ.
MALT HOUSE.

No. 549,856.

Patented Nov. 12, 1895.



Witnesses:
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Rudolph W. Blot

Inventor
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Attorney.

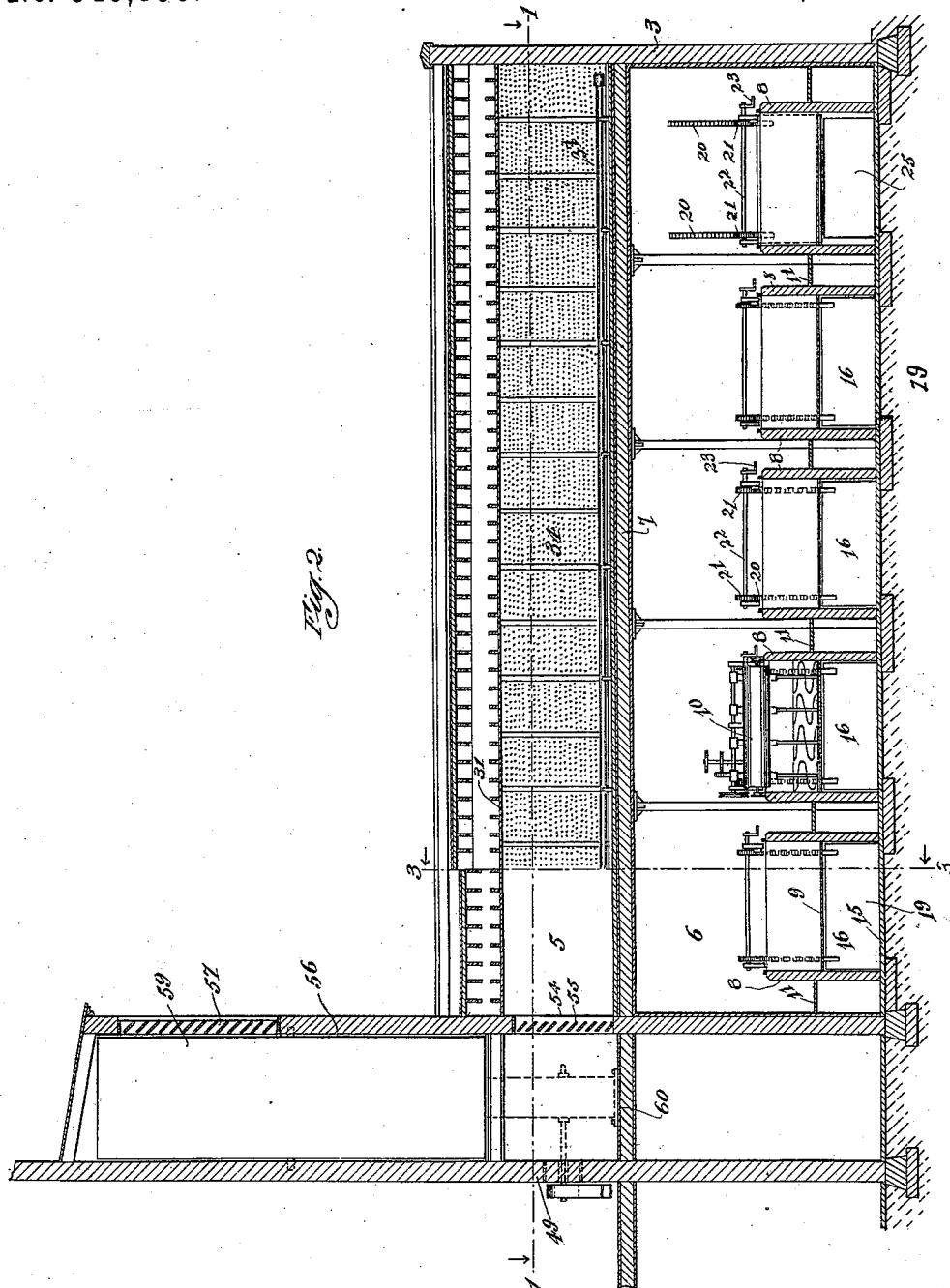
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4 Sheets—Sheet 2.

W. H. PRINZ.
MALT HOUSE.

No. 549,856.

Patented Nov. 12, 1895.



Witnesses

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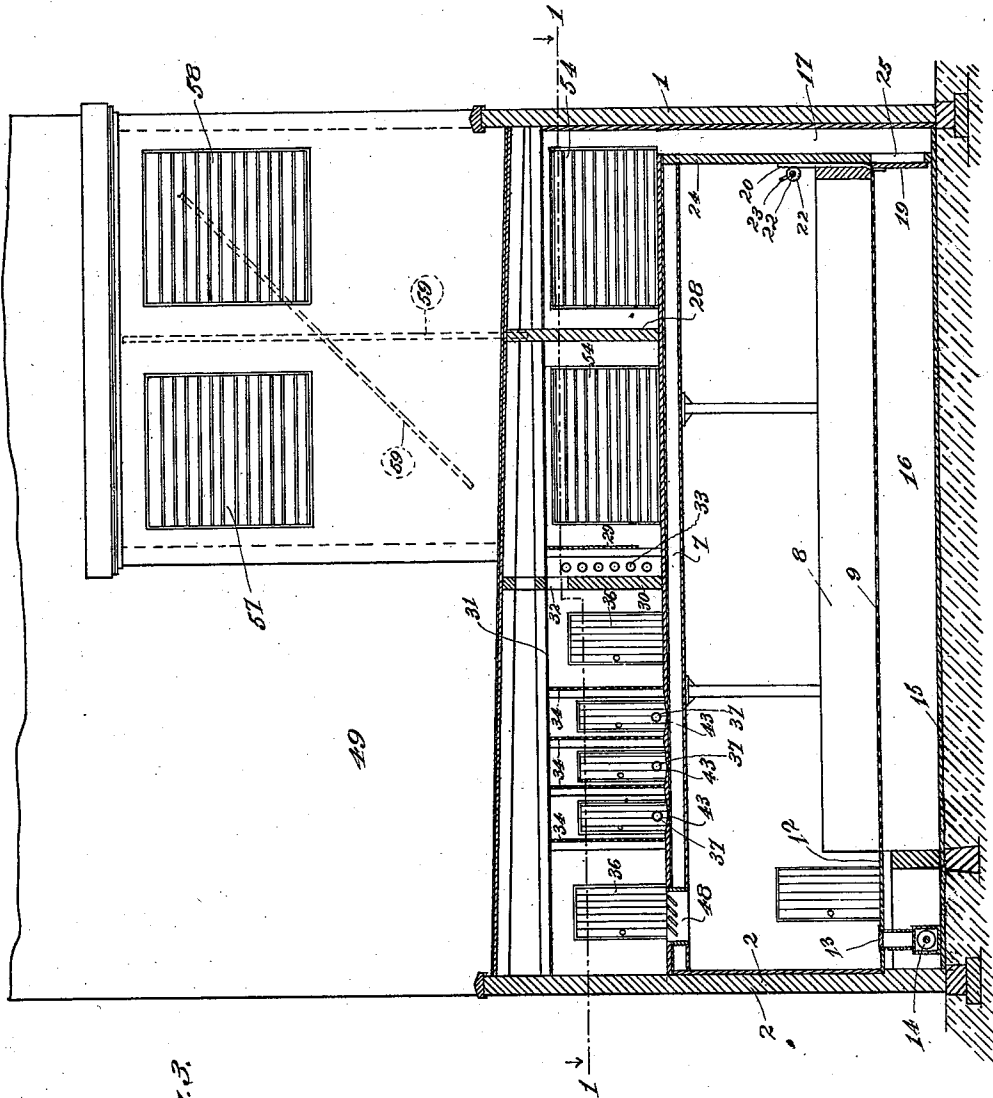
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4 Sheets—Sheet 3.

W. H. PRINZ.
MALT HOUSE.

No. 549,856.

Patented Nov. 12, 1895.



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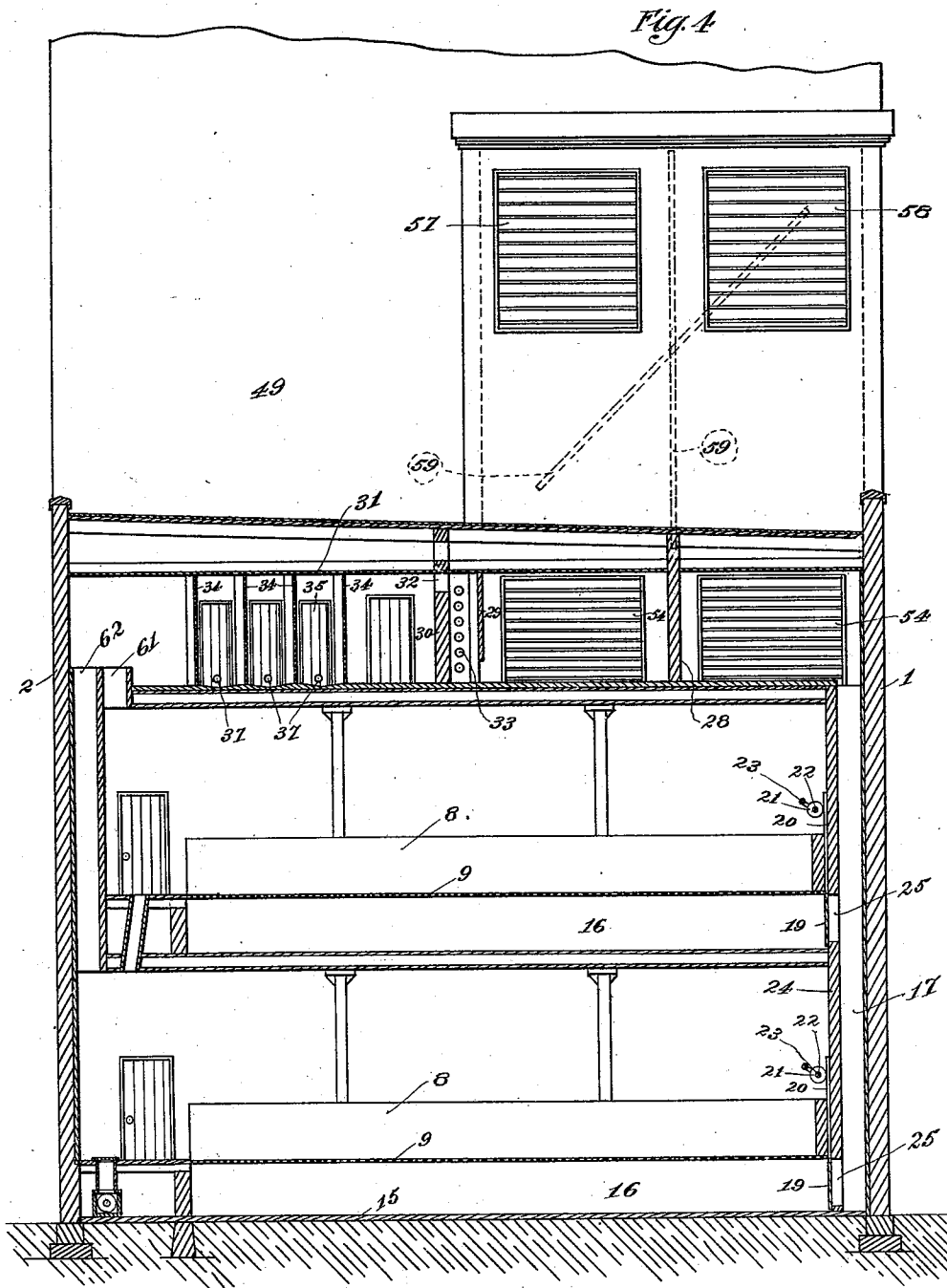
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4 Sheets—Sheet 4.

W. H. PRINZ.
MALT HOUSE.

No. 549,856.

Patented Nov. 12, 1895.



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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. 549,856, dated November 12, 1895.

Application filed September 25, 1894. Serial No. 524,110. (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.

This invention relates to a novel construction and arrangement in a malt-house, designed especially for use in connection with what is known as the "Saladin" system of pneumatic malting.

The objects of the invention are to simplify the construction of the malt-house, and consequently reduce the cost of the building, and to provide a novel arrangement in the air-channels, air attemperator and moistener, and in the devices for controlling the air-currents, whereby the construction of the house is simplified and cheapened, the air-currents can be more easily regulated and controlled, and the cost of running the malt-house is reduced.

To these and other useful ends my invention consists in the features of construction and combination of parts hereinafter fully described and specifically claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a horizontal sectional view of a malt-house constructed in accordance with my invention and taken on the line 1 1 of Figs. 2 and 3. Fig. 2 is a vertical longitudinal section taken on the line 2 2 of Fig. 1. Fig. 3 is a vertical transverse section taken on the line 3 3 of Figs. 1 and 2. Fig. 4 is a vertical transverse section similar to Fig. 3 and illustrating the construction in a malt-house of this description where two floors of germinating-compartments are employed.

In a malt-house constructed in accordance with my invention the fresh and foul air shafts, tunnels, and the air attemperators and moisteners are placed above the floor on which the germinating-compartments are located and the air is drawn in, forced downwardly, and then drawn upwardly and discharged or reused, as found most convenient, instead of the manner now in general use in

malt-houses of this construction, wherein the air first passes downwardly and then upwardly through the germinating-compartments, then downwardly again to take it from the germinating-room and then upwardly again to discharge it.

Referring now especially to Figs. 1, 2, and 3 of the drawings, 1 indicates the rear wall of the malt-house; 2, the front wall; 3, the outer end wall, and 4 the inner end wall of the malt-house proper. The malt-house is divided into an upper story 5 and a lower story 6 by the floor 7. Within the lower story 6 the germinating-compartments 8 are located, extending transversely across the story and constructed in the usual manner with perforated bottoms 9, malt-stirring machine 10, and walks 11.

In the front of the compartments and between the end of the compartment and the front wall 2 of the malt-house is the walk or platform 12, having the trap-door 13, leading to the conveyer 14, to remove the malt. Beneath each compartment and between its perforated bottom and the floor 15 of the lower story is an air-tunnel 16, closed at its forward end, but communicating at its rear end with an upright air-shaft 17, leading to the foul air tunnel 18 in the upper story 5. Communication between the air-tunnel 16 and air-shaft 17 is controlled by a valve, (one for each compartment,) indicated by 19, said valve sliding in vertical guides and provided with upright racks 20, that extend above the rear end of the compartment and that are engaged by gear-wheels 21, upon a shaft 22, which can be turned by a crank 23. In this way it will be seen that by turning the crank to elevate these valves communication between the air-tunnels and shaft 17 can be established. The air-shaft 17 is formed by an upright wall 24, extending between the floors 7 and 15 and provided with openings 25 along its lower edge, opposite the air-tunnels 16. The said supplemental wall 24 extends between the ends of the malt-house and meets the floor 7, which does not extend farther than said supplemental wall, so as to provide an opening at the top of the air-shaft 17.

The upper story 5 is divided into three compartments—namely, the foul-air compartment 18, the fresh-air compartment 26, and the

air attemperating and moistening compartment 27. The foul and fresh air compartments are divided by a partition 28, extending between the end walls of the malt-house, while
 5 the fresh-air compartment 26 is divided from the air attemperating and moistening compartment 27 by two walls 29 and 30, extending between the end walls of the malt-house, but not between the ceiling 31 of the upper story
 10 and the floor 7, so as to establish communication between the fresh-air compartment 26 and attemperating and moistening compartment 27. Said wall 29 extends from the ceiling 31 to a point near the floor 7, while the
 15 partition 30 extends from the floor 7 to the ceiling 31, but is provided at its upper end with openings 32, extending its entire length. The partitions 29 and 30 are parallel and a little distance apart, so that a coil of steam-
 20 pipes 33 may be located between them to warm the air as it passes to the attemperating and moistening compartment.

Within the compartment 27 are arranged a plurality of upright perforated or reticulated plates or sheets 34, extending between
 25 the end walls 3 and 4 and the ceiling 31 and floor 7. These plates 34 are parallel and located a sufficient distance apart to allow a person to pass between them, and the inner
 30 end wall 4 of the malt-house is provided with doors 35 between each pair of plates, and also doors 36 outside of the plates to permit attendants to enter the compartments made thereby for cleaning the plates and other
 35 parts of the malt-house. Between these plates 34 and near the floor 7 are the water-pipes 37, provided on their upper sides with suitable spray-nozzles, arranged to spray water upon the plates, and these pipes 37 are
 40 connected with a suitable source for supplying water under pressure, such as the pump 38, by means of the branches 39 and 40, controlled by valves 41. The pipe 37 between the last two plates 34, or those nearest to the
 45 front wall 2 of the malt-house, is provided with a separate supply-pipe 42, so that if it is found convenient to re-use the water over some of the plates it can be accomplished, and at the same time fresh water can be supplied to the last two plates to accomplish the
 50 washing of the air. The floor 7 between the plates 34 is provided with gutters or troughs 43, into which water runs down over the plates and passages, and these gutters or troughs
 55 43 are inclined downwardly toward the inner wall 4 to lead the water to the bath or tank 44. From this tank 44 a pipe 45 leads, having branches 46 that can lead to the pump, or a branch 47 that can lead to the waste-
 60 pipe, whereby the water can be forced back or allowed to escape. In the floor 7 between the last plate 34 and the front wall 2 of the malt-house a plurality of openings 48 are located, having suitable gratings to establish
 65 communication with the malting-room.

Parallel with the inner wall 4 of the malt-

house and a convenient distance therefrom is an upright wall 49, extending usually some distance above the malt-house and forming part of the other buildings of the plant. Be-
 70 tween this wall 49 and the wall 4 is a partition 50 to divide off the room in which the tank 44 and water-forcing devices are located, and the said partition 50 is located about opposite the partitions 29 and 30. Be-
 75 tween the walls 49 and 4 and about opposite the partition 28 is a partition 51, extending upwardly to about the height of the ceiling 31, and dividing such space into the foul-air shaft 52 and the fresh-air shaft 53, located at
 80 the ends of the fresh and foul air compartments 26 and 18.

Openings 54, having slats 55, are made in the wall 3 to establish communication between the shafts 52 and 53 and compartments 26 and
 85 18. The said fresh and foul air shafts 52 and 53 join at their upper ends into an air-stack or chimney 56, extending above the malt-house and provided with slatted openings 57 and 58, located above the fresh and foul air
 90 shafts 53 and 52. Located within the chimney 56 and pivoted between the said fresh and foul air shafts 52 and 53 is a valve 59, which, when standing in an upright position, reaches from the upper end of the partition
 95 21 to the top of the chimney and divides said chimney into two shafts. The said valve 59 can be provided with any suitable devices for regulating its position—such as, for instance, to control it automatically by weights. Lo-
 100 cated within the foul-air shaft 53 is an air-forcing device 60 for drawing the air from the foul-air compartment 18 and establishing a current.

A malt-house constructed in the foregoing
 105 manner will be operated as follows: If the valve 59 stands in an upright position, as shown in full lines in Fig. 2, and the air-forcing device 60 is started, air will be drawn from the compartment 18 and create a current
 110 drawing in the air from the outside through the slatted opening 57 of the chimney, down through the fresh-air shaft 52, and into the fresh-air compartment 26. It then passes between the partitions 29 and 30 into the com-
 115 partment 27, being heated during such passage, if necessary. The air then passes through the attemperators upon which the water is spraying and then down through the openings 48 into the compartment-room, and then
 120 down through the malt in the compartments to the tunnels 16, out through the opening 25 into the air-shaft 17, and then up into the foul-air compartment 18, into the foul-air shaft 53, and then up and into the outer air
 125 shaft 58 in the chimney. The above is the direct current of air when fresh air only is supplied, but it is found expedient and economical to reuse the air after it has passed through the malt, and this I accom-
 130 plish by setting the valve 59 across the chimney. It will be understood, also, that all of

the foul air can be used over again or only a part mixed with fresh air, according to the degree of economy desired, as the air is washed and cleansed in passing through the attemperators. The advantage in reusing the air wholly or only partially is that it saves to a great extent the heat requisite to bring the air to the correct temperature in winter and the refrigeration necessary for a like purpose in summer, which of course requires an expense. I have found that by setting the valve 59 in an inclined position, as shown in dotted lines in Fig. 3, a portion of the foul air leaving the shaft 53 will pass upwardly and through the opening 58, while the rest will be deflected into the shaft 52 and pass, with a supply of fresh air entering between the lower end of the valve and the side of the chimney, into the fresh-air compartment 26, the amount of foul air returned being proportionate to the inclination of the valve. In this way it will be seen that this foul air, being mixed with the fresh air and having a higher or lower temperature, according to the season, will raise or lower the temperature of the fresh air, so as to require less expenditure of energy than would be required if the entire supply of the malt-house were fresh air, while the foul air is thoroughly cleansed and washed in passing through the attemperators. It will be noted, therefore, that the air used has a straight course, first down to the tunnel 16 and then up, while in the malt-houses built according to this system, as now constructed, the air is first forced downwardly through the moistener and attemperator, then upwardly into the tunnels beneath the compartment, and up through the malt into the malting-room is then drawn downwardly again through openings in the floor of the malting-room into tunnels from which it is forced upwardly into the outer air. I am therefore enabled to control and force the same amount of air with much less expenditure of energy, which is consequently less expensive, as it does not require the same capacity of air-forcing devices and furthermore I materially simplify the construction of the malt-house by obviating the necessity of a cellar below the compartment-room, which cellar, of course, has to be built with firm foundations to form the tunnels which must be cemented, and I thus again reduce the cost of a malt-house by placing all my air-shafts, tunnels, and moisteners, attemperators, and forcing devices above the floor of the compartment-room. Again the maltster can always find the exact condition of the air—that is to say, its temperature and humidity—from the compartment-room itself, thus obviating the necessity of going down stairs and into the tunnels. Further, there can be absolutely no foul odors or vitiated air in the compartment-room, as heretofore, when the air first passes through the malt and then into the compartment-room, for in a

house of this construction the fresh and clean air comes directly into the compartment-room and then through the malt, after which it is carried away.

An air attemperator and moistener constructed and shown as I have described is also an improvement and possesses advantages over those heretofore employed, for, in the first place, there are walks between each plate and the supply of water can be separately cut off between any pair of plates, so that an attendant can clean any particular plate without interfering with the operation of the attemperator or causing a cessation of the malting operation. Again, the water which is sprayed upon the plates can be re-used by carrying it from the bath and the tank 44 back through the spray-pipes, except, of course, on the last two plates, where fresh water is desired, so that the air will be surely washed and cleaned before passing into the malt. By reusing the water upon some of the plates it will be noted that so much energy will not be required to bring it to the correct temperature as when fresh water is used, and to have this water that is reused brought to the correct temperature the steam-pipe forming part of the coil to bring the air to the correct temperature is passed through the bath or tank 44, as before referred to.

In Fig. 4 I have shown a malt-house where there are two compartment-floors. In a malt-house of this construction the opening leading from the compartment 27 is divided into two parts 61 and 62, the former leading directly into the upper floor, while the latter communicates through a shaft 63 with the lower floor. Of course the air-shaft 17 passes by both floors in the same manner as heretofore described, and the openings 25 are controlled by similar valves, as described. The fresh-air supply and foul-air outlet and accompanying parts are similarly constructed. It will therefore be seen that I am enabled to build a malt-house with two compartment-floors in a simple and inexpensive manner and without heavy and expensive walls for the tunnels, as heretofore necessary.

I find that a malt-house constructed in the manner above set forth is less expensive, because by placing the attemperators above the malting compartment-rooms I am enabled to make them of lighter, and consequently less expensive structure, for heretofore when placed below the compartment-room they necessarily were built strong enough to support the great weight of the malt-house, and the heavy masonry and cement walk and air-tunnels were expensive. In a malt-house of this construction, therefore, the heavy part of the structure rests upon the ground, and the attemperators, which can be made of light material, rest upon this heavy structure, thus combining in a malt-house the best structure and most desirable features. By placing the attemperators at the top of the malt-house, I

am further enabled to take the fresh air in at quite an elevation from the ground and thus insure its purity.

I claim as my invention—

5 1. In a malt house, a malting compartment room provided with malting compartments having perforated bottoms and air tunnels below said perforated bottoms, a foul air compartment located above said malting compartment room and communicating with said
10 air tunnels and having an outlet, a fresh air compartment located above said malting compartment room and having an inlet, an air attemperating and moistening compartment
15 located above said malting compartment room and communicating with said fresh air compartment and with said malting compartment room, and devices for creating a current of air through said compartments, room and
20 tunnels, substantially as described.

2. In a malt house, a malting compartment room provided with malting compartments having perforated bottoms, under each of which is located an air tunnel provided at its
25 end with a valve, a foul air compartment located above said malting compartment room, an air shaft communicating at its upper end with said foul air compartment and at its lower end with said air tunnels, an outlet for
30 said foul air compartment, and a fresh air compartment located above said malting compartment room and having an inlet, an air attemperating and moistening compartment located above said malting compartment
35 room and communicating with said fresh air compartment and with said malting compartment room, and devices for creating a current of air through said compartments, room, tunnels and shaft, substantially as described.

40 3. In a malt house, a malting compartment room provided with malting compartments having perforated bottoms, under each of which is located an air tunnel, a foul air compartment located above said malting compartment room and communicating with said
45 air tunnels and with a chimney having an outlet, a fresh air compartment located above said malting compartment room and communicating with said chimney, an inlet in said
50 chimney, a valve in said chimney pivoted between said inlet and outlet, an air attemperating and moistening compartment located above said malting compartment room and

communicating with said fresh air compartment and with said malting compartment
55 room, and devices for creating a current of air through said compartments, room and tunnels, substantially as described.

4. In a malt house, a malting compartment room provided with malting compartments
60 having perforated bottoms, under each of which is located an air tunnel, a foul air compartment located above said malting compartment room and communicating with said air tunnels and having an outlet, a fresh air
65 compartment located above said malting compartment room and having an inlet, an air attemperating and moistening compartment located above said malting compartment room and communicating with said fresh air
70 compartment, openings in the floor of said air attemperating and moistening compartment establishing communication between the latter and said malting compartment room, and devices for creating a current of air through
75 said compartments, room and tunnels, substantially as described.

5. In a malt house, a plurality of malting compartment rooms located one above the other, malting compartments located within
80 said malting compartment rooms and having perforated bottoms, under each of which is located an air tunnel, a foul air compartment located above the upper of said malting compartment rooms and communicating with
85 each of said air tunnels, a valve controlling the communication between said air tunnels and foul air compartment, an outlet for said foul air compartment, a fresh air compartment located above the upper of said malting
90 compartment rooms and having an inlet, an air attemperating and moistening compartment located above the upper of said malting compartment rooms and communicating with said fresh air compartment, passages leading
95 from said air attemperating and moistening compartment to each of said malting compartment rooms, and devices for creating currents of air through said compartments, rooms and tunnels, substantially as described. 100

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

WILLIAM H. PRINZ.

Witnesses:

HARRY COBB KENNEDY,
RUDOLPH WM. LOTZ.