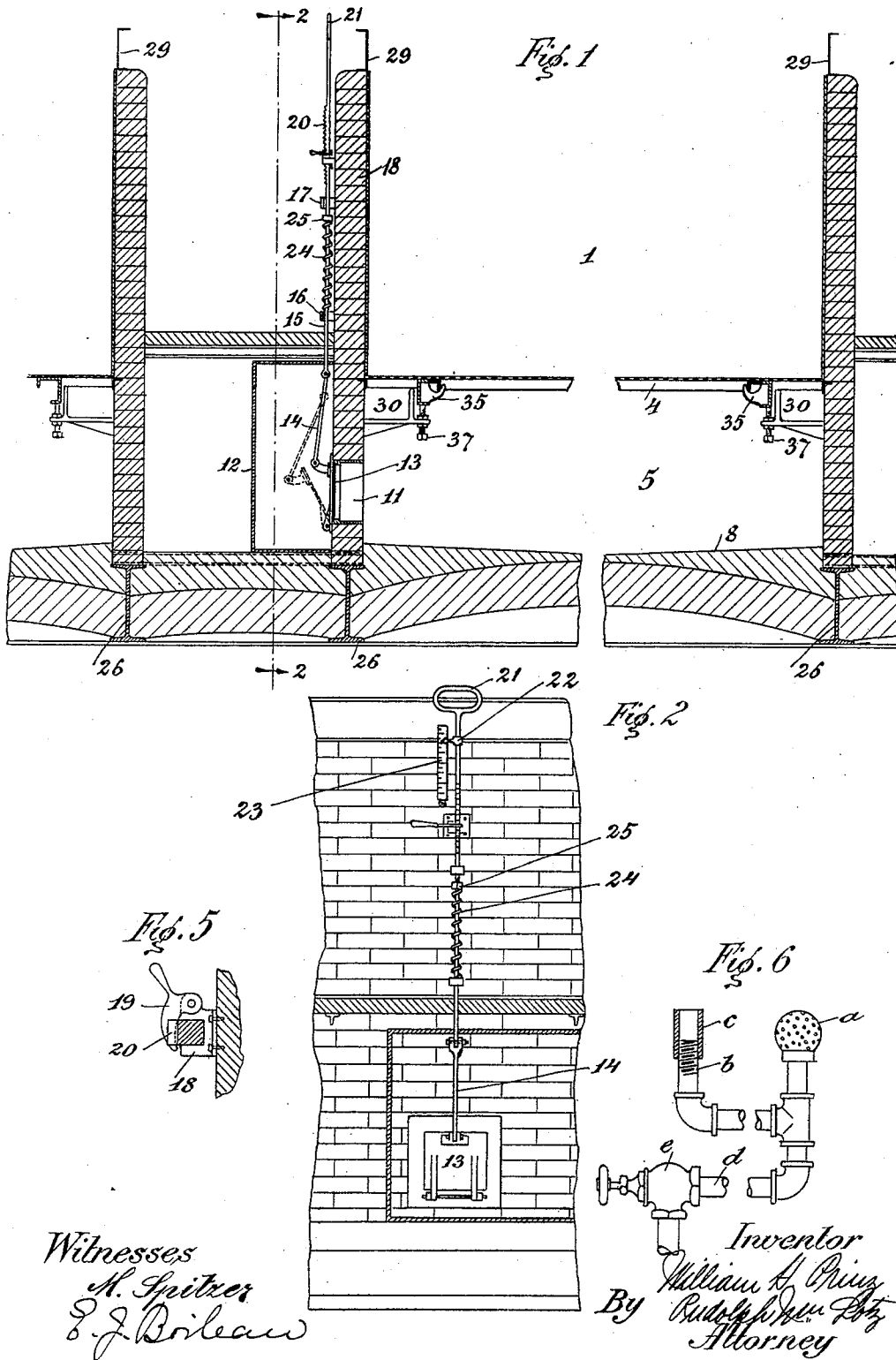


W. H. PRINZ.
MALT HOUSE.

No. 582,434.

Patented May 11, 1897.



(No Model.)

3 Sheets—Sheet 2.

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Fig. 3

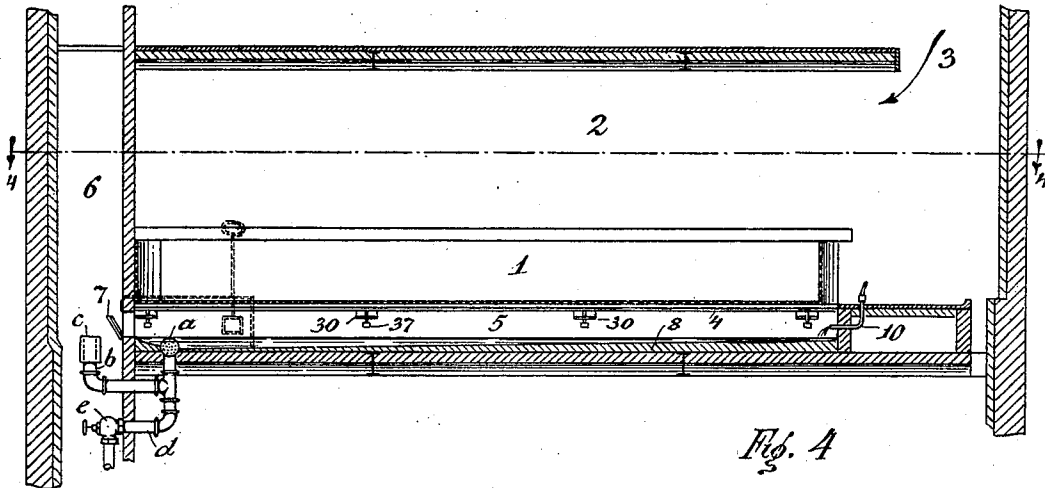
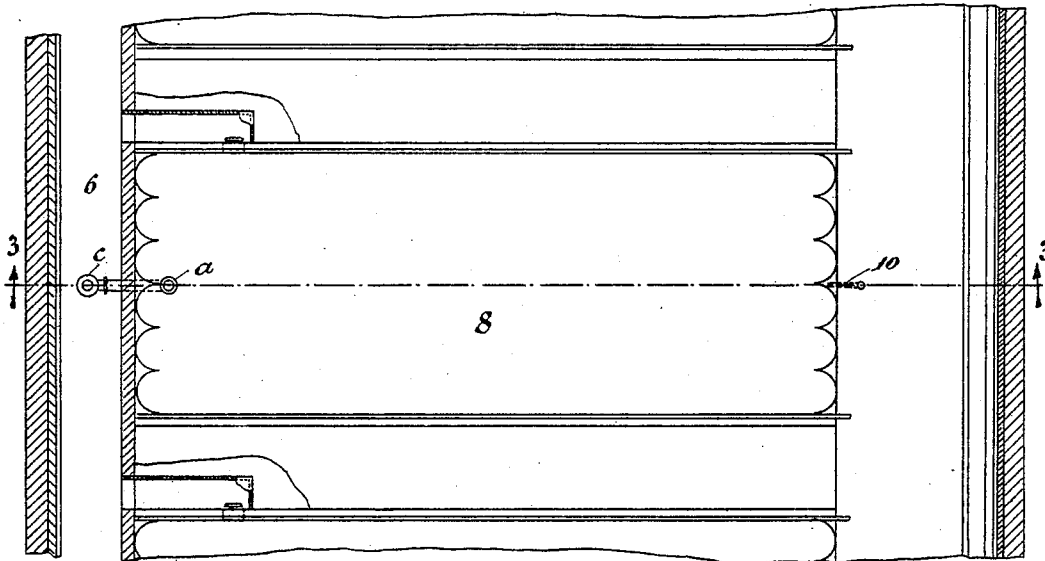


Fig. 4



Witnesses

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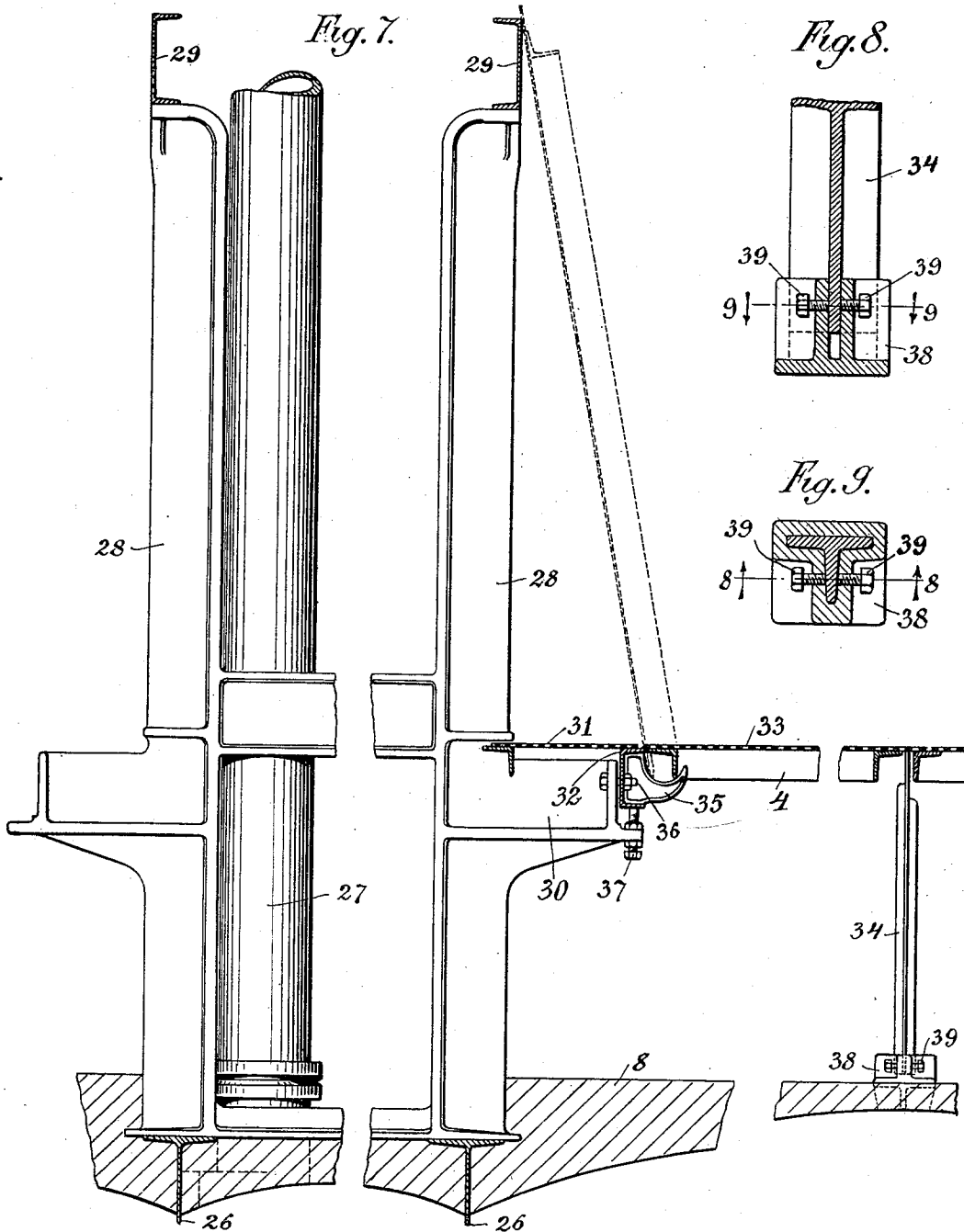
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UNITED STATES PATENT OFFICE.

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MALT-HOUSE.

SPECIFICATION forming part of Letters Patent No. 582,434, dated May 11, 1897.

Application filed July 13, 1896. Serial No. 599,045. (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 in a malt-house, the object being to provide a malt-house in which the malting of the grain can be carried out in the most efficient manner.

The invention consists in the features of construction hereinafter fully described and specifically claimed.

In the accompanying drawings, illustrating my invention, Figure 1 is a fragmentary vertical transverse section of a malting-compartment constructed in accordance with my invention. Fig. 2 is a fragmentary vertical longitudinal section taken on the line 2 2 of Fig. 1. Fig. 3 is a vertical longitudinal section, on a reduced scale, of the floor of a malt-house constructed in accordance with my invention and taken on the line 3 3 of Fig. 4. Fig. 4 is a top plan view of the same, partly in section, on the line 4 4 of Fig. 3. Fig. 5 is a fragmentary detail of the latch for holding the auxiliary valve. Fig. 6 is a fragmentary detail of the water-outlet and trap. Fig. 7 is a transverse section, on an enlarged scale and partly in elevation, of the framework of the compartments. Fig. 8 is a longitudinal section of the lower end of the leg supporting the perforated floor-sections of the malting-compartment and taken on the line 8 8 of Fig. 9. Fig. 9 is a transverse section on the line 9 9 of Fig. 8.

My invention relates to that system of pneumatic malting known as the "Saladin-Prinz" system, wherein compartments are employed in which the grain is placed for germination. These compartments are provided with perforated floors, below which air-tunnels are arranged. Mounted and traveling upon the walls of the compartment are malt-turning machines, which serve to loosen up and agitate the malt as it germinates, and the germi-

nating grain is ventilated at intervals by air which has been suitably attemperated or moistened, according to the exigencies of the case, before being passed through the grain. This air is forced into the room in which the compartments are situated under pressure and passes down through the malt into the tunnel below the compartment and then out through a suitable foul-air shaft. This is known as the "downward-pressure" system—that is to say, ventilating the germinating grain by air that is forced downwardly through the grain and from the compartment-room, although of course suction in the foul-air shaft will create this current also. In the germination of grain carbonic acid is generated, and the presence of this gas affects the germination of the grain, so that to produce the best and desired quality of malt the maltster should have the means to regulate the amount of carbonic acid present during the germination. It is apparent, of course, that the presence of an excessive amount of this gas will retard the germination of the grain to such an extent as to seriously affect the production of the malt, and therefore by controlling the amount of carbonic-acid gas the maltster can control the time necessary for germination and the quality of malt produced. It is also apparent that during the periods in which the grain is ventilated the excess of carbonic acid is carried off, but that between the intervals of ventilation the gas is generated, and owing to its specific gravity will descend into the tunnel below the perforated floor of the malting-compartment, and that in time the accumulation of this gas will be such that the tunnel may not accommodate a further amount and thus the excess of gas generated will remain in the grain. In accordance, therefore, with my improved method for removing and controlling the amount of carbonic-acid gas I place beneath the perforated floor of the malting-compartment and in the bottom of the tunnel a water-bath that will absorb the gas thus generated, as will be obvious. Thus I am enabled to remove the gas generated by the germinating grain, first, by its absorption by the water, and then, further, by the communication of the tunnel with a suitable foul-air shaft communicating with

an outlet. Consequently the gas that is generated and leaves the grain never passes there-through again, but is removed and carried into the outer air directly from the tunnel without opening the main ventilating-valve and thus ventilating the grain. I thus provide a method of collecting below the germinating grain the gases formed therein and then withdrawing those gases without passing them through the grain, and, furthermore, this method in connection with the downward ventilation.

Referring now to said drawings, 1 indicates a malting-compartment situated within a compartment-room 2, that is provided with an inlet 3, communicating with a suitable source for supplying air thereto. The said malting-compartment 1 is provided with a perforated floor 4, beneath which is the tunnel 5, communicating at one end with a foul-air shaft 6, which communication is controlled by a valve 7. In the operation of malting the grain is placed upon the perforated floor 4 and ventilated at intervals by the attemperated and moistened air, forced therethrough and entering the room 2 through the inlet 3, then down through the grain into the tunnel 5, through the valve 7, into the foul-air shaft 6. When it is desired to stop the ventilation, the valve 7 is closed and the grain "rests," as it is called, or germinates. During this period of rest the carbonic acid generates and of course descends into the tunnel 5. The bottom 8 of said tunnel is made in the form of a tank or trough, so that it can hold a water-bath—that is to say, the bottom of the tunnel is made so that it slopes to form a tank or trough—and the sides of this trough incline toward one point, whereat an outlet is situated, which is controlled by a suitable trap or seal. A supply-pipe 10 is arranged to deliver water into the tank or water-bath. In accordance with the principle involved by my invention I keep this water-bath below the germinating grain, and consequently the water-supply is practically continuous to keep the body of water fresh, that it may absorb the maximum quantity of the carbonic-acid gas.

The trap or seal above referred to is constructed to allow the vitiated water to escape without creating a current of air, and consists of a perforated intake *a*, that communicates with an upturned end *b*, situated in the foul-air shaft 6. The end of this upturned portion *b* is higher than the intake *a*, and this preserves the water seal. An adjustable nozzle *c* is placed upon the upturned end *b*, by means of which the level of the water-bath can be regulated. To draw the water from the tank or water-bath, a branch *d* is employed, that communicates with the intake *a* and is controlled by a valve *e*, the outer end said branch being situated within the foul-air shaft 6 or any other convenient place where the water can escape.

Adjacent to the end of the tunnel 5 and communicating with the foul-air shaft 6 and

in the side wall of said tunnel is an opening 11, that communicates by a pipe or passage 12 with said foul-air shaft. The opening 11 is controlled by a valve 13, preferably hinged at its lower edge and adapted to be operated by hand or to act automatically. The said valve 13 is of course situated within the pipe or passage 12 and is connected by a link 14 with the lower end of an upright rod 15, that passes upwardly through an opening in the passage 12 and is confined by guides 16 and 17, fastened to the wall 18 of the malting-compartment. Above the upper guide 17 the said rod 15 is toothed and passes through a guide 18^a, that is provided with a latch or detent 19 to engage the said teeth 20 of the rod. The upper end of the rod is provided with a handle 21 and with a pointer 22, that moves over an indicating-scale 23 to indicate the position of the valve 13. In this way it will be seen that the valve can be opened to any desired extent and held in this position by moving the detent 19 into engagement with the teeth 20. I have also provided means for operating this valve automatically or by reason of the pressure within the tunnel, and as a convenient construction I employ a spring 24, arranged around the rod 15 and bearing at its lower end upon the guide 16 and at its upper end against an adjustable stop 25 upon said rod, said adjustable stop conveniently consisting of a nut screw-threaded upon the rod. It will thus be seen that the spring acts to close the valve, but that it will yield if sufficient pressure be applied to the valve, and therefore the spring can be set by reason of the adjustability attained by the adjustable stop, so that the valve will open under a predetermined pressure within the tunnel and close again when said pressure is relieved.

For instance, the maltster determines the amount of pressure desired within the tunnel and adjusts the spring to act under an excess of this pressure. Then, should the generation of the carbonic-acid gas continue to such an extent between the intervals of ventilation, it is apparent that the gases accumulating within the tunnel in excess of the amount that will be absorbed by the water will create a pressure therein, and when this pressure exceeds that at which the valve is set the valve will open and allow the gases to flow through the passage 12 into the foul-air shaft, and will remain open until the decrease in pressure is such that the desired conditions are restored. In this way it will be seen that it is not necessary for the maltster to pay such close attention to the germinating grain as has heretofore been necessary, since the gas is released and withdrawn automatically. It will be understood, however, that the operation of malting depends so much upon the skill and discretion of the maltster and the varying conditions under which the operation is carried out, the quality of the grain employed, and the malt to be produced that no rigid or fixed rule can be given for operating

a plant of this kind, and that the maltster can release the gases before the predetermined pressure is reached should he find it desirable. It will of course be noted that if the valve 13 is open and then the ventilating-valve 7 is opened the valve 13 will close automatically owing to the decrease in pressure.

In Figs. 7, 8, and 9 I have shown a novel construction in the malting-compartments, on an enlarged scale, wherein 26 indicates the floor-beams, 27 a pillar supporting an upper floor, and 8 the floor of the compartment. The walls 18 of the compartment are supported by frames 28, which rest upon the beams 26 and at their upper ends carry the tracks 29, upon which the malt-turning machines travel. The perforated floors 4 of the malting-compartment are supported by brackets 30, extending laterally from the frames 28. The said floors 4 consist of the side sections 31, rigidly mounted upon a movable block 32, secured to said bracket 30, and swinging sections 33, having a pivotal connection with the blocks 32 and supported at their free ends by means of legs 34. One of these legs 34 is fastened to one of a pair of sections 33, and the other section of such pair overlaps the outer edge thereof, as shown in Fig. 7. The pivotal connection between the section 33 and block 32 consists of a pivot-bracket 35, that receives a flange of an angle-iron fastened to the edge of the said section 33.

I have provided means for leveling the perforated floor 4 to compensate for settling of the building and to keep the lower ends of the malt-turning screws close to the perforated floor. To accomplish this, the blocks 32 are removably held to the vertical ribs on said brackets 30 by the bolts 36, said vertical ribs on said brackets 30 being slotted to permit said bolt 36 to be vertically adjusted, and an adjusting-screw 37 is carried by the bracket and bears against the lower face of the block 32. In this way it will be seen that by loosening the bolt 36 the adjusting-screw can be turned to raise or lower the block 32 as found necessary, after which the bolt 36 can be tightened to hold it in its adjusted position. The leg 34 that supports the inner ends of the pivotal sections of the perforated floor is provided at its lower end with an adjustable shoe 38, that fits over the lower end of the leg and is held in its adjusted position by set-screws 39, as shown clearly in Figs. 8 and 9.

I claim as my invention—

1. In a malt-house, a malting-compartment provided with a perforated floor, a tunnel underneath said compartment, a valve-controlled opening at one end of said compartment communicating with the foul-air shaft of said malt-house, an opening in one of the said walls of said compartment, a passage leading from said opening to the foul-air shaft, a valve on said opening, and means for controlling said valve comprising a rod vertically movable in guides on the side walls

of said compartment and connected with said valve by a connecting-rod, a collar on said rod, and a spring interposed between said collar and one of said guides and adapted to bear against said collar to hold said valve normally closed.

2. In a malt-house, a malting-compartment provided with a perforated floor, a tunnel underneath said floor, an opening in one wall of said tunnel communicating with the foul-air shaft, a valve on said opening, a rod movable in guides on the wall of said compartment and connected with said valve, teeth on said rod, and a detent pivotally mounted upon said wall of said compartment adapted to engage said teeth on said rod to control the said valve.

3. In a malt-house, a malting-compartment provided with a perforated floor, a tunnel underneath said floor, an opening establishing communication between said tunnel and the foul-air shaft, a valve in said opening, a rod movable in guides on the wall of said compartment and connected with said valve, an adjustable collar on said rod, and a spring interposed between said collar and one of said guides and adapted to bear against said collar to control said valve.

4. In a malt-house, a malting-compartment provided with a perforated floor, a tunnel underneath said floor, an opening establishing communication between said tunnel and the foul-air shaft, a valve in said opening, a rod movable in guides on the wall of said compartment and connected with said valve, an adjustable collar on said rod, a spring interposed between said collar and one of said guides and adapted to bear against said collar to hold said valve normally closed, teeth on said rod, and a detent pivotally mounted in one of said guides and adapted to engage said teeth to control said valve against the action of said spring.

5. In a malt-house, a malting-compartment provided with a perforated floor, a tunnel underneath said floor, the floor of said tunnel being adapted to contain a water-bath, a water-supply pipe in said tunnel, and a water-outlet in said tunnel comprising a pipe having a perforated hood situated within said water-bath, a branch leading from said pipe and provided with an upward extension situated in the foul-air shaft, an adjustable sleeve on said upward extension, and a waste-pipe connected with said outlet and provided with a valve.

6. In a malt-house, a malting-compartment comprising a floor and walls mounted in a framework on said floor, said frame comprising uprights provided with outwardly-extending brackets, a perforated floor in said compartment comprising a plurality of side sections adjustably mounted on said brackets of said uprights, and a plurality of middle sections resting at their outer ends upon adjustable supports secured to said brackets and at their meeting ends to adjustable posts or sup-

ports mounted upon the floor of said compartment.

7. In a malt-house, a malting-compartment comprising a floor and walls mounted in a framework on said floor, said frame comprising uprights provided with outwardly-extending brackets, a perforated floor in said compartment comprising a plurality of side sections mounted at their inner ends upon adjustable shoes secured to the ends of said brackets, and a plurality of middle shoes resting with their outer ends in pivotal projections on said shoes, and at their inner ends upon adjustable supports mounted in shoes on the floor of said compartment.

8. In a malt-house, a malting-compartment

comprising walls mounted between uprights on the floor of said malt-house, outwardly-projecting brackets on said uprights, shoes provided with pivotal projections adjustably secured to the ends of said brackets, shoes mounted upon the floor of said malt-house within said compartment and adapted to receive adjustable supports, and a perforated floor in said malting-compartment mounted upon said adjustable shoes and supports.

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

WILLIAM H. PRINZ.

Witnesses:

RUDOLPH W. LOTZ,

E. J. BOILEAU.