

A. D. LINN.  
 STOCK VALVE FOR DRYING KILNS.  
 APPLICATION FILED AUG. 14, 1912.

Patented Aug. 3, 1915.  
 2 SHEETS—SHEET 1.

1,149,147.

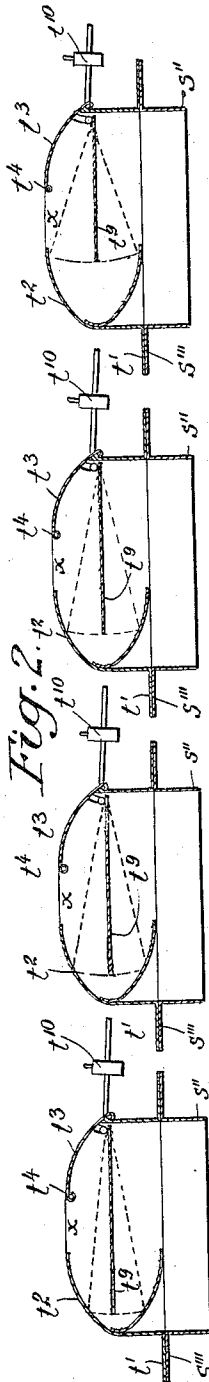


Fig. 2.

Witnesses:  
 Leon A. Linn  
 Frank A. Hunsbury

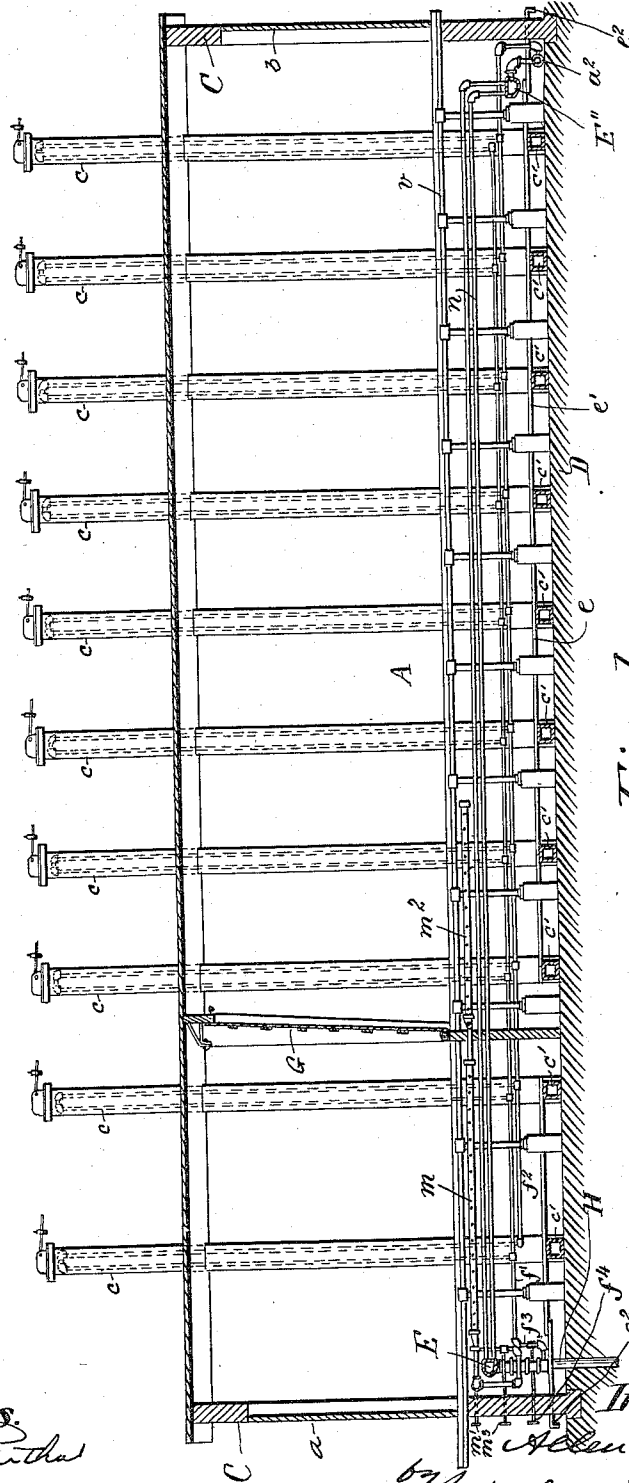


Fig. 1.

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 attorneys

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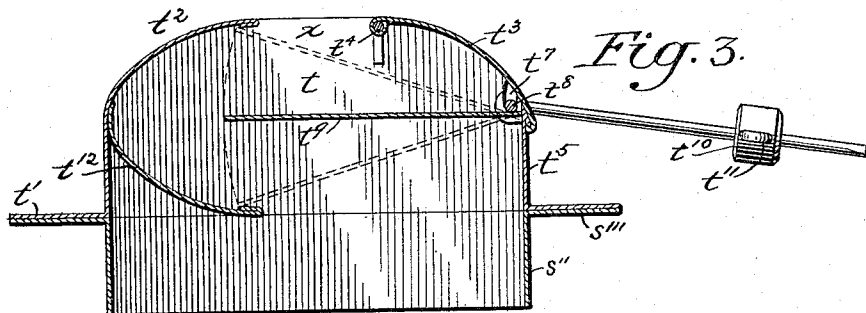


Fig. 3.

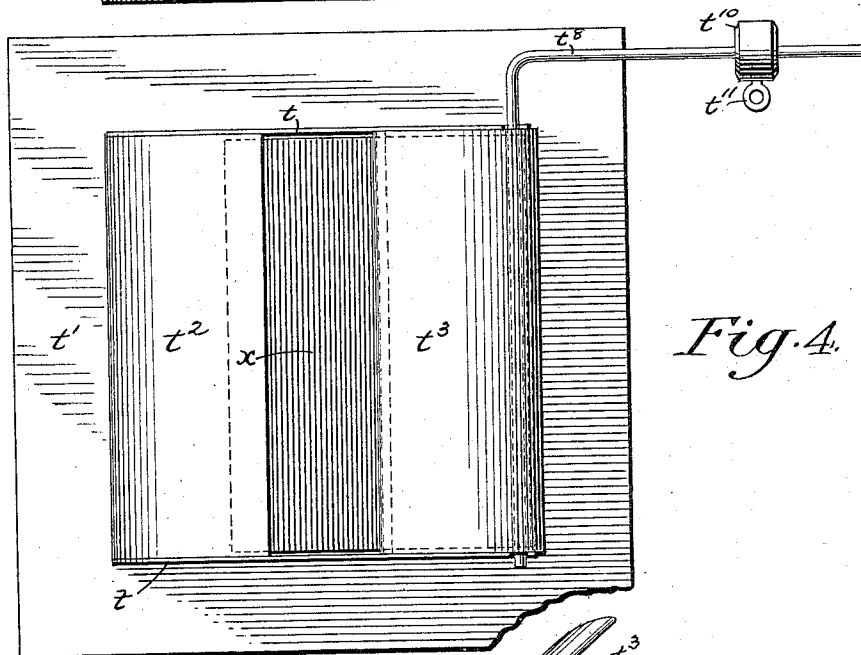


Fig. 4.

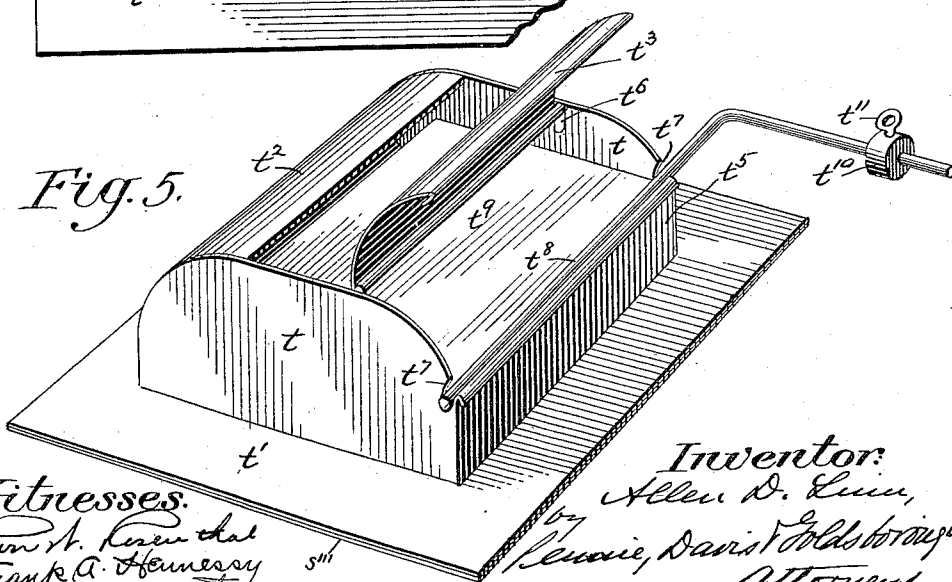


Fig. 5.

Witnesses:  
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# UNITED STATES PATENT OFFICE.

ALLEN D. LINN, OF GRAND RAPIDS, MICHIGAN, ASSIGNOR TO GRAND RAPIDS VENEER WORKS, OF GRAND RAPIDS, MICHIGAN, A CORPORATION OF MICHIGAN.

## STACK-VALVE FOR DRYING-KILNS.

1,149,147.

Specification of Letters Patent.

Patented Aug. 3, 1915.

Application filed August 14, 1912. Serial No. 714,963.

*To all whom it may concern:*

Be it known that I, ALLEN D. LINN, a citizen of the United States, residing at Grand Rapids, county of Kent, State of Michigan, have invented certain new and useful Improvements in Stack-Valves for Drying-Kilns; 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 certain new and useful improvements in stack valves for kilns for drying lumber and the like; and, while particularly applicable to the kiln described in Letters Patent of the United States granted to me under date of October 10, 1911, No. 1,005,243, it is likewise capable of employment to advantage in the operation of other like kilns having generally similar characteristics.

In the use of drying kilns of the type referred to, the orderly progress of the operation is at times liable to be interfered with by the disturbing effects of high winds. In some instances, it is found that the wind, depending upon its velocity and the quarter from which it comes, will blow downwardly through the chimney stacks, and will introduce into the interior of the kiln a volume of cold air, thereby chilling the wood and causing a deposition of moisture upon its surface, or otherwise interfering with the drying operation at the zone where the down draft takes place. In other instances, again depending upon the velocity and course of the wind, it is found to exert a rapid exhausting action upon the kiln, with the result that the operation is practically brought to a stand-still by the continued withdrawal of the kiln's heated atmosphere.

The present invention is designed to preserve the desired normal operation of the kiln, under all conditions of wind and weather, by automatically preventing the disturbing influence of the wind, whether tending to cause a down draft in the stacks, or tending to withdraw its effective atmosphere. To this end, as will hereinafter more fully appear, I have provided the several stacks of the kiln with automatically operating valves, so constructed and arranged that they will close appropriately to prevent either a down draft or an excessive up draft,

as the case may be, which would otherwise result from the action of the wind.

In the accompanying drawings, Figure 1 represents a longitudinal sectional view of a kiln illustrating the application of my improvements thereto; Fig. 2 represents, in section, the automatic valve and its cap or casing, and illustrates a series of valves of different length, interchangeable with each other and adapted for use at various locations along the length of the kiln; Fig. 3 represents a like view of one of the valves and its cap or casing, on a larger scale; Fig. 4 represents a top plan view thereof; and Fig. 5 represents a perspective view, illustrating a portion of the cover as hinged and in a raised position, for the ready removal and replacing of the automatic valve.

Similar letters of reference designate similar parts throughout the several views.

As hereinbefore explained, the kiln structure shown in the drawings is chosen as a suitable kiln structure to which my invention may be applied, although it will be understood that the invention is not limited to employment with this particular construction of kiln, which, nevertheless, is one wherein its advantages are prominent in practice.

In the kiln structure shown, A indicates the side walls of the kiln, and C indicates the end walls, provided respectively with entrance door *a* and exit door *b*.

*c* indicates the ventilating or draft discharge stacks, projecting through the roof B and provided with horizontal extensions or intakes *c'*, which rest upon the floor D of the kiln, and which may be provided with hinged valves or dampers *d* and with slide dampers *e*.

In my patent referred to, the construction and mode of operation of the kiln is fully set forth, and the corresponding parts shown in the present drawings are similarly lettered, and cross reference is now made to the specification of said patent for the further understanding of the kiln's functions.

In my present invention, I apply to the several chimney stacks *c* the automatic valve whose particular construction is illustrated more fully in Figs. 3, 4, and 5. The valve structure consists of a cap whose lower portion *s''*, is adapted to fit the chimney stack. The lower portion *s''* of the cap is provided

with a flange  $s'''$ , and the upper portion is provided with a similar flange  $t'$ . The upper portion is provided with upright ends  $t$ , a curved or domed portion  $t^2$  and a cover  $t^3$ , which latter is hinged to swing upon a rod  $t^4$ .

The hinged cover  $t^3$  may be strengthened by an inturned flange at its free edge as shown, which inturned flange rests upon the corresponding upwardly turned flanged of the side  $t^5$ . The rod  $t^4$  may conveniently be provided with downwardly extending projections  $t^6$ , whereby it can be brazed or otherwise secured to the ends  $t$  of the cap. An open space  $x$  is provided in the cap, which open space communicates with the outer air.

The ends  $t$  are suitably notched at  $t^7$  (see Figs. 4 and 6) for the reception of the cross-rod  $t^8$  to which the swinging valve  $t^9$  is secured and which constitutes the rocking axis of the valve. At its outer end, the rod  $t^8$  is bent, and carries an adjustable counterweight  $t^{10}$  adapted to be secured at any desired point along the rod by means of the set screw  $t^{11}$ . Within the cap or casing is contained the curved partition  $t^{12}$ , which, together with the similarly curved upper portion of the side  $t^2$  forms a space which is preferably substantially elliptical in cross section, as illustrated, for instance, in Fig. 4, this form being preferred so as to diminish the liability of the valve  $t^9$  binding when it is either in its upward or downward limit of inclination. By suitably adjusting the counterweight, the valve  $t^9$  can be delicately adjusted to occupy normally the horizontal position indicated in full lines in Figs. 2 and 3, but with the capacity to tilt upwardly or downwardly, as the case may be, according to the action of the wind.

In operation, I find that when the wind tends to blow downwardly into the chimney stack, the valve  $t^9$  is immediately tilted to the lower position indicated in dotted lines in Figs. 3 and 4, thereby preventing its entrance into the stack below and into the kiln. The pressure within the kiln thereupon restores the valve to its upper position. If the wind again tends to enter the stack, the valve is once more swung to its lower dotted line position, and is thereafter again raised; and so on, this alternate movement sufficing to preserve the normal conditions within the kiln, by maintaining the necessary pressure therein for its effective action and preventing the down-flow and entrance of cold air into the kiln's interior; while, at the same time, providing for the venting of the kiln, as contemplated in kilns of this character. So also, if the wind tends to create a sudden excess suction in the chimney stack, which, if not arrested, would result in the withdrawal or emptying out into the open air of the effective atmosphere of the kiln, that discharge is immediately obviated by the up-

ward swing of the valve into the position indicated in the upper dotted lines of Figs. 2 and 3. In either event, therefore, whether the wind tends to blow downwardly into the stack, or whether it tends to create an excessive suction, the swinging valve operates promptly to suppress its disturbing effect. The necessary conditions prevailing in the kiln, that is to say, the internal temperatures, humidity, and compression are preserved, in spite of the varying atmospheric conditions prevailing without. It will be noted, on reference to Fig. 4, that a slight space is left between the side edges of the valve and the sides of the casing. This not only provides for sufficient clearance to give the valve free action, but also, under all conditions, gives a sufficient vent as against extraordinary pressures from within the stack. The cap or casing is further provided with a longitudinal opening extending across its top, as shown, so as to give free exit to that portion of the kiln's atmosphere which the cap or cover is designed to discharge under working conditions.

It will be understood that the valved compression cap may be used to advantage with a single stack kiln. It is of particular advantage, however, for use with a kiln having a number of stacks, and wherein different degrees of temperature, humidity, and pressure exist at different locations along the length of the kiln, as, for instance, in the kiln illustrated in the drawings and as explained at length in my Letters Patent hereinbefore referred to. To adapt the pressure cap to serve the series of such stacks, the swinging valve is made removable, by raising the cover  $t^3$ , as shown in Fig. 5, and then lifting the valve rod  $t^8$  and valve  $t^9$  out of the casing. By reason of this construction, I am enabled to fit any of the casings or compression caps of a series with a valve of the desired length, appropriate to the conditions prevailing in that part of the kiln where any particular stack is located. Thus, for instance, the four stacks at the extreme left-hand side of Fig. 1 are located in the section of the kiln where, because of the steaming and sweating action desired, the minimum amount of exhaust or draft is required in the normal operation of the kiln. Accordingly, for these particular stacks, the longest blade is appropriate, as indicated in the compression cap shown at the extreme left of Fig. 2. For the two stacks at the extreme right of Fig. 1, where the greatest amount of exhaust or draft is desired, I prefer to employ the shorter blade, as shown at the extreme right of Fig. 2. For the stacks intermediate of those referred to, I prefer to employ the blades of intermediate length, appropriate to the amount of draft or exhaust which they are to govern. The ready removal of

the valves from their casings, and the facility with which they may be substituted by others of different length, gives the necessary flexibility to the system, adapting it to whatever kiln conditions are desired along the length of the kiln, the valves being proportioned in length to the work to be accomplished and to the particular kind of stock treated, whether previously air dried, or green from the saw, and whether hard wood or soft wood.

I prefer to make the compression cap and the valve of non-corrodible material, as, for instance, of sheet copper, and to make the rods  $t^4$  and  $t^8$  likewise of non-corrodible material, as, for instance, of brass, so that the parts may not only resist atmospheric influences, but also so that they may not be affected by the kiln gases.

What I claim is:—

1. A stack valve for kilns for drying lumber and the like, said valve being balanced to normally vent the stack, said valve having two seats against one of which it is adapted to close as against down draft from the outer air, and against the other of which it is adapted to close as against wind suction; substantially as described.

2. A stack valve for kilns for drying lumber and the like, comprising a compression cap or casing having an outlet opening into the outer air, and a balanced valve operating in said casing and having an upper and lower seat, said valve being removably journaled in the casing so as to be readily replaceable; substantially as described.

3. A stack valve for kilns for drying lumber and the like, comprising a compression cap or casing having an outlet opening into the outer air, and a balanced valve operating in said casing and having an upper and lower seat, said valve being removably journaled in the casing so as to be readily replaceable, said casing being provided with a hinged top section normally holding the valve in place; substantially as described.

4. A stack valve for kilns for drying lumber and the like, comprising a compression cap or casing having an opening into the outer air, and a balanced valve operating within the casing, said casing having an interior cross partition constituting one seat for the valve and having a top section constituting another seat for the valve; substantially as described.

5. A stack valve for kilns for drying lumber and the like, comprising a compression cap or casing having an opening into the outer air, and a balanced valve operating within the casing, said casing having an interior cross partition constituting one seat for the valve and having a top section constituting another seat for the valve, the top section and partition being elliptical in cross-section; substantially as described.

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

ALLEN D. LINN.

Witnesses:

W. H. JUSTICE,  
H. E. LODGE.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents, Washington, D. C."