L. V. RISLEY.

Kiln for Drying Hops.

No. 220,989. Patented Oct. 28, 1879.

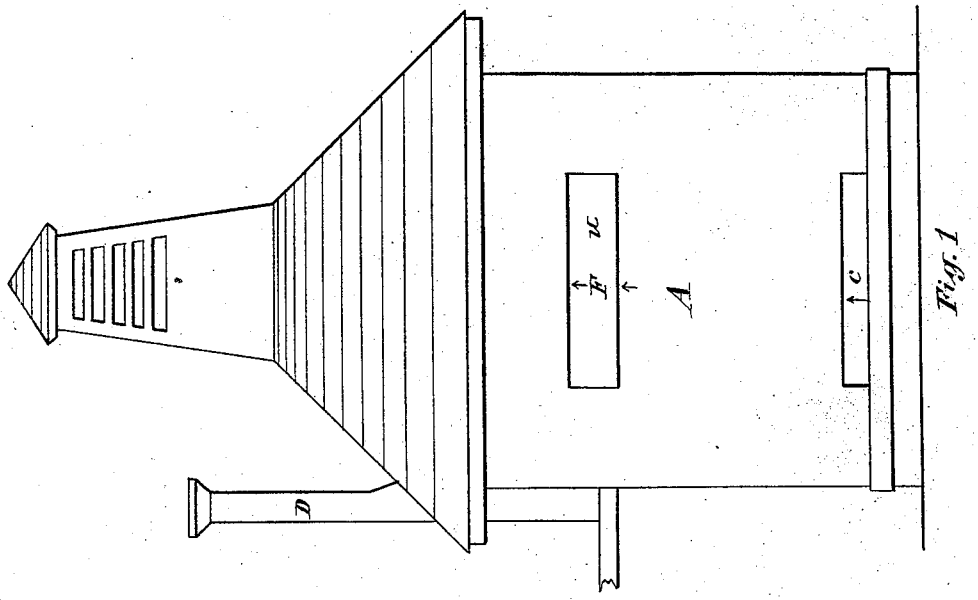

Fig. 1

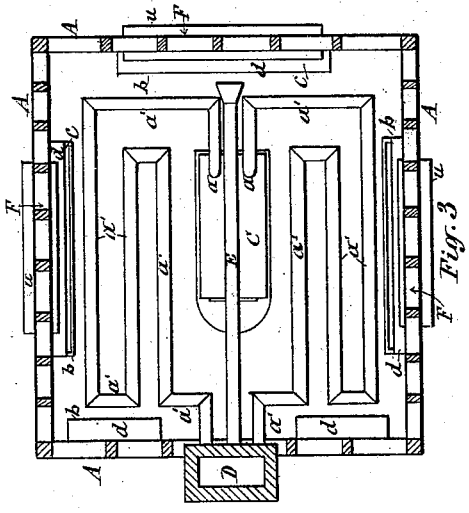

Fig. 3

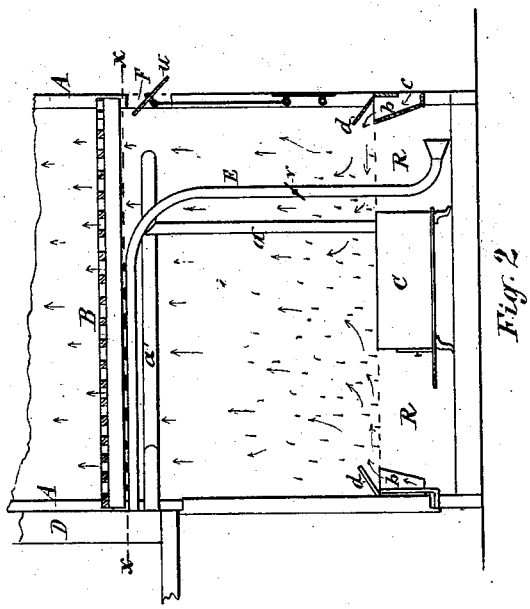

Fig. 2

WITNESSES:

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UNITED STATES PATENT OFFICE.

LEWIS V. RISLEY, OF NEW HARTFORD, NEW YORK, ASSIGNOR OF ONE-HALF OF HIS RIGHT TO NATHAN S. HAYES, OF SAME PLACE.

IMPROVEMENT IN KILNS FOR DRYING HOPS.

Specification forming part of Letters Patent No. **220,989**, dated October 28, 1879; application filed July 7, 1879.

To all whom it may concern:

Be it known that I, LEWIS V. RISLEY, of New Hartford, in the county of Oneida, in the State of New York, have invented new and useful Improvements in Kilns for Drying Hops, of which the following, taken in connection with the accompanying drawings, is a full, clear, and exact description.

This invention relates to improved means for regulating the temperature and currents of air in hop-kilns during the process of drying and curing hops; and it consists, chiefly, in an improved arrangement, with a hop-kiln, of the inlets for the exterior air relative to the floor of the kiln, and to the furnace or heating apparatus, by which arrangement all moisture is eliminated from the air admitted into the kiln, and only dry and moderately-heated air is allowed to pass through the drying-floor, thus facilitating the circulation of said air through the hops and accelerating the drying and curing process, and materially improving its results.

It also consists in the combination, with a hop-kiln having a furnace on its ground-floor and the inlets of air nearly or quite on a level with the top of the furnace, of a pipe leading from near the floor of said compartment to the chimney or flue receiving the products of combustion from the furnace, by means of which the moisture eliminated from the air is utilized to promote combustion, its accumulation in the kiln prevented, and at the same time the draft of the furnace and the temperature of the kiln regulated; and it furthermore consists in the combination and arrangement, with the lower compartment of a hop-kiln, of adjustable transverse cold-air inlets in the sides of the kiln between the heating-pipes and drying-floor, whereby the drying process can be readily arrested at the proper time, and the hops cooled before removing them from the kiln, all arranged and combined to operate substantially as hereinafter more fully described.

The invention is clearly illustrated in the accompanying drawings, wherein Figure 1 is a side elevation of a hop-kiln provided with my improvements; Fig. 2, a longitudinal section of same, and Fig. 3 a horizontal section on line *x x*.

Similar letters of reference indicate corresponding parts.

A represents the main frame or structure of the hop-kiln, constructed in the usual manner and of the ordinary form and dimensions, generally having posts about twenty feet in height. About fifteen feet above the ground-floor is arranged the drying-floor B, usually formed of cleats or strips of wood laid short distances apart across joists, and covered with burlaps or other suitable material to support the hops to be dried.

C represents the furnace or stove usually employed for generating the heat requisite for the drying process. The said furnace is generally placed near the center of the ground-floor, and the products of combustion are conducted to the chimney or flue D by means of vertical pipes *a a*, connected with circuitous or serpentine horizontal pipes *a' a'*, arranged in the vicinity of, and a proper and safe distance below, the drying-floor, and communicating with the chimney D.

The air necessary to the drying process has heretofore been admitted to the kiln through openings in the base of the vertical sides of the building and allowed unimpeded circulation in the lower compartment of the kiln. The result of this was that the current created by the heat radiating from the furnace caused the air to pass from its ingress along the bottom of the kiln directly to the furnace. By impinging the heated exterior of the latter, the air, together with its accompanying moisture or aqueous vapor, became heated and ascended to the drying-chamber above, and carried through the hops not only the moisture naturally attending the air, but also that which may rise from the bottom of the kiln, thereby greatly retarding the drying or curing process and impairing the commercial value of the hops.

To obviate these injurious effects I provide each of the openings *c* with an upward-deflecting case or flue, *b*, on the inside of the kiln, which flues have their discharge end nearly or quite on a level with the top of the furnace, or sufficiently above the ground-floor to prevent the cool, damp air which naturally rests at the bottom of the kiln from being disturbed

by and commingled with the current of fresh air.

To regulate the ingress of the fresh air I provide the discharge end of said flues with a valve or damper, *d*, which is hinged horizontally to the side of the kiln, and thus, when opened, serves to deflect the current of fresh air toward the center of the kiln and cause it to become thoroughly diffused over the heating apparatus. By its circulation over the calm stratum of cold air the moisture accompanying the fresh air becomes condensed and is caused to descend to the bottom of the kiln, which thus becomes a reservoir for the moisture, and is designated as such by the letter R in the drawings.

All moisture being thus eliminated from the current of air ere its reaches the vicinity of the heated pipes *a'*, the light dry air rapidly ascends, circulates freely around the said pipes, and permeates thoroughly and at a moderate temperature through the hops in the chamber above. In its passage through the latter it absorbs the moisture of the hops and carries it off through the ventilator above. By this means the stratum of hops under treatment is dried and cured uniformly throughout, and, being thus maintained loose and light, the circulation of the air is facilitated and the process materially expedited.

The moisture in the reservoir R, before described, is drawn into the furnace or stove C by the natural draft thereof, and thus utilized to promote combustion in same. To guard against accumulation of moisture, I provide an extra ventiduct in the form of a pipe, E, having a funnel-shaped mouth on the ground-floor of the kiln in the vicinity of the furnace C, and its opposite end communicating with the chimney or flue D. A valve, *v*, is connected with the pipe E for the purpose of controlling the exhaust through same. The described arrangement of the pipe E, with its valve *v*, furnishes an efficient means for regulating the temperature of the kiln, inasmuch as the opening and closing of the valve *v* affects the draft of the furnace.

To guard against excessive drying and bleaching of the hops without the necessity of removing the same from the drying-chamber of the kiln while yet hot, as has been customary heretofore, I provide apertures F in the side of the kiln, communicating with the space between the pipe *a'* and the drying-floor B, for the purpose of admitting fresh air thereto. The ingress of the air is regulated and its course directed by means of valves *u*, pivoted horizontally in the openings. By opening these ventilators and closing the draft of the furnace the drying process is at once arrested and the hops cooled rapidly and uniformly.

Having thus described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a hop-kiln provided at its base with the openings *c c*, of the flues *b b*, connected with said openings, and having their discharge end nearly or quite on a level with the furnace, substantially as described, for the purpose set forth.

2. The combination, with a hop-kiln provided at its base with the openings *c c*, of the flues *b b*, connected with said openings, and having their discharge end nearly or quite on a level with the top of the furnace, and the valves *d d*, hinged horizontally to the side of the kiln, all arranged to operate substantially as described, for the purpose set forth.

3. In combination with a hop-kiln having a furnace on its ground-floor and the inlets of air nearly or quite on a level with the top of the furnace, in the manner described, the pipe E, extended from the ground-floor to the chimney which receives the products of combustion from the furnace, and provided with the valve *v*, all substantially in the manner specified and shown, and for the purpose set forth.

4. In combination with a hop-kiln provided at its base with a furnace having its smoke flues or pipes arranged horizontally underneath the drying-floor in the manner described, the apertures F in the sides of the kiln, communicating with the space between the pipes *a'* and drying-floor, and the valves *u*, pivoted horizontally in said apertures, substantially as described and shown, for the purpose set forth.

In testimony whereof I have hereunto signed my name and affixed my seal in the presence of two attesting witnesses at Utica, in the county of Oneida and State of New York, this 13th day of June, 1879.

LEWIS V. RISLEY. [L. S.]

Witnesses:

JOHN GARRETT,

IRA C. POTTER.