June 10, 1930. M. L. MUELLER 1,762,879

METHOD OF AND MEANS FOR DRYING LUMBER

Filed April 12, 1929 2 Sheets-Sheet 1

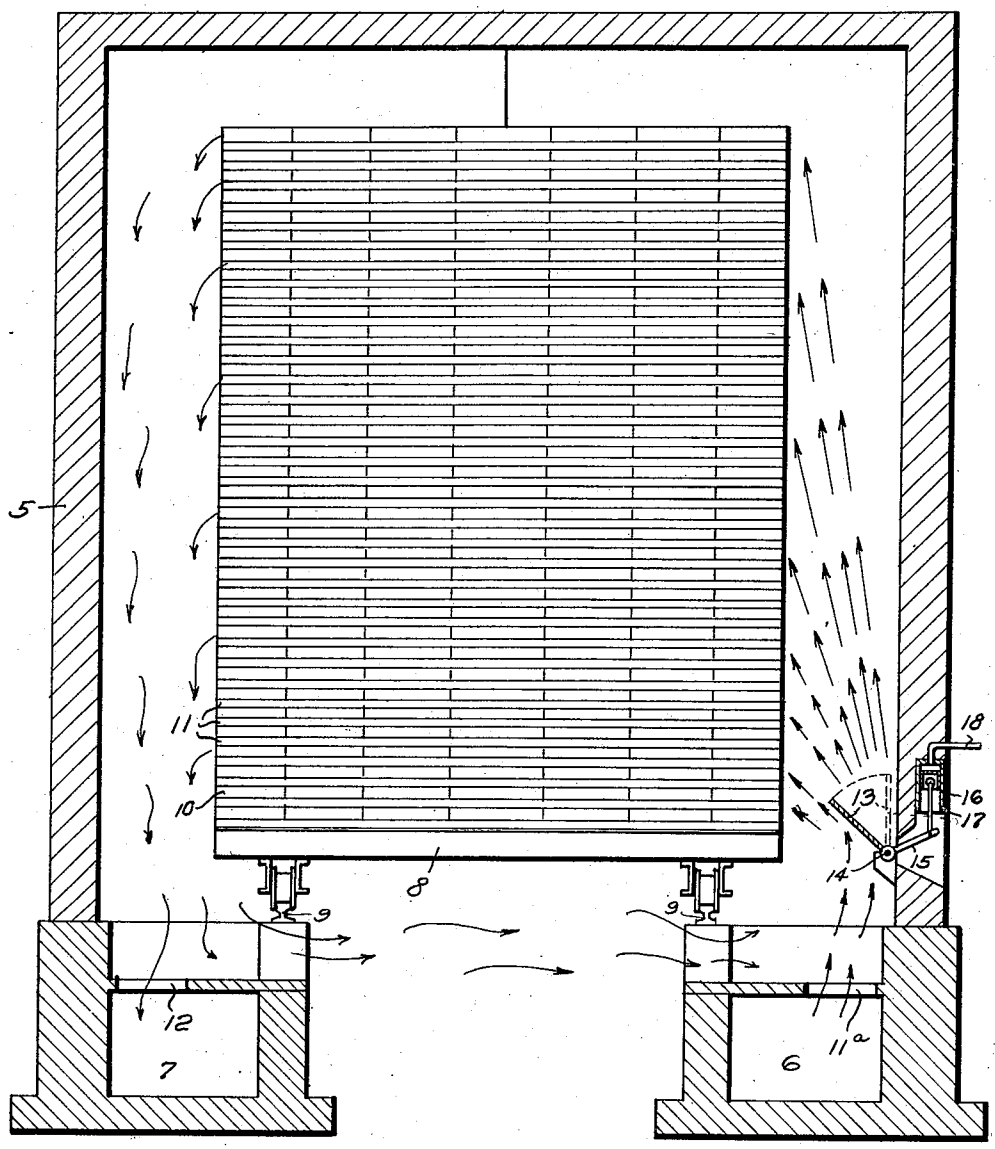


Fig. 1.

INVENTOR.
Moritz L. Mueller,
BY
Shepherd & Campbell
ATTORNEYS

June 10, 1930. M. L. MUELLER 1,762,879

METHOD OF AND MEANS FOR DRYING LUMBER

Filed April 12, 1929 2 Sheets-Sheet 2

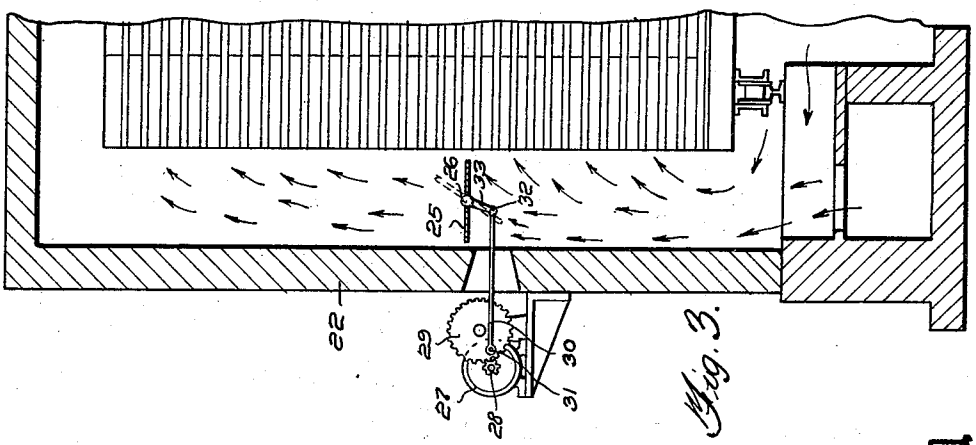


Fig. 3.

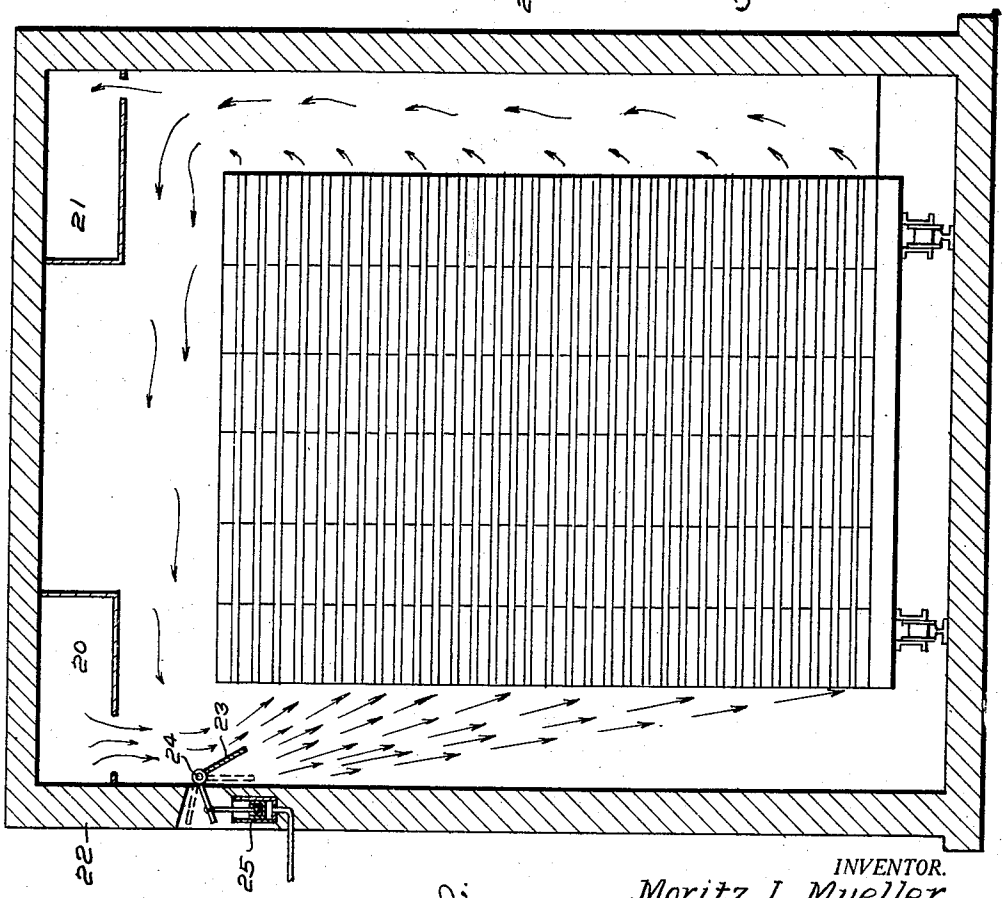


Fig. 2.

INVENTOR.
Moritz L. Mueller,
BY
Shepherd & Campbell
ATTORNEYS

Patented June 10, 1930 1,762,879

UNITED STATES PATENT OFFICE

MORITZ L. MUELLER, OF SEATTLE, WASHINGTON

METHOD OF AND MEANS FOR DRYING LUMBER

Application filed April 12, 1929. Serial No. 354,570.

This invention relates to a method of and means for drying lumber, and it has for its object to provide a lumber drying kiln, equipped with means for setting up a circulation of air transversely of the kiln, and throughout the length thereof, through piles of flat piled lumber, loaded on trucks, into the kiln, together with means for continually varying the angle at which the air discharged from the pressure air duct of the kiln strikes the pile of lumber and by proper control of the vanes, the air may be directed in the most advantageous way to dry the particular lumber being treated.

Broadly stated, the invention resides in providing a deflector, which extends substantially the full length of the kiln, and which has its angle continuously changed by any suitable type of motor, said deflector being located between the side wall of the kiln, and the pile of lumber being dried, and acting as an obstructing means in the space between the wall of the kiln and the lumber, to force the bulk of the air to sweep up and down the side of the pile of lumber, and to contact with the pile of lumber at such an angle that the edges of the courses of lumber will deflect the air through the spaces between the courses of lumber, so that a continuous circulation will be set up transversely of the kiln, and through the pile of lumber.

It will be clear that since the vane continually changes its position, the point in the pile of lumber at which the greatest volume of air is being forced through the pile, will be continuously varied, and it will be seen, as hereinafter set forth, that important advantageous results are thereby secured.

In the accompanying drawings:

Fig. 1 is a transverse vertical sectional view of a kiln, constructed in accordance with the invention.

Fig. 2 is a like view of another form of the invention, and

Fig. 3 is a fragmentary view, illustrating another form of the invention.

Like numerals designate corresponding parts in all of the figures of the drawings.

Referring to Fig. 1, 5 designates the body of a lumber drying kiln, of well known type, comprising a pressure air duct 6, at one side of the kiln, and a suction air duct 7, at the opposite side of the kiln. Lumber trucks 8, adapted to travel on the rails 9, carry piles of lumber, piled in spaced courses 10, so that transverse passages 11 are left through the piles of lumber.

In the usual and well known operation of kilns of this type, the air is discharged upwardly through longitudinally spaced ports 11^a, only one of which is shown, from the pressure air duct, and passes transversely through the passages 11, and is drawn back into the suction air duct, through longitudinally spaced ports 12. Considerable difficulty has been experienced in securing an even air flow through the piles of lumber, with the kilns heretofore employed. Some of these kilns have been provided with deflectors to deflect the air toward the sides of the piles of lumber. A set deflector produces set air currents, which may be correct as long as the relative positions of air source and the required points of delivery remain constant, or, in other words, as long as the proper geometrical combination of angles and velocity of air flow, exists. However, it is sometimes difficult to maintain these relations, as, for example, when the edge of the lumber load varies in relation to the kiln walls. Consequently, it is desirable to provide a moving control of the air currents, to overcome this lock of uniformity, in existing conditions and dimensions.

To accomplish this result, I provide a deflector or resistance vane 13. This vane is carried by an oscillatory shaft 14, to which movement may be imparted through crank arm 15, from any suitable type of motor. The power employed may be electric, pneumatic, or otherwise. For purposes of illustration, I have indicated a piston 16, in a cylinder 17, in which suction and pressure may be alternately created through pipe 18. It is apparent that it is well within the skill of the mechanic to provide a motor to impart oscillation to shaft 14.

The deflector vane 17 may extend to any desired extent along the length of the kiln, but I, preferably, construct it of such length

as to extend substantially the entire length of the kiln. It is clear that with the vane in the position illustrated in Fig. 1, the bulk of the air being discharged from the pressure air duct will be directed toward the lower portion of the pile of lumber, and that as the vane moves more toward the vertical, or toward the dotted line position, in Fig. 1, the air will be caused to sweep upwardly along the side of the pile of lumber, and that this up and down sweeping movement of the air current will be continued throughout the drying process.

Thus, it will be seen that the present arrangement involves a new principle, in connection with the drying of lumber. With a given air volume, even though each portion of the lumber pile is, at some time, receiving an excess of air over its share, and thereafter receives a deficit, yet, with a proper cycle of operation of the deflecting vane, every portion of the lumber pile will receive its usual and proper total amount of air over an extended period of time.

This action of intermittent rapid, then slow, air circulation, will produce equivalent periods of rapid and slow drying in the lumber. This action has been found beneficial in the drying of many kinds of lumber. By intermittenty forcing, then relaxing, the rate of water removal from the surface of the stock, the total rate of removal of moisture is in excess of a steady condition, and in addition produces lower strains than when a steady drawing out of water is maintained. Local seasoning stresses relax and equalize between removal periods, and the delay between permits a more rapid transfusion of moisture to the surface than when a steady draining effect is maintained.

In the forms of the apparatus illustrated in Figs. 2 and 3, the same principles of operations exist.

In Fig. 2, the suction and pressure air ducts 20, 21, respectively, are at the top of the kiln, the body of which is indicated at 22. The deflector vane 23, is, in this case, located near the top of the pile of lumber, and is operated by an oscillatory shaft 24, said shaft, in turn, being actuated by any suitable type of mechanism, such as the pneumatic motor 25. The circulation of air is as indicated by the arrows, in both Figs. 1 and 2.

In Fig. 3, the deflector vane 25 extends to each side of its oscillatory shaft 26, said vane beng movable from a position where it extends substantially horizontally across the space between the wall of the kiln and the pile of lumber, as indicated in full lines in Fig. 3, to a position where it lies nearly vertical.

As illustrating one form of actuating mechainsm that may be employed, I have diagrammatically shown an electric motor 27, which, through pinion 28, drives a large gear wheel 29. A connecting rod 30 is pivoted to this gear wheel at 31, and is connected, at 32, to a crank arm 33, of the oscillatory shaft 26.

I wish to stress the importance of the automatic equalization of air distribution throughout all portions of the pile of lumber, arising from the use of moving, rather than set air streams, and also the importance and advantage of intermittent circulation for any given portion of the load of lumber with respect to the reduction of degradation of the lumber. As before stated, where the action of the air upon the lumber ceases, for a period of time, the moisture in the interior of the lumber tends to flow or move under capillary action, into those portions of the lumber which have been partially dried, and then when the air current again strikes these portions, this moisture is removed, but without excessive drying, which might cause checking or cracking, if the action of the air stream was continuous for too long a time.

The location and design of the vanes are controlled by local conditions, and are based on either the geometrical principle of a moving body of gas striking an inclined plane, and being deflected at an angle, relative to the angle of contact or the physical principle of obstructance, or back pressure, or by a combination of these forces.

It is to be understood that the invention is not limited to the particular apparatus herein described, but that it includes, within its purview, any means for causing the air current to vertically traverse the piles of lumber through uniform cycles of operation, as described, irrespective of the nature of the source of air supply.

Consequently, it is to be understood that the invention includes, within its purview, whatever changes fairly come within either the terms or the spirit of the appended claims.

Having described my invention, what I claim is:

1. The herein described method of drying lumber, which consists of setting up a current of air transversely through a pile of lumber, piled in spaced courses, and continuously changing the direction of the air current to cause it to sweep up and down the side of the pile of lumber.

2. The herein described method of drying lumber, which consists of setting up a current of air through a pile of lumber flat piled in spaced courses, and continuously changing the direction of the air current to cause it to sweep from top and bottom of the pile of lumber and vice versa, at such angles as to be caught by the lower edges of the courses of lumber and deflected laterally therethrough.

3. The herein described method of drying lumber, which consists of disposing the lum-

ber in a kiln, setting up a current of air transversely of the kiln, through the pile of lumber, and continually varying the angle at which the current of air is directed toward the pile of lumber to cause the current of air to sweep from top to bottom of the pile of lumber.

4. The herein described method of drying lumber, which consists of disposing the lumber in horizontal spaced courses within a kiln, and in spaced relation to the side wall of the kiln, and discharging air into the space between the side wall of the kiln and the pile of lumber, and continually varying, in a fixed cycle, the angle at which the air is directed toward the pile of lumber, to cause it to sweep up and down the side of the pile of lumber.

5. The combination with a kiln, of means for discharging piles of flat piled lumber, lying in spaced courses, into said kiln, means for setting up a circulation of air transversely of the kiln through the pile of lumber, and a driven and movable vane disposed in the space between the lumber and the side wall of the kiln, and acting to continually vary the direction of air flow to cause the air current to continuously sweep up and down the sides of the pile of lumber.

6. The combination with a kiln, adapted to receive lumber trucks, and of such dimension that when the trucks are in place in the kiln, the piles of lumber are spaced from the side walls of the kiln, a deflecting vane adjacent the side wall of the kiln, and a motor for driving said vane through a determinate cycle of operation, and means for setting up, an air flow past said vane and through the pile of lumber transversely of the kiln, the action of the vane serving to cause the current of circulated air to continuously sweep the pile of lumber from top to bottom.

7. The combination with a kiln, of a trackway therein, adapted to receive lumber trucks, with the lumber on the trucks in spaced relation to the wall of the kiln, suction and pressure air ducts at the opposite sides of the kiln, which serve to set up a circulation of air transversely of the kiln, an oscillatory shaft adjacent the pressure air duct, means for oscillating said shaft through a determinate cycle, and a deflecting vane carried by said shaft and serving, in its cycle of movement, to cause the air current to continually vary its point of greatest application to the lumber, throughout the height of the pile of lumber.

In testimony whereof I affix my signature.

MORITZ L. MUELLER.