

Oct. 19, 1937.

J. W. DOHERTY

2,096,373

DRY KILN

Filed May 23, 1936

2 Sheets-Sheet 1

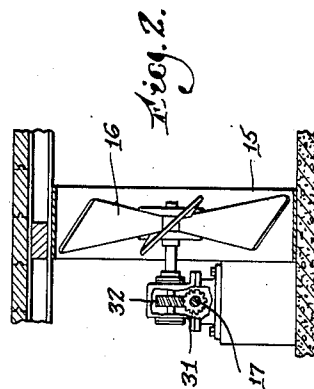
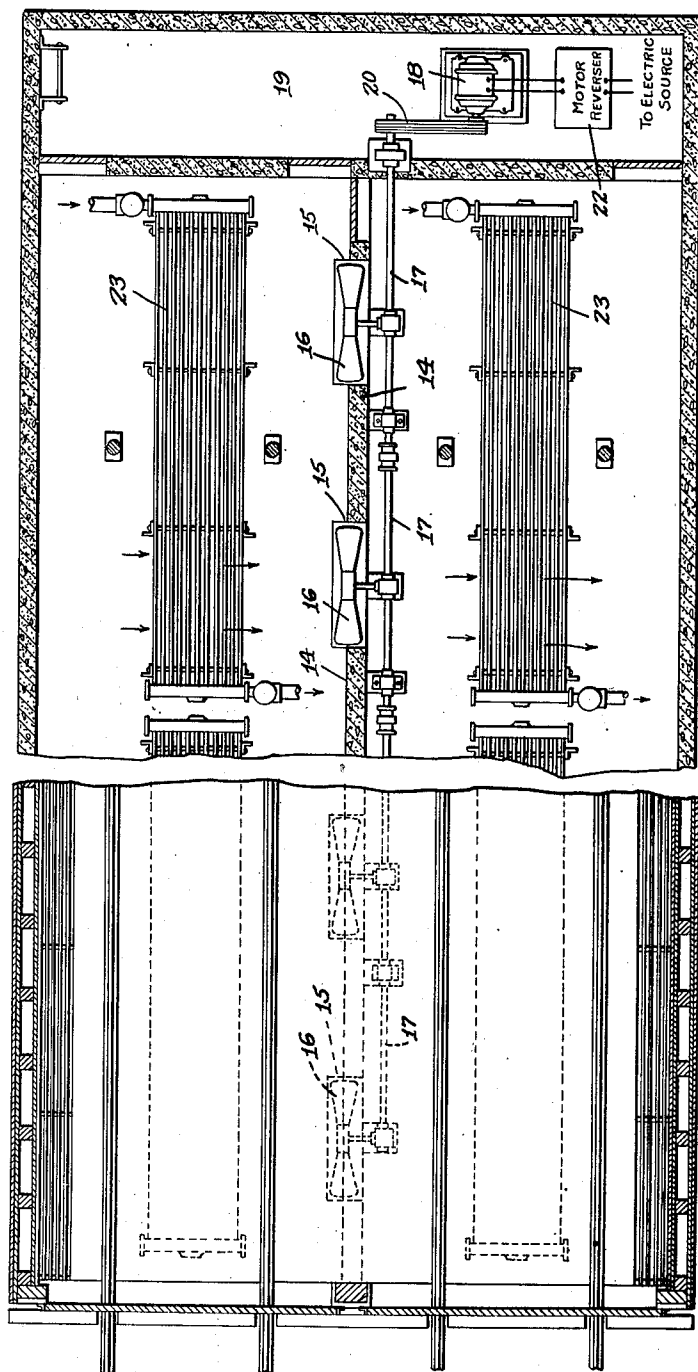


Fig. 1.

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Fig. 4.

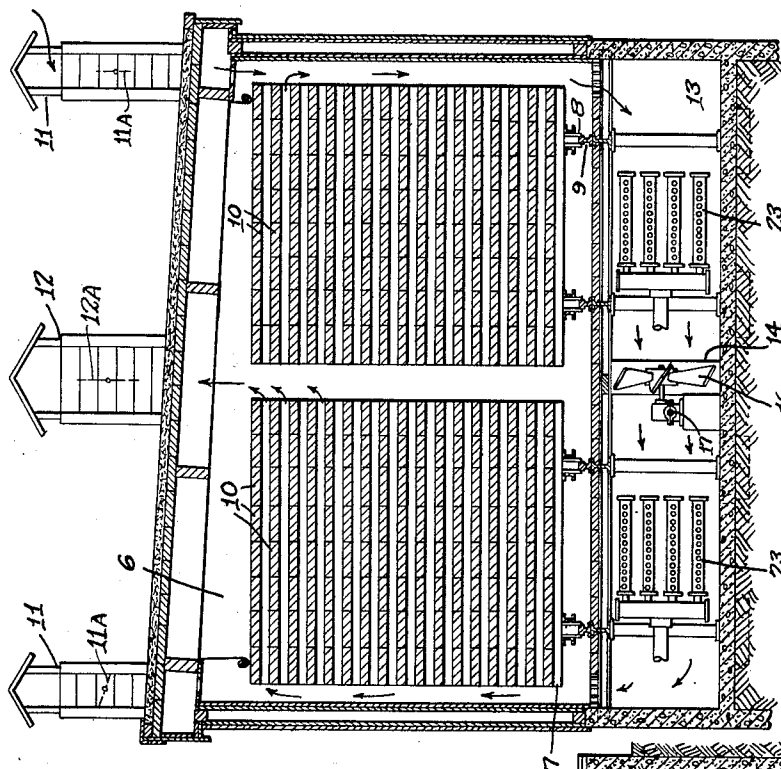
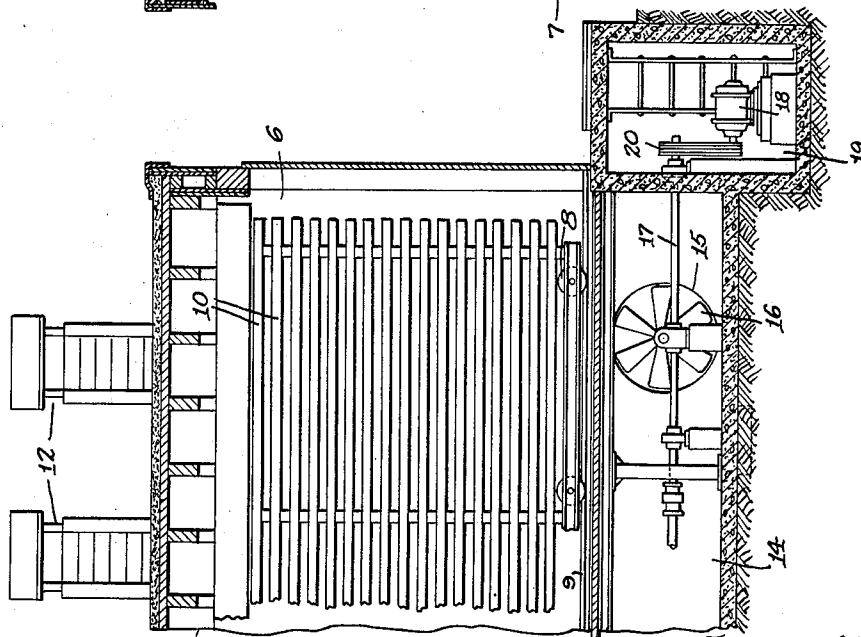


Fig. 3.



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UNITED STATES PATENT OFFICE

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DRY KILN

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6 Claims. (Cl. 34—46)

This invention relates to drying systems and relates more particularly to the drying of lumber and the like, in what are known as dry kilns.

In kilns for the drying of lumber in the form of boards or planks, it is customary to so stack the boards in the kiln, that interstices between the boards are formed and through which, heated air is blown under forced draft to dry out both sides of the lumber.

It has been appreciated that the heated air as it passes through the stacked lumber, loses through its absorption of moisture and loss of heat, its effectiveness to a considerable degree, so it has been customary to provide reversible fans for causing the drying air stream to enter first one side of the stack to be dried, and then after a period of time, the opposite side. It has however, been the practice in the past to mount the reversible fans in openings in transverse walls, so that the columns of drying air initiated by the fans are first projected longitudinally of the kiln. The columns of air are then deflected crosswise the kiln by zigzag walls or baffles to perform their drying duty. This arrangement however, not only is inefficient in that considerable energy is wasted in turning the columns of air at right angles to their original courses, but the drying chamber is necessarily complicated by the multiplicity of deflecting walls required, and finally what is even more serious, the lumber is unevenly dried due to the tendency of the columns of air to drift, after turning, towards that end of the kiln towards which they were originally projected.

According to this invention, there is provided in the drying or fan chamber of a dry kiln, a single central longitudinal wall provided with a plurality of spaced openings in which reversible disc type fans are mounted. The fans are all rotated from a single reversible motor, by means of a longitudinal shaft common to all fans, and a set of gears, and a transverse shaft for each fan.

An object of the invention is to provide a simple, efficient fan system for dry kilns of the internal fan type.

Another object of the invention is to provide a fan system for dry kilns of the internal fan type, in which the drying air is projected crosswise the kiln, without longitudinal drift.

Other objects of the invention will be apparent from the following description taken together with the drawings.

The invention will now be described with reference to the drawings of which:

Fig. 1 is a plan view looking downwardly, with portions of the upper and lower kiln chamber in section, of an internal fan kiln according to this invention;

Fig. 2 is a detail view of the gear drive for each of the fans of Fig. 1;

Fig. 3 is a longitudinal section through one end of the kiln of Fig. 1;

Fig. 4 is a partial side view in section of the kiln of Fig. 1, and

Fig. 5 is an end view in section of the kiln of Figs. 1 and 3.

With reference to Figs. 3 and 4, the lumber to be dried is stacked in the drying chamber 6 upon the floor member 7, which in turn is mounted upon the wheels 8 which rest upon the track rails 9. The successive layers of lumber 10 are spaced apart in the usual manner to form a plurality of horizontal channels therebetween, through which the drying air is forced.

The fresh air inlets 11 contain the dampers 11A and the exhaust air vents 12 contain the dampers 12A. Fresh air is drawn in through one or the other of the two series of inlets 11, depending upon the direction of rotation of the fan. One of the dampers 11A of Fig. 4 is closed and the other open when the fan is rotating in one direction, and when the fan is rotating in the other direction, the positions of these dampers are reversed. The exhaust air always passes out through the center vents 12.

Underneath the drying chamber 6 is the fan chamber 13, down the longitudinal center of which extends the wall 14 provided with the spaced circular openings 15 in which are mounted the fans 16. The fans 16 are rotated from the longitudinal shaft 17 which is driven by the motor 18 in the apparatus room 19 by means of the V-drive 20. Each fan 16 is driven as shown by Fig. 2, from the shaft 17 by the gear 3 which is keyed to the shaft 17 and which is meshed with the gear 32 which is keyed to the shaft of the fan.

The motor 18 is provided with a standard type of reverser 22 for changing the polarity of the current supplied from the electric main to windings of the motor 18.

The wall 14 divides the fan chamber into two parts in each of which are arranged the longitudinal steam heating coils 23 for heating the drying air.

In operation the fans 16 may first be rotated as shown by the arrows in Fig. 4 to draw fresh air in through the right hand inlets 11 (facing the drawings) and to project the drying air through the fan chamber 13 from right to left

and through the lumber in the drying chamber from left to right. After a period of time which experience has shown to be correct, the fan driving motor 18 is reversed so that the fans 16 rotate in the opposite direction to reverse the previously described air flow. At the same time, the dampers 11A in the right hand inlets 11 are closed and the dampers 11A in the left hand inlets are opened.

Regardless of the direction of rotation of the fans 16, the exhaust air is vented out the centrally placed vents 12. Thus, the exhaust air is always made up of moist air which has previously performed its drying functions instead of relatively dry and fresh air as has been the practice in the past where the same vents alternately performed the function of admitting fresh air and venting exhaust air.

As may be readily appreciated from Fig. 1, the air projected by the fans 16 passes in direct flow transversely the kiln without drift to one or the other ends of the kiln as has been the practice in the past. This ensures that every portion of the lumber is dried an equal amount regardless of whether it is located adjacent or between the two ends of the kiln.

The fans are all driven from a single motor which is not exposed to and is therefore not affected by the drying atmosphere. The shaft 17 and gears 31 and 32 are not affected by the drying atmosphere and provide a simple dependable driving mechanism.

While one embodiment of the invention has been disclosed for the purpose of illustration, it should be understood that the invention is not limited to the exact arrangement described, since many departures would suggest themselves to those skilled in the art, after access to this disclosure.

What is claimed is:

1. A dry kiln comprising a drying chamber, means for supporting material to be dried in said drying chamber in two separate stacks with a central space therebetween and with side spaces between the longitudinal sides of said drying chamber and said stacks, means forming fresh air inlets over said side spaces, means forming exhaust air vents over said central space, a fan chamber under said drying chamber, a wall extending down the longitudinal center of said fan chamber and dividing same into two compartments, each of said compartments connecting with one of said side spaces, said wall having a plurality of openings, fans in said openings, means mounted external said fan and drying chamber for rotating said fans, and means for reversing said last mentioned means.

2. A dry kiln comprising a drying chamber, means for supporting material to be dried in said chamber in two separate stacks with a central space therebetween and with side spaces between the longitudinal sides of said chamber and said stacks, said stacks including a plurality of horizontal air channels, means forming fresh air inlets opening into said side spaces, means forming exhaust air vents over said central space, a fan chamber under said drying chamber and communicating directly with said side spaces, and an air tight partition between said central space and said fan chamber, whereby air from said fan chamber can only reach said central space through said side spaces and through said channels.

3. A dry kiln comprising a drying chamber, means for supporting material to be dried in said

chamber in two separate stacks with a central space therebetween and with side spaces between the longitudinal sides of said chamber and said stacks, said stacks including a plurality of horizontal air channels, means forming fresh air inlets opening into said side spaces, means forming exhaust air vents over said central space, a fan chamber under said drying chamber and communicating directly with said side spaces, an air tight partition between said central space and said fan chamber, whereby air from said fan chamber can only reach said central space through said side spaces and through said channels, and reversible means for alternately drawing air from said drying chamber through one of said side spaces acting as a recirculated air passage, into said fan chamber and forcing air from said fan chamber through the other of said side spaces acting as an air discharge passage, into said drying chamber.

4. A dry kiln comprising a drying chamber, means for supporting material to be dried in said chamber in two separate stacks with a central space therebetween and with side spaces between the longitudinal sides of said chamber and said stacks, said stacks including a plurality of horizontal air channels, means forming fresh air inlets opening into said side spaces, means forming exhaust air vents over said central space, a fan chamber under said drying chamber and communicating directly with said side spaces, an air tight partition between said central space and said fan chamber, whereby air from said fan chamber can only reach said central space through said side spaces and through said channels, and reversible means for alternately drawing air from said drying chamber through one of said side spaces acting as a recirculated air passage, into said fan chamber and forcing air from said fan chamber through the other of said side spaces acting as an air discharge passage, into said drying chamber, the fresh air inlets for the one of said side spaces acting as a recirculated air passage being opened and the fresh air inlets for the one of said side spaces acting as a discharge air passage being closed.

5. A dry kiln comprising a drying chamber, means for supporting material to be dried in said chamber in two separate stacks with a central space therebetween and with side spaces between the longitudinal sides of said chamber and said stacks, said stacks including a plurality of horizontal air channels, means forming fresh air inlets opening into said side spaces, means forming exhaust air vents over said central space, a fan chamber under said drying chamber and communicating directly with said side spaces, an air tight partition between said central space and said fan chamber, whereby air from said fan chamber can only reach said central space through said side spaces and through said channels, a wall extending down the longitudinal center of said fan chamber and dividing same into two compartments, each of said compartments connecting directly with one of said side spaces, said wall having a plurality of openings, fans in said openings, means external said drying chamber for rotating said fans, and means for reversing said last mentioned means.

6. A dry kiln comprising a drying chamber, means for supporting material to be dried in said chamber in two separate stacks with a central space therebetween and with side spaces between the longitudinal sides of said chamber and said stacks, said stacks including a plurality of hori-

zontal air channels, means forming fresh air inlets opening into said side spaces, means forming exhaust air vents over said central space, a fan chamber under said drying chamber and communicating directly with said side spaces, an air tight partition between said central space and said fan chamber, whereby air from said fan chamber can only reach said central space through said side spaces and through said channels, a wall extending down the longitudinal center of said fan chamber and dividing same into two compartments, each of said compartments connecting directly with one of said side spaces, said wall having a plurality of openings, fans in

said openings, means external said drying chamber for rotating said fans, and means for reversing said last mentioned means, said fans when rotating in one direction draw air from said drying chamber through one of said side spaces acting as a recirculated air passage, into said fan chamber and force air from said fan chamber through the other of said side spaces acting as an air discharge passage, into said drying chamber, the fresh air inlets for the one of said side spaces acting as a recirculated air passage being opened and the fresh air inlets for the one of said side spaces acting as a discharge air passage being closed.

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