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AGRICULTURAL COLLEGE

THE REVERSIBLE CIRCULATION INTERNAL FAN KILN

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In the experimental drying of lumber at the Forest Products Laboratory a number of devices for producing a positive, rapid, and reversible circulation of the air in compartment kilns have been tried out. Of these the most effective is a series of disk fans mounted on a shaft running the full length of the kiln. Fans of this type are very efficient at the low pressures used. No long air ducts are necessary, and large amounts of air can be moved effectively with a comparatively small expenditure of power. The reversal of the direction of circulation can be accomplished by merely reversing the direction of rotation of the shaft. This reversal largely compensates for the normal difference in the drying rate between the entering-air edge of the lumber and the leaving-air edge.

The internal disk fan design may be adapted to almost any type of compartment kiln, flat piled or edge stacked, cross piled or end piled; but it finds its most logical application in edge-stacked kilns and in flat-stacked end-piled kilns in which a cross circulation is used.

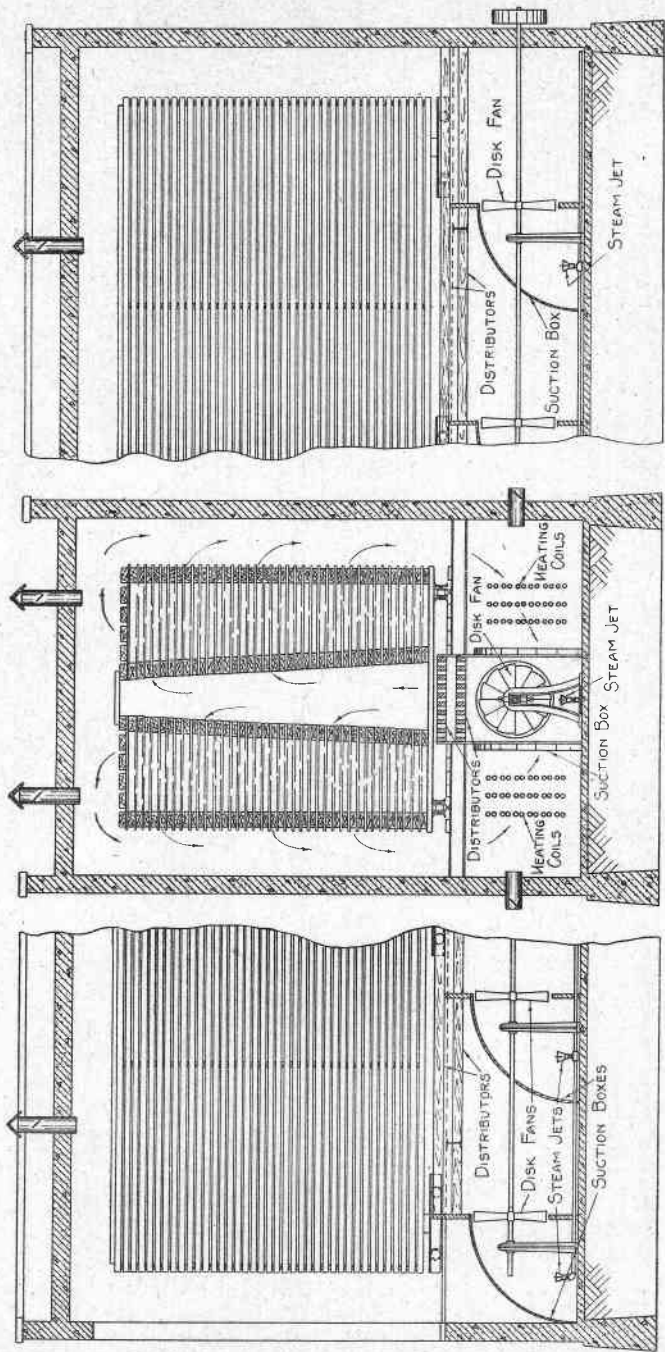
The diagrammatic sketch shows one of a number of possible arrangements of disk fans in a single-track end-piled compartment kiln with a central flue in the flat pile. When the direction of air travel is upward through the central flue as indicated by the arrows, each fan draws air from the suction box at its left, which is open at the sides towards the heating coils, and discharges it into the distributor at its right. This air escapes through the slots in the top of the distributor, rises in the central flue, passes laterally outward through the lumber, falls in the passages between the lumber and the side walls, goes over the heating coils

and comes back to the suction boxes. After the air has been allowed to circulate in this manner for some time, the direction of rotation of the fans is reversed. The air then follows the same path as before but in the opposite direction, and those portions of the pile that previously received the air first now receive it last.

The heating coils may be separated in two groups as indicated, and each group may be split up into several units so that any number of pipes may be used in accordance with the heat required. The humidity in the kiln may be increased by means of steam or reduced by ventilation. Steam jets and inlet and exhaust flues are provided for this purpose.

The internal-fan kiln is particularly adapted to the drying of green hardwoods, the upper grades of softwoods which contain a large amount of moisture and dry rapidly, and the common grades of all softwoods. It is, of course, capable of drying the less refractory classes of lumber as well as the difficult kinds.

A patent on the internal-fan kiln has been granted to its inventors, members of the staff of the Forest Products Laboratory, who have in turn dedicated the patents to the free use of the public.



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