

age and box stuff, is less inclined to give trouble in this respect, than 1-inch and thicker, we find that the kiln will give more uniform results and, at the same time, be more economical in the use of steam, when these conditions are maintained.

Cooperage stock is now universally dried in the progressive type of kiln. In a kiln of this type, the material is piled on trucks, which are pushed down through the kiln on tracks, progressing through the kiln slowly as the demands for dry stock determine. One of the main advantages in a kiln of this type is the small expense of handling and it also has advantages from the drying standpoint, which cannot be duplicated in other types of kilns.

The progressive type of kiln is divided into two classes—the pipe kiln, in which natural draft is relied upon for circulation, and the blower kiln, in which the circulation is produced by fans or blowers. The blower kiln is the older of the two and has been used for drying this stock for nearly 25 years, during which time, of course, it has undergone steady improvement, not only in the apparatus and equipment used, but also in the general design of the kiln, method of introducing air and provision for controlling the temperature and humidity.

The pipe kiln first became known about 15 years ago, and while it has been used to some little extent for the drying of cooperage stock, the results obtained from it have not been so uniformly good as from the blower type of kiln.

Cooperage stock essentially requires positive and uniform circulation to insure good results. With a natural draft of pipe dryer, we find that the varying atmospheric conditions affect the circulation, in some cases to such an extent that good results cannot be obtained, while with the blower kiln, the circulation is always under control and can be adjusted to suit the conditions arising from the operation of a dry kiln, which necessarily vary with the condition of the stock going into the kiln and the amount of output that is expected.

In either type of kiln, however, it is absolutely essential, in order to secure good results, both as to rapidity in drying and good quality of stock, that the kiln be so designed that the temperature and humidity, together with the circulation, are always under convenient control. Any kiln, where this has not been carefully considered and allowed for, is sure to give trouble. In the pipe, or natural draft kiln, we find that while the temperature and humidity can be controlled to a satisfactory degree, the trouble has been in the circulation. In the old blower kiln, the trouble was, while the circulation and temperature were very largely under control, it was next to impossible to produce conditions in the receiving end of the kiln so that the humidity could be kept at the proper point. In fact, this was one reason why the natural draft, or so-called moist air kiln, was developed and it succeeded very well in overcoming this trouble, but, as usually is the case, it developed the other defect, which was just about as detrimental to good results.

The advent of the pipe, or moist air kiln, served as an education to kiln designers, in that it has shown conclusively the value of a proper degree of humidity in the receiving end of the kiln and it has been of special benefit to us in that it gave us our first idea of how to improve the design of our blower kilns to overcome the difficulty above referred to. This has been remedied and in a decidedly simple manner, as is usually the case with all things that possess any merit. We find by returning from one-third to one-half of the air used in a kiln back to the fan room, and mixing it with fresh air, that we can produce ideal conditions for drying work.

The amount of air that can be returned from the kiln depends on three things—first, the condition of the stock on going into the kiln; just how hard the kiln is being worked; and the condition of the outside atmosphere. In the winter time, we find that a larger proportion of air can be returned than in the summer time. This is rather a fortunate coincidence, as, when the kiln is being operated in this way, it is also much more economical in steam consumption, as must be perfectly obvious. In the summer time, when the outside atmosphere is saturated to a much greater extent, we find that it is not possible to return as large an amount of air from the kiln, although we have some kilns in operation in which all of the air is returned and no fresh air whatever taken. This is an unusual thing, however, and can only be accounted for by the peculiar conditions surrounding the installation, which we will not go into at this time and explain.

It is not generally understood that the length of a kiln has any effect upon the work that can be gotten from it, but it is a fact, nevertheless, that long kilns produce a better quality of stock and in a shorter time. Our experience has shown us that for cooperage stock a kiln from 75 feet to 90 feet long will produce the best results, and it is our practice in every case, where possible, to keep within these figures. The reason for this is that in a long kiln there is a greater drop in temperature between the discharging end and the green or receiving end. As we have outlined in the foregoing, it is very essential that the condition in the receiving end of the kiln, as far as temperature and humidity are concerned, must go hand in hand. We find in a long kiln, we can produce the desired conditions with higher temperatures than with short kilns, consequently we can carry much higher temperatures in the discharging end of the kiln on this account and on account of the length of the kiln as well. It is nothing unusual to find that a temperature of 200 degrees and over can be carried in the hot end of the kiln safely, without, in any way, injuring the quality of the material, although perhaps a better average would be placed at 180 degrees in the hot end and about 120 to 130 degrees in the receiving end.

With the positive circulation that can be maintained, with a blower kiln, and the conditions of temperature and humidity under absolute control, we have the elements most necessary to produce good drying results in the fastest possible time.

As may be gathered from the above, that in spite of the fact that we manufacture what is pretty generally recognized as the best moist air, or natural draft, kiln on the market, we find, from our experience, that the "ABC" blower kiln is better adapted for the purpose of drying cooperage stock and we have no hesitancy whatever in recommending its use for this purpose.

It must not be inferred from this, however, that this type of kiln can be installed and good results obtained regardless of how the kiln is handled. A great deal of the success of any kiln depends on intelligent handling. Although there have been any number of kilns exploited in the last 10 or 15 years, for which extravagant claims have been made, both as to efficiency, rapidity in drying, freedom from attention, etc., most of these have been of the type that might be classed as "freaks" and have died a natural death. Every year we are approached by would-be inventors with ideas to sell, and as we are continually seeking improvements in the art, which possess real value, we investigate all of them carefully. Invariably, we are sorry to say, we have had to reject them for one reason or another. Usually they are not based on sound principles, or comprise features which would make their use uncommercial.