

### THE STURTEVANT PATENT PROGRESSIVE LUMBER DRY-KILN.

The accompanying cuts very clearly represent the construction and method of operation of the kiln and the apparatus required for it. The designer and builder of the apparatus has been before the public for over a quarter of a century as a manufacturer of blowers and heating apparatus. His extended experience, and a careful consideration of the wants of his customers, has enabled him to present to them, not only an apparatus which is unequalled, but in connection with it the complete drawings for a first class dry-kiln of any given capacity.

The principle which he has adopted is undeniably the best and only one that can secure satisfactory results. Every one is perfectly well aware of the necessity of the circulation of the heated air coming in contact with the lumber in the process of drying. The great question always is how to secure such circulation most cheaply and satisfactorily. Of all methods of generating currents of air, the most expensive is that of causing a movement by heating the air and thereby changing its density.

Changes in the condition of the atmosphere produce reversed currents, or worse still, sometimes prevent currents altogether, rendering for days such an apparatus ineffectual.

The action must be positive and this condition can only be secured by the use of a Fan for impelling the air. The objection has often been raised that it costs too much to run a Fan, but in connection with a heater it in reality costs nothing, for a heater must necessarily be used in connection with a kiln, and the exhaust from the engine can be entirely utilized in the heat. It is well known that exhaust steam has only three per cent less heat in it than live steam at 70 lbs. Hence the exhaust from the engine can be utilized in the heater in place of three per cent less live steam. Actually the engine cylinder is but an enlargement of the steam pipe on its way to the heater.

The first patent on B. F. Sturtevant's Steam Hot Blast Apparatus was issued about twenty years ago. Since that time the apparatus has been greatly improved both in efficiency and construction. The fact that over 5000 of the Sturtevant apparatus have been sold is sufficient evidence that he knows what the trade requires, and that he has succeeded in supplying it.

The apparatus here represented consists of a fan and heater placed side by side, making a very compact arrangement and occupying but little floor space.

The fan is known as the steel plate, and is the latest and most approved pattern, designed especially for handling large volumes of air with the expenditure of a minimum amount of power. Fans above fifteen feet in height are usually constructed with half brick and half steel housings and provided with horizontal steam engines. The advantage of a direct connected engine are evident: it does away with belts and pulleys, is independent of any other source of power, and can be run at any speed desired day and night.

The engines are directly connected to the Fans and are built in a superior manner and will show the best attainable economy. They are especially designed for this work. It must not be supposed that blowing engines are not, when properly adapted to their work, superior to the ordinary run of mill engines in point of strength and workmanship. They must be the heaviest, strongest and fastest engines that can be made. They must be made to stand twenty-four hours' work, six days in the week, frequently in the midst of dirt, and neglected by the engineer. They must be made to run without getting out of order at any speed, and, if possible, live longer and on harder fare than any other engines. Direct connected, or independent engines, either upright or horizontal, are furnished as the requirements of the case demand. The sizes vary from three to one hundred-horse power.

The heaters are made of the heaviest lap welded wrought iron pipe on improved patent sectional bases. These sectional bases vary in length, and the height and floor space of the heaters can be proportioned to any situation. The heaters are arranged for perfect circulation and drainage, and every square foot of heating surface is utilized. They are designed with special reference to the use of exhaust as well as of live steam. Each heater section is tested with 150 pounds hydraulic pressure and one hundred pounds steam pressure. The heaters are furnished with substantial wrought iron foundation, and are encased in a jacket of steel plate.

From careful experiment it has been demonstrated that a given quantity of pipe in one of the Sturtevant heaters will impart four to six times more heat units to a given quantity of air than will an equal amount of pipe arranged in the ordinary form. Single heaters vary in size from 300 to 20,000 lineal feet, and in design and style are proportioned to the situation and work to be performed.

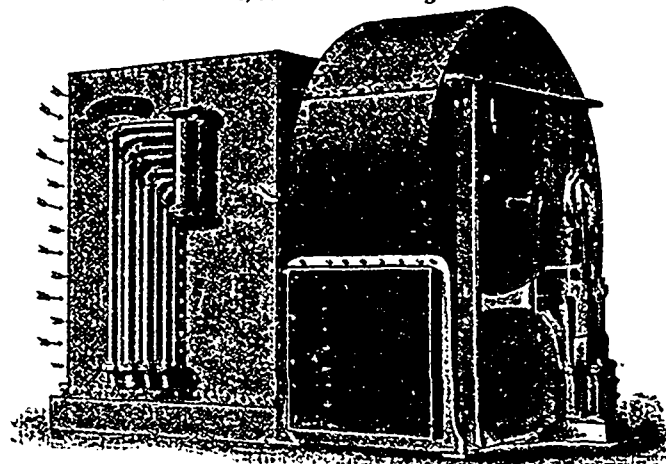
The Sturtevant kilns are arranged on either of two plans,

the apartment or the full length kiln. In the former rooms of any desired number are constructed to suit some particular size of lumber to be dried. Whether the lumber is piled lengthwise or crosswise of the apartment, the apparatus is so arranged that the air passes through the lumber lengthwise of the piling sticks, and dries it uniformly throughout. By this arrangement the lumber in any apartment may be seasoned to any extent, independently of that contained in another apartment, or the heat may be tempered to different degrees in the different rooms by the manipulation of dampers in the ducts and ventilators. The apartment plan offers advantages where limited quantities of different kinds and thicknesses of lumber are to be seasoned.

The "Sturtevant Progressive Lumber Dry-kiln" which is illustrated herewith is, however, the most popular form where large quantities are to be dried. This style may of course be constructed of various sizes, but the "Sturtevant Standard" is designed to meet the average conditions.

The Sturtevant Standard Kiln of this type is 85 feet long, 17 feet wide and 9 feet high, and will contain twelve cars, each car holding about 4000 feet of lumber. Two additional cars are required for each kiln for the loading and unloading platforms. The holding capacity of a Standard kiln is about 50,000 feet, and the daily drying capacity is about 8,000 to 12,000 feet, depending upon the nature and condition of the lumber. The lumber loaded upon cars, is run into the kiln on trucks, two or more cars each day, then slowly passes through against a constant current of air. In this manner the lumber is subjected to an even hot air draught, gradually increasing in intensity as the cars gradually advance to the hot end of the kiln. The difference in temperature between the two ends of the kiln varies from 70 to 100 degrees. The kiln should be provided with curtains at the top, bottom and sides, so that the hot air shall be forced through the lumber. The piling sticks for 1-inch lumber should be  $\frac{3}{4}$ -inch thick, and the lumber carefully piled on the car. In the kiln 17 feet wide, three rows of tracks are used, thus giving the lumber three independent supports.

Additional capacity is best secured by increasing the number of the rooms, instead of increasing the size.



The cuts show the apparatus located in a small room adjacent to the kiln, and it is advisable to locate the fan as near the dry room as possible. Where it is necessary, the hot air can be carried through several hundred feet of pipe when it is well protected. It is immaterial whether the hot blast is admitted at the top or bottom of the dry kiln, although it is usually admitted at the bottom. The ventilation is always at the bottom.

Green and air dried lumber, dense and porous lumber, lumber of different thicknesses, all require different treatment; for instance, Southern Yellow Pine, when cut green from the log, will stand a very high temperature—say 200 degrees F.—and, in fact, this high temperature is necessary, together with the rapid circulation of a large volume of air, in order to neutralize the acidity of the pitch, which causes the lumber to blue and discolor. The treatment of oak, walnut and hickory, and dense lumber of this nature, calls for a large amount of air at a lower temperature; otherwise the lumber would dry too rapidly upon the outside, the pores close, and the lumber becomes honeycombed and checked. Again, air dried oak and walnut calls for the use of the return duct or its equivalent, the sweating process, in order to open the pores and soften the outside of the timber, so that the moisture can work its way out to the surface. The Sturtevant process meets the requirements of every case; as by the use of the steam Fan, a greater or less quantity of air can be admitted into the dry room, and the temperature can be perfectly regulated.

The apparatus may be applied with advantage to ordinary dry kilns where steam pipes are used in the bottom, in which case smaller heaters are required. In dry kilns thus heated without forced circulation, the application of a fan has increased

the capacity 50 per cent. It is even more important to have perfect circulation, which only a fan can give, than a faultless heating apparatus; for the best heating apparatus, without such circulation, may give the poorest results. The want of circulation in ordinary dry-kilns causes the lumber to blue and discolor.

Attention has already been called to the fact that the fans can be driven either by a belt or by a direct connected engine. Important advantages are gained by the use of the steam fan, enabling the temperature and volume of air to be controlled at all times, and causing the drying operation to be continuous. By the use of a steam fan, the temperature can be raised gradually and maintained at a uniform safe degree, until the process of seasoning is complete. Sudden and marked changes of temperature in the kiln are fruitful sources of warping, checking, case-hardening, etc. If the drying apparatus is operated but twelve hours in the twenty-four, and the kiln is allowed to cool down in the night, then the time of drying will be more than doubled, as several hours are lost in the morning in heating the kiln up to the temperature of the night before. The Sturtevant heaters are designed with special reference to using exhaust steam in the day time from the engine and live steam at night.

Experiment shows that the air does not become saturated with moisture and rendered incapable of further use in passing through the lumber once; but that it may be passed over the lumber many times before becoming saturated. The effect of the return duct is not only to increase the temperature of the air; but its relative humidity is changed so continuously and gradually, that warping, checking and case-hardening are entirely prevented, a result which is practically impossible with other systems of drying. This is a result which other processes have endeavored to effect by means of a steam jet which is introduced into the dry room in the early stages of drying. In rare instances, where the lumber to be seasoned is air dried and does not contain a great amount of moisture to effect the sweating and opening of pores, the steaming room is recommended.

The apparatus is especially designed for utilizing the exhaust steam from the main engine, and where it may be desirable, live steam can be used in the heater at night. The exhaust steam from the engine which drives the fan is also utilized in the heater. Of course it is well understood that there is no cheaper artificial medium for drying lumber than exhaust steam.

All kinds and thicknesses of lumber cannot be dried at the same time; but as each require different treatment, it follows that different periods of time are required. One inch air dried lumber (by air dried is meant lumber that has stood out from three to six months) can be seasoned in from 36 to 60 hours, while perfectly green inch lumber calls for from three to six days and lumber of different thickness in like proportion.

One of the greatest advantages which the Sturtevant system offers is freedom from fire risk. The steam pipes are encased in a steel jacket, and placed in an apartment distinct from the dry room, and do not come in contact with any wood work whatever. No pipe whatever is used in the dry room. Parties who are using this kiln are getting a less rate of insurance upon the kiln than upon the mill itself. The ordinary dry-kilns with steam pipe in the bottom are fire traps; and, where it is possible to insure them at all, they are considered a very hazardous risk. Annoyance from steam pipes leaking and freezing is also obviated.

This process offers, not only the most efficient lumber dryer, but the most essential feature of combining cheapness of first cost with low running expense. It also affords the still further advantage of being portable; and, like any other machine in the mill, can be moved from point to point with no other expense than the erection of a new building.

This house is prepared to fit our complete dry-kilns of all descriptions, furnishing the engines, boilers, entire heating apparatus, rails, trucks, complete working drawing for building the kiln, in fact everything pertaining to the perfect drying of lumber. Parties are invited to send to B. F. Sturtevant, Boston, Mass., for the "Illustrated Catalogue of B. F. Sturtevant's Steam Hot Blast Drying and Heating Apparatus," which contains full descriptions of the apparatus and method of application.

—Baltic timber is likely to be scarce this season, and sellers are reluctant to quote prices until the market has become somewhat more settled, while, on the other hand, buyers eagerly contract for all parcels offered them at a slight increase on last spring's prices.

—The lumber firm of Allison, Cousland & Hamilton of Glasgow has ceased to exist, Mr. Robert Hamilton having retired from it for the purpose of carrying on business under the style of Robert Hamilton & Co., while Messrs Allison and Cousland continue in business together under the name of Allison, Cousland & Co.