CANADIAN WOODWORKER

Vol. 1.] JUNE 1908 [No. 4.

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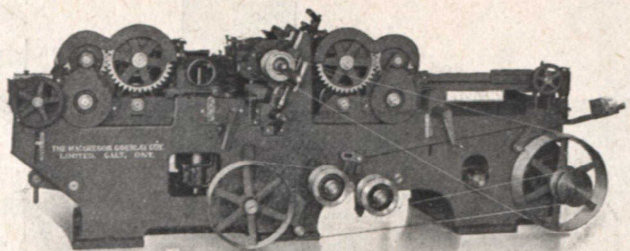

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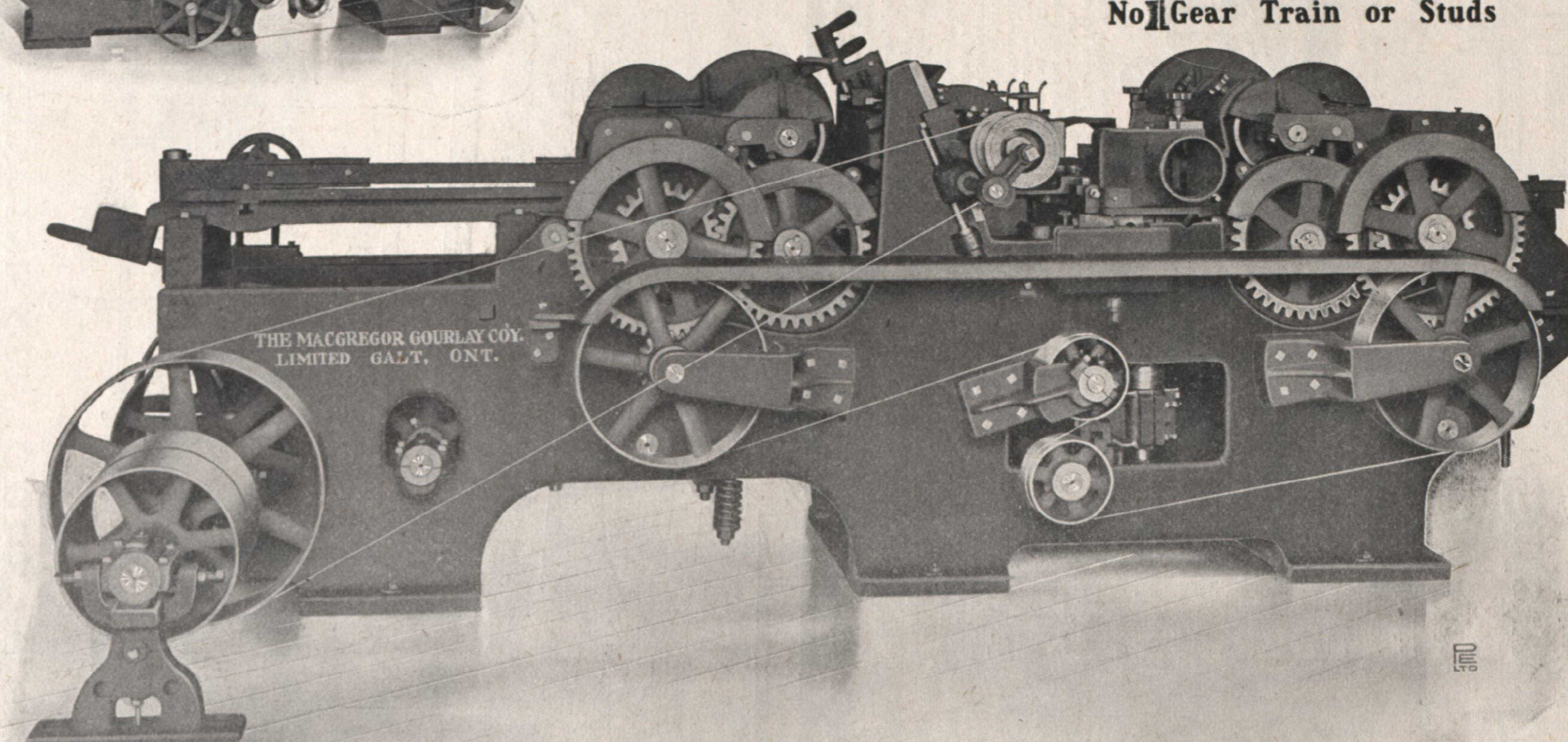

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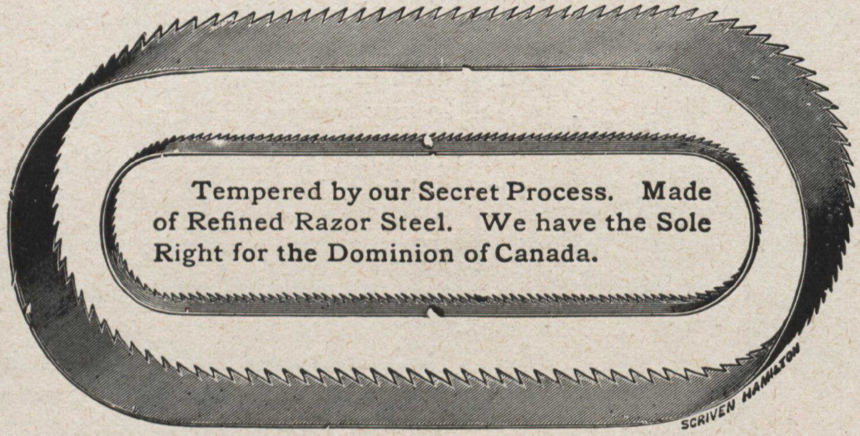

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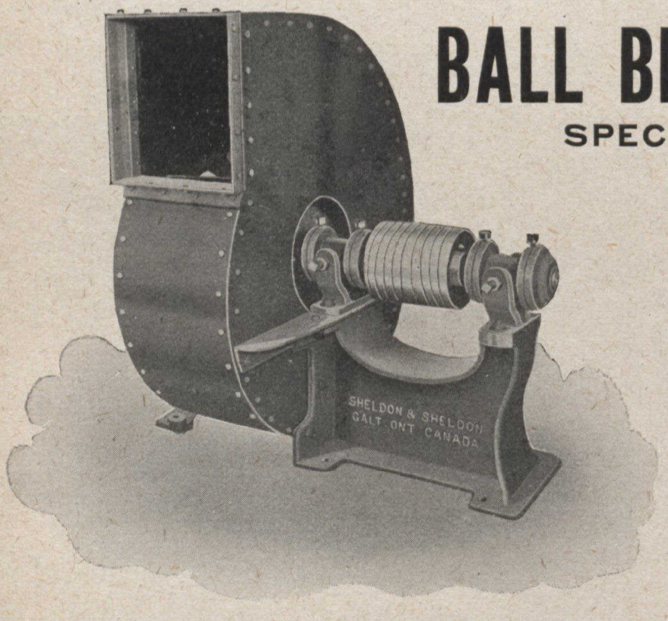

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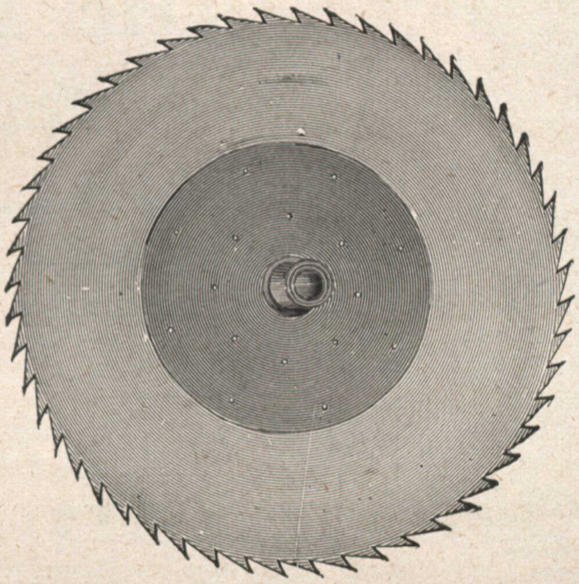

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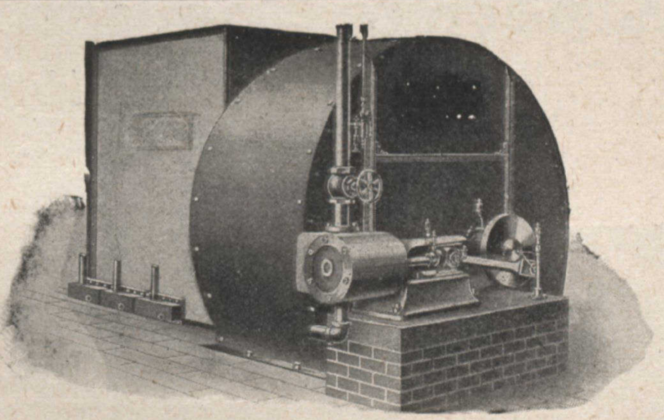

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Canadian Woodworker

A MONTHLY JOURNAL
FOR ALL CLASSES OF WOODWORKERS

Vol. 1 TORONTO, JUNE, 1908 No. 4

CANADIAN WOODWORKER

A Monthly Journal for all classes of Woodworkers.

Subscription: Canada, United States and Great Britain, $1.00 per year; Foreign, $1.25, payable in advance. Advertising rates on application.
SAMPLE COPIES FREE ON REQUEST.

BIGGAR-WILSON, Ltd., Publishers

Offices: 79-80 Confederation Life Building, Toronto. Ont.
Telephone, Main 6377.

Canadian Woodworker is published by the first of the month. All changes for advertisements, news items and other matter must be in hand by the 15th of the preceding month. Cuts should be sent by mail, not by express.

Practical men are invited to send to the Editor signed articles or paragraphs upon any subject of interest to their fellow woodworkers.

SYSTEM IN MILL ARRANGEMENT.

Plan before acting is a good motto to remember, not only before undertaking any particular piece of work, but at the time a mill is built and when putting in machinery. An awkward, left-handed relation of stock to machine, or of one machine to another, may sometimes save half a dozen square feet of floor space and at the same time waste one step in six, or three or four minutes every hour of the machine-man's time. And time and labor are just as valuable as space. But floor space, too, can often be saved by a careful thinking out of the details of mill arrangement beforehand. Often these details, in a big plant or where the operations are of a multifarious character, are a very complicated matter to arrange together in proper order; so that much thought and careful mapping out to scale have to be devoted to it before the equipment is installed.

In some mills the most conspicuous feature which strikes the visitor is the entanglement of its various departments, the general disorder which prevails throughout. The thoroughfares are continually getting obstructed, the men constantly getting in one another's way. The slightest hitch in one department means a general disorganization of the whole. One thing in the wrong place often means that it becomes a nucleus for a dozen other things which accumulate around it, making the confusion worse confounded.

The first necessity in building a mill is, of course, to see to the structure itself. The constant vibration of the machinery is going to try the permanence and solidity of the best material to be obtained. The foundation must be reliable, and arrangements made to place the heavier machines in the best position with a view to their doing the least damage possible. Every attention should be paid to the kind of floor, so as to have it as substantial as possible. A floor in a planing mill is not over-durable at the best; it is good policy to build it so as to make renewals as infrequent as possible. Do not forget the roof and overhead work. Posts among the machines are a nuisance and generally in the way. Skylights are generally the best means of lighting the building, in addition to ordinary side windows at any rate. The constant endeavor to get at the right angle for light to reach a machine from the latter alone is a vexation to the spirit when doing a delicate woodworking operation or fixing up a machine; and it is one that wears a man out sooner than an equal amount of time spent in hard work. The lighting arrangements, not only those of an artificial character, but the superior one emanating from Nature's sunshine should be carefully considered. Remember that good light is a factor all the time, and that a very little falling away from the best possible has, in the aggregate, an immense influence over the quality and the quantity of the work done. The same applies to fresh air and ventilation, and to heating arrangements. In some mills, the men may be shivering with cold, while at the same time there is enough potential heat going to waste in badly-fitted boilers, etc., to properly heat two or three such buildings.

Above all, keep an eye on the conveniences for handling and rehandling the stuff that comes in and goes out of the mill. The time sometimes spent in double handling of material would often represent a fair profit in itself. In building, arrangements should be made for running all finished work out of the mill itself, preferably into an adjoining room or watertight shed. As to the plan for receiving material, it should be such as will allow the man who first uses it to feed it in a natural way to his machine, not left-handed, or having to make awkward turns. The position of the next machine should be such as will most naturally take advantage of the position in which the material was taken off from No. 1. The man who feeds a matcher has quite enough to attend to without having to go all over the place getting wood. Paths or thoroughfares between the various machines should be as straight as possible, and wide enough to allow passing along without having to waste time drawing one's limbs and clothes out of the danger line. In all these things there is a point of scientific reasonableness quite easy to reach with a little thinking out and experience. The aim should be to have all the space necessary to get around quickly without using up so much as to lose dividends on that unit of floor area.

LOOK OVER YOUR PLANT.

While business is not so brisk as it was a year ago, nor so much so as, we believe, it will be a few months hence, just at present is exactly the right time for mill-owners to thoroughly examine their plants, make repairs, put in new and improved machinery and make a general renovation. It pays to keep abreast of the times and to keep your mill up to date in every respect, but most emphatically it pays to do this at a time when there is any degree of trade slackness, and when , as a consequence, the disarrangement of ordinary business will be at a minimum. A large firm of machinery manufacturers told us recently that they had scarcely ever put in so many new boilers and other machinery as during the so-called hard times of last winter. For not only were they supplying equipments for a fair number of new mills; but a good many older ones, not pressed by the rush of orders which has been keeping them engaged at high pressure for so long, were glad to seize the opportunity to look over their plants and put in new machinery wherever it was required. The depression gave them a breathing spell, and, in one way almost a welcome one, because it allowed them to get things in proper shape for another future rush. Replacing old and half-worn-out machinery with new and better is often the most truly economical thing a planing or sawmill can do; and this is just the time to do it, when there is a temporary lull.

WATERPROOF GLUE.

Aside from glue and its cost as factors in the development of built-up lumber, there has entered the trade of late another idea in this connection, which is that of waterproof glue. At various times during the past, there have been efforts at supplying a waterproof glue, but many of them have proved failures, either through costing too much, or from some other cause, yet the idea has persistently bobbed up, time and again, and, during the past year or two there have been developed some pretentious undertakings in this line in which a glue or cement is used in making built-up lumber that is seemingly waterproof, and, according to information obtained from the promoters, who keep secret the formulae of their glue, it is cheaper rather than more expensive than the ordinary glue used in veneering. If this new idea continues to make good it will be a factor contributing materially to further development in certain lines of veneer usage, where the work has been more or less handicapped heretofore because exposure to moisture prevented its being done with ordinary glue. This applies to buggy and automobile bodies, to outside work of various kinds in connection with house building and to the making of various kinds of packages, in the form both of boxes and of barrels or cylindrical packages. There is, probably, not a branch of the veneer industry which will be watched with more interest than this one.

Taken altogether, the veneer industry, though it has been marked with many failures in the early days of the past, has prospered in the later years of the decade, and its future to-day looks bright and fully as promising as the future of any of the woodworking industries.

CANADIAN TIMBER SUPPLY.

In a report on the Canadian timber acreage, the "American Lumberman says: The estimate made by Mr. Treadwell Cleveland, jr., of the United States Forest Service, is even lower than that by Mr. B. E. Fernow, Dean of Forestry at the University of Toronto, who placed it at 300,000,000 acres. Mr. Cleveland places Canada's acreage, stocked with good commercial timber, as at present not exceeding 260,000,000 acres, a strangely low estimate when Canada's official figures give the forest area of the Province of Quebec alone at 209,000,000 acres, not, however, all stocked with good commercial timber. Mr. Cleveland asserts that Canada does not possess much more than 50 per cent. of the quantity of good timber still to be cut in the United States, although the former is exporting twice as much as the United States. In other words, Canada is in that respect using up twice as much of its timber resources as is the United States. To convey a rough idea of the supposed value of the timber lands of Canada, it may be stated that a rough estimate, said to be conservative, of the value of Quebec's forest area, 209,741,000 acres, or 327,721 square miles, is $2,709,327,692. There is one point upon which none of the experts can differ, namely, the necessity of dealing with the forests of the country on business principles, and soon.

MOISTURE AND STRENGTH OF WOOD.

The United States Forest Service made some time ago a thorough study of this question. The results of its investigations are interesting and instructive. It has been found that the relation of moisture to strength follows a definite law. The strength of all kinds of wood increases rapidly with proper drying, the amount of increase depending on the species and the degree of dryness. Thus the strength of a piece of unseasoned red spruce may be increased by over four hundred per cent. by a thorough drying at the temperature of boiling water. But the strength decreases again as the wood reabsorbs moisture. Air-dried wood protected from the weather, and containing twelve per cent. of moisture, is, according to species, 1.7 to 2.4 times stronger than when green. Drying also increases the stiffness of wood. These conclusions have been drawn from pieces of small cross-section, not exceeding four inches by four inches. Large timber requires years of drying before the moisture is reduced to the point at which the strength begins to increase. It has been found that, under normal conditions, wood fibre will absorb a definite amount of moisture. Additional water only fills the pores. It has also been found that the water which simply fills the pores has no effect on the strength. The fibre saturation points are: For long-leaf pine, 20; red spruce, 31; chestnut, 25; red gum, 25; red fir, 23; white ash, 20.5; Norway pine, 30 per cent., estimated on the dry weight of the wood. Timber that has been dried and resoaked is slightly weaker than when green.—Engineering Times.

—The thirty-fifth annual special issue of the "Timber Trades Journal," London, Eng., keeps up its reputation as a full and complete representative of the lumber trade, not only of Great Britain, but of the world's great producing countries as well. It comprises nearly 400 pages of matter, and is well illustrated.

Planing and Molding

CUTTING OUT SASH AND DOORS.

By R. Pearce.

A few decades ago this work was entrusted to the care of any man who could tumble over a lot of lumber in a day; and strength was the special requirement. To-day brains count.

The increased cost of material suitable for sash and doors permits of no unnecessary handling. While the increased cost of lumber has been met, to a certain extent, by improved machinery, the men engaged in cutting out the stock are the greatest factors in keeping down the cost of production to a paying basis. A car of lumber is now surrounded by possibilities never dreamt of a few years ago. Then it was simply a car of lumber, but to-day it means much more to the man who has paid good money for it, and what it means to him is fully shared in by the man whose duty it is to see that every foot cut up will yield a fair return. This man belongs to a class who are experts in their particular calling, a calling which has become specialized, showing that the woodworker has kept pace with changing conditions.

When lumber was to be had at $25 a thousand, the quality of which was such that a man would have little difficulty in selecting as many planks as he desired that would yield four door stiles, 7 ft. 10 in by 5 in., per plank, it can easily be seen that any one capable of running a rip saw, or cutting off to a length could handle this kind of work. But as the price of material increased, and the grade and quality became inferior, the demand for sash and doors of good appearance, without a corresponding increase of price being offered, remained the same. In order to meet the demand profitably only men well trained are employed to do this class of work. A well trained man will produce from, say 1,000 ft. of lumber, anywhere from 12 to 15 doors more than the untrained man, and probably the same number of sash, and take less time in doing it.

His work will also have a good appearance, and commercially will grade No. 1.

Perhaps a few hints to the young woodworker will not be out of place here. In making suggestions about this or any other class of work, the writer is fully aware of the many difficulties that prevent the suggestions being carried out in their entirety. So many things enter into the subject. The ones to be most considered are the volume of trade handled and whether contract or custom work, also the floor space at the disposal of the sawyer. But a good man can always change his own system and methods to suit any circumstances in which he finds himself placed. He will direct all his efforts and energy in getting the best results. The first essential requirement is the proper conception at the first glance of the value of a plank. This gives one the ability to cut it up at once for all it is worth and be done with it. Let us say you have been handed two orders, one for doors, the other for sash. Go over them carefully, fixing in your mind every item called for. If any of the stiles or rails are to be of an unusual size and are not noted, underscore them so that you will not forget them. You can, by cultivating the memory, carry a large and varied number of sizes and figures in your mind, thus doing away with constant and continual reference to the bills. When you have acquired this ability it will prove a very valuable aid.

When ripping it is well, if the saw fence will permit of your doing so, to have strips at hand that can be placed next to the fence so that when you have set to the widest width you require to rip, you then can rip the plank for sash or door stiles or rails without spending time handling a plank a second or a third time. This is one of the ways in which you can get direct results.

In cutting off, train your mind so that you will know just how many pieces of a certain measurement you must cut off. Then when you have placed a length on the table cut it up for what it is most suitable. This will keep you busy, especially if their is much variation, but it teaches one how to do more than one thing at a time. In order to have your work show up well when finished, and to prevent any pieces being returned to you as faulty, see to it that you supply to the man whose duty it is to lay it out for the machines, material suitable for the most important doors or sash. You can always strain a point for cellar or attic sash, the same with back or side doors. This is often overlooked.

In cutting out sash you can always tell by the lengths of the bars—if any are called for—just how many lights are in the sash, and should know within an inch without taking measurements, about where the mortise must be made. Be careful to avoid knots that will weaken the piece, whether to be used for rail or stile. It might pass safe and sound through all the machines only to snap off in the clamp. It costs money and time to replace these pieces and to rectify these mistakes; and ofttimes trouble with a large T.

It is careful observance of these seemingly trivial things that makes one a good man at the business. Of course you are expected to take chances, but you need not be reckless.

The word reckless, suggests the term, waste, so often heard in our business. No matter what purpose lumber is cut up for, there will always be a certain amount of waste or cuttings of no value for the immediate work in hand, but which will still be of some use for some other branch of the trade. Find out what these left overs can be used for in the shop you are working in, and lay them aside. Any pieces that have no worth other than for firewood should be thrown out for that purpose at once. No time should be spent in sawing them into pieces two or three inches long. That is where the real waste occurs. Young men should bear in mind that nowadays carefulness counts.

PITCH OF PLANER KNIVES.

The pitch of knife on a woodworking machine is a very important matter in many cases, especially when working cross-grained and knotty hardwood lumber. Some years ago many planers were equipped with three-sided heads. They are not so common to-day; the four-sided slotted head seems to be the favorite, with two plain straight knives, with opportunity to put beading, grooving or molding cutters on the other two sides. It is readily seen that the three-sided head gives a different pitch from a four-sided one. If we take a cross-section of these two heads and continue lines across the flat sides, where the knives are attached, till lines intersect, in one case we have a triangle and in the other a quadrangle.

The back on bevel side of knife or cutter makes little difference in ease of working or quality of work done, so long as there is sufficient bevel so that the cutting edge only comes in contact with the material worked. The face or flat side does. Time is too limited at present to look up data and make drawings of what has been found good practice in working straight-grained wood or cross-grained, knotty material. For general use I have found the four-sided head gives good results for general work, both for power required and smoothness of finish, but for hard, cross-grained and knotty material a shorter pitch will do smoother work, but requires more power and slower feed, the relative speed being considered.

On a plain, straight knife it is a practice with the best operators to give edge of knife less projection over lip of head when working wood where the grain tears up, than when working straight-grained dry lumber. A projection of 3/16-in. will require less belt power than one set ⅛-in., but the short projection does the smoother work. In using solid cutterheads one can secure the benefit of this principle that he cannot on the ordinary head, where knife is bolted on. There are makers of these tools who have made a study for years of the best shape of the face of the cutters, and as a result their goods have become standards of quality, as in most other lines.

WINDOW FRAMES.

The use of more grooving saws on the outside spindle of the moulder, saves time and reduces the number of times the jambs are handled, by jointing the edge of the jambs and plowing them at the same time; the saws make a clean cut and leave the edges of the plow square, not torn out as cutters do. When but one plow is wanted, but one saw is used; when two plows are wanted, two saws should be provided, unless one of the plows is to be more than ½-in. wide, in which case two saws, each thick enough to make a ½-in. plow, and one thick enough to make the desired width of plow when used with one of the ½-in. saws. The diameter of the saws should be at least 2-in. more than the diameter of the head used on the spindle; the larger the diameter of the saws the longer they will last.

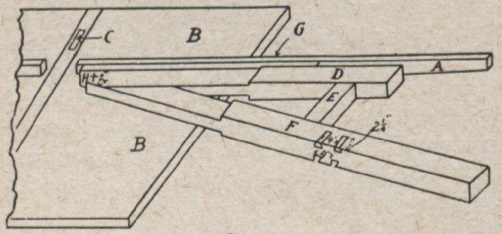


Fig. 1.

Some molders require larger saws to reach the work, as they are made so the outside spindle will not go very close to the fence of the machine. If the top of the spindle is provided with a nut, and thread collars can be provided for the spindle and the saws placed between them, a collar should be provided of the proper length to put between the saws to plow jambs for 1⅜-in. sash, and a ⅜-in. collar to use with that one to plow jambs for 1¾-in. sash.

Where the spindle is not provided with a nut and thread, two short sleeves, made to fit spindle, with a setscrew in each to fasten to spindle, may be used. One end of sleeve must be fitted to receive the saw like a saw arbor, except that no loose collar is used, the nut being made large and one end being turned round for about ⅛-in., so the corners of nut will not touch the saw when screwed up; nut should not be over ⅝-in. thick, and the end of sleeve should be even with nut when nut is screwed up against the saw. One of these sleeves should be made to take two saws together, and a collar made as thick as the other saw, to put on when only one saw is to be used for each plow. This allows of the saws being placed close enough together to plow jambs for 1⅜-in. sash.

The arrangement described above for holding the saws is used by some machinery manufacturers for the trimming saw on the tenoner.

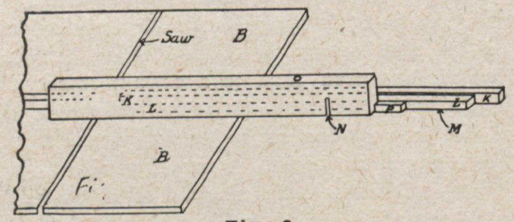


Fig. 2.

Fig. 1 shows a device for saving time in gaining frames. A A is the saw guide or fence, B B the saw table. D should be pine, 1¾-in. thick at one end and 1⅜-in. thick at the other end, as shown, and 2¼-in. wide. E, pine, 1¾ x 1¾-in., and F, ash or other hardwood, 1¾-in. thick at one end and 1⅜-in. thick at the other end, 3-in. wide, and should have a number of dovetails in each side (although only two are shown in sketch), one for each length of frame to be gained. These dovetails should be ¾-in. wide at the widest place and ½-in. deep. The side next the gaining head should be cut in square, all the bevel being on the other side, as shown. The dovetail must be all alike and exactly 4-in. from center to center, to make the proper length for each regular size of frame. D, E and F should be put together in a substantial manner, the angle just enough so that when D is placed against the fence and the jamb placed on the table against F, the gaining head will cut the gain the proper pitch for the subsill, and should be 2-in. wide at the point. H H is ⅞ x ⅜-in., is screwed onto the back of D, and projects beyond D.

Make a stop ½ x ¾ x 5½-in. long, of hardwood, beveled on one edge so that both ends will fit the dovetail, one end in the dovetail on one side and the other end in the one in the other side. When you have this device made as described, gain the top of a jamb, place the device on the saw table as shown, with the end of D at X, about 2-in. from line of cut of gaining head, mark jamb where your gain for subsill is to be, and put jamb on table with the outside edge against F, in position to cut gain. Now put stop in the dovetail in the under side of F, next to the point from the gain in the jamb for the head jamb, place jamb with the head gain on the top, and push it up so the lower side of the gain will be against the stop. Now move jamb and device back so jamb will be in position to cut the gain for subsill, and clamp device to guide about at G, and cut gain. Cut H H off where it will make a stop to put the top of the jamb against, for the top gain, and mark the length of glass you have gained jamb for, back of dovetail on both sides of device. All the dovetails should be marked.

When the device is set for one length of frames, to change length, pull out stop and put in proper dovetail. For the jambs on the other side of the frame, turn device other side up, then set and clamp to fence on other side of gaining head. To cut jambs for brick-wall frames, clamp device on so the top of jamb will come against stop and the place the jamb is to be cut for bottom of jamb is in cutting line of saw, and clamp and go ahead. Jambs for both sides can be cut by turning those for one side face up and those for other side face down.

Fig. 2 shows a way of arranging stops for making the cuts in the sills near the ends, to cut blocks out of corners. After the sills are cut the proper length, clamp the strip L L to the fence K K, so that it will make a stop for the first cut in the sill at N, placing the clamp back at about M, so it will be back where sill O will not reach it when in position for the second cut, as shown. After making the first cut, clamp block P in the position shown. For different lengths of sills only block P needs to be moved. The sills are cut as above before they are taken from the cut-off saw, then taken to the jointer and the front edge beveled, then finished with the band saw.

The subsills and headjambs for brick-wall frames can be gained by the use of the strip and small block in the same way. The cut for taking out the front corner of subsills for brick-wall frames can be made in the same manner. The subsills should be taken to the jointer and beveled before they are gained, since they have to be brought back to the cut-off anyway to have the corner cut made. They are then taken to the band saw and finished. When the dado head mentioned is used, one of the saws of the head can be used to make the cut for the corner, or a small saw can be used.—H. B.

POINTS ABOUT GLUE.

There is probably no more trying proposition connected with any factory than the one of using glue, knowing when it is right, and being sure of the work, or that it is going to stick and hold the parts. Even in using the same make and number of glue, one finds that it is not always of the same quality; one batch may be first-class and the next very inferior to it. No doubt glue manufacturers do not always use the same quality of stock in the making of glue, and I am of the opinion that some of it gets very stale before it is made up, especially in summer time.

I find in using ground glue, one should first put the water in the kettle and heat it to a temperature of 110 degrees, then put in the glue and stir for five or ten minutes, or until it is thoroughly mixed and doesn't lump up, as the lumps are apt to be dry on the inside. One lets it soak for about one hour, when it is ready for more heat, and should be heated up to about 140 degrees. Stir again, and when it is thoroughly dissolved, which usually takes about ten minutes, it is ready to test with a glue-tester to see that it has the proper specific gravity.

Glue that has a specific gravity of 35 per cent. is all right for general use, but may be used with safety as low as 30 per cent., while on work that needs to be glued especially strong it can be made as heavy as 40 per cent. That is to say, one must ascertain the per cent. of specific gravity of glue best suited for each class of work, and use the same per cent. each time for that class.

The glue-tester is much more satisfactory than weighing the glue and water; one can test his glue in three minutes and see just the per cent. he is using; he may have mixed the glue five or six hours before, and in this time it has become very heavy at the bottom of the kettle, and without the tester he can only guess at the amount of water it needs and let it go at that—and if the panels come apart the company can stand for it. I have in mind now one company that went to the wall because it couldn't make its furniture joints hold.

Glue should be very carefully selected. Get a good grade, as this will take more water and cover more surface, and is more satisfactory all around than the cheap grades. See that it has a good fibre, or is stringy. Don't heat it too hot, as this takes away the strength; and always keep it as fresh as possible. Sour glue should not be used at all; it has then lost its life.

MORTISING AND TENONING.

The mortising and tenoning machines of to-day are about perfect; any kind of style can be had. In the tenoning machine line you get single or double-end, light or heavy. In the mortising machine the collection is greater and varied. An improved vertical, with boring attachment, is a very handy machine. Then we have the chain mortiser, which is the slickest thing you ever saw for the class of work which it was made to do; and the automatic hollow-chisel machine, the boring attachment arranged in such way that the bit works through the hollow chisel. This machine is built principally for heavy duty. One manufacturer of this class of machines claims that it combines the handiness of the old-style flat-chisel mortiser with a speed of operation four to ten times as fast as that type of machine. As the old-style machine requires laying out the work sometimes boring previous to mortising, and cleaning out the chips, no one can afford to operate that class of machine if he desires a maximum saving of labor. I am satisfied that this class of machine is very handy (in fact, the best) for working wide sills, to make double mortises; also for end tenoning, gaining, boxes, etc. The cutting-off feature can be dispensed with in the case of end-tenoning sills.

So much for the machine; now for the work. Of course, it is understood that we are dealing with two classes of work. A man may be efficient in one and not in the other, for the reason that he never had an opportunity to learn both, but I think a good man on the mortiser should also be a good man on the tenoner, as the two are so closely related that it is really necessary.

The first thing necessary is to get the stock in proper shape to mortise and tenon, length, width, thickness, etc. The thickness is very important for the accomplishment of a passable job. The stiles, rails, etc., should be the same thickness throughout. Do not have one piece 1-16-inch thicker than the other; be accurate; have them all the same, as nothing else will do. Just imagine the stile thicker than the rail, and the time required to jack it off, all of which time is caused by carelessness, at the expense of the company or party for which you work.

Be sure to have a face side to every piece, no matter how small, and that face side marked; keep the face side up against the guide when mortising, and down when tenoning. Another important feature is to fit the tenon to the mortise, not the mortise to the tenon. I have seen hours of time wasted by hammering, banging and chiseling, in order to get the tenon into the mortise, all caused by not trying the tenon in the first place.

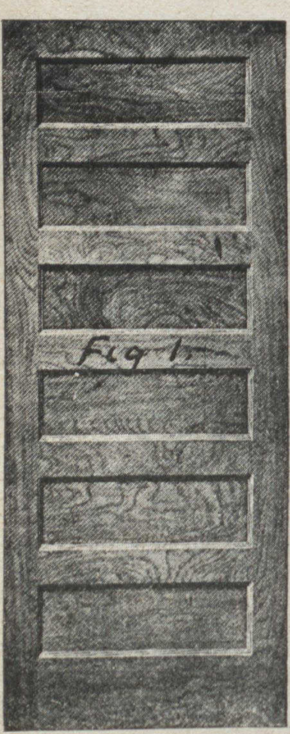
The same rule applies to the man who spends unnecessary time on a job caused by carelessness as the man who is addicted to the habit of loafing. It all comes out of the employer's pocket. Another matter that should not be lost sight of is cutting the rails so long as to have the tenon sticking through the stile three or four inches. The tenon should not project through the rail more than ½-inch—just enough to cut off flush with the handsaw to make the job pass inspection. Lots of good lumber can be saved by adhering to this rule.

Operators of these two machines will find an improvement in their work if they will keep their cutters sharp and clean. The tenon cutters should have a good bevel to them and clear of gaps; a short-bevel cutter will tear the stock up, especially if soft wood. The same rule applies to mortise cutters—plenty of bevel, and keep them sharp.

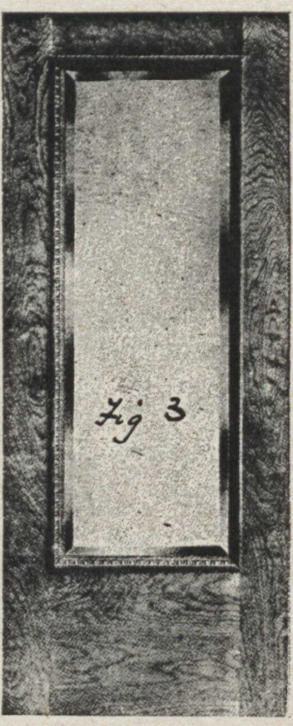
If you should come in contact with any fire-proofed wood, swage your cutters, just as you would a saw tooth, wide at the extreme point. This only applies to the mortise cutters. You will be surprised at the difference in using this swaged cutter in comparison to the old-style cutter. —A. H.

VENEER FOR DOORS.

There are veneered doors made in regular patterns known as stock patterns both in front doors and in interior doors, and there are various patterns made in special orders in the planing mills. It is these latter that are of the most interest to the average planing mill running a veneering department, because veneered stock doors, like the solid stock doors, are made in large quantities by big door manufacturers, and, as a rule, can be supplied to the trade cheaper than the planing mill men can make special doors. Some planing mills enlarge their door department from time to time, and make a greater number of doors in what might be termed standard sizes, and thus develop a sort of special door trade. In all doors, whether stock doors from the factory or special doors from the planing mill, the tendency of the times is toward the simpler forms and toward plain surfaces. Quite a common type of door has from five to six panels running crosswise in it. This door is especially common in the larger buildings and office buildings, and, though made very plainly, is a tasty door (see Fig. 1).



The type of door shown in Fig. 2 furnishes an excellent opportunity to show off good veneer work, especially in panels. It consists of two large panels, the top one full width running practically two-thirds of the length, and the bottom one one-third. Sometimes this is varied, and only one panel full size is made use of, but two panels make an excellent door, and does not involve large enough sizes to be very difficult. In fact, the sizes are such that they can be nicely handled in almost any glue-room, and where there is figured wood or wood that shows a good grain it furnishes a good chance to display one's artistic ability in fitting together and using face veneer.



The real single-panel type is a door with wider bottom rail, as shown in illustration (Fig 3); the panel may be glass, as shown in this instance, or it may be of any desired veneer. For interior doors it is quite common to make them of oak, mahogany, also of birch and gum, both in natural color and stained, and in the front doors the glass is used in the same frame, both square and oval, the oval glass requiring a panel support for the glass and the frame remaining the same. The sash and door people say there is quite a decided tendency these days to use more glass in front doors, not only in the city, but in the country, too, and to use longer glass. Some use them as shown in the style as illustrated here, and others use them in what might be termed two-thirds length, with a small wooden panel below. In the older type of glass front doors for the country trade, just about half of the door is made of glass, and possibly not that amount, but now the country people want the glass to come lower down, so that even when sitting in the house one can see through it out on the road or to the street beyond. It is also stated that there is less tendency to use stained glass, leaded glass, or any of what was formerly termed the artistic styles. The majority of calls are for plain glass, either bevelled or the flat plate, and then whatever decorations are wanted are put on in the form of curtains on the inside.

The birch door presents many beautiful effects, too, in different shades and figures, and it is pretty generally recognized as the best wood to stain in imitation of mahogany. On this point of mahoganizing birch it seems the trade frequently falls into serious error. Take the birch doors illustrated, for example, and they are not only much prettier as they are than they would be if stained a deep red in imitation of mahogany, but they wouldn't look like mahogany if so stained. It is not meant by this that birch cannot be stained to pretty cleverly imitate mahogany, but in this instance there is a distinctively birch figure, and this figure is not a mahogany figure by any means. To imitate the color of mahogany is only one part of the process of imitation; another essential part is to imitate either the grain or the figure. There is some birch that does this, that has a grain and figure that takes pretty close examination by an expert to distinguish from mahogany after it is properly stained and finished, but this figure evidently is not obtained by using birch indiscriminately and then coating it with a mahogany stain.

The writer does not claim to be intimately familiar with the working of birch, and it is up to the birch veneer manufacturers to explain just where, how and when they get the grain and figure that may best be stained in imitation of mahogany, whether it is by quarter-cutting or by the use of certain kinds of logs or what. It is important, however, if the veneer user would get the best effects from the use of birch, that he take note of and understand this distinction of figure. If he has veneer with what might be termed a birch figure, it is not wise to try and make mahogany out of it, and much better results may be secured by using it as birch and staining it a little to deepen it to whatever tone is desired, but be careful about going into the red staining of mahogany with a figure that anyone who knows mahogany at all knows doesn't belong there. If it is necessary to make a mahoganized birch job, select veneer with a suitable grain or figure, with occasional dark strips or with little waves or some of the other peculiar characteristics of mahogany, and then good results can be obtained, whereas if birch without these characteristics is used and stained for mahogany, it becomes a poor imitation that doesn't look good nor wear well.

Something of the same logic that applies in the use of birch—and it applies in mill work just as well as in doors—applies with equal strength to various other woods. Gum is another wood that is frequently stained in imitation of mahogany, and some of it gives excellent results when so treated. Some of the sappy or white gum with an interlocking grain, if carefully handled and stained, is pretty hard to beat as an imitation of mahogany, but much of the gum used, and especially red gum, would look better and be better if its natural tone were deepened and developed instead of an effort being made to convert it into something else with heavy stain.

One may add a little brown or a little dash of red to the filler in finishing gum, sometimes with splendid results, and in this work the aim should be to improve the tone and bring out to better advantage the natural figure rather than to obscure the figure and stain heavily to get an effect that is neither paint nor stain, but a smear. What it seems we need to do more than anything else right now is to get ourselves thoroughly awakened to the beauty of figure and color in our various native woods, and learn how to combine and use them for harmonious and artistic effects, instead of just putting up the work regardless of specific figure or color and then stained to get the color effect.—"Veneers."

FEEDING THE MOLDER.

While it is perhaps economical to use cheap feeders in planing mill work, furniture work, and, in short, nearly every kind of stock moldings and long runs, depending upon the grade of lumber used and the quality of the moldings turned out, it is certainly wasteful to use inexperienced help on odd details and expensive woods.

In the case of flooring, drop siding, ship lap and other items of planing mill work, the lumber is graded before coming to the machine, and in some places even marked for face and end. Of course, in a case of this kind all the feeder has to do is to keep the boards in and look after the machine. But when it comes to getting first-class moldings out of stock containing many defects which the character of the molding will hide, it plainly follows that an error in feeding will disclose one or more of these defects and thus ruin the piece for its intended purpose.

CANADIAN PIANOS IN ENGLAND.

Inquiries made in well-informed circles, says the Canadian Trade Agent in Leeds, show that openings in England for Canadian-made pianos occur, but for this trade, to be successful, the demand must be catered to in every minute detail. Manufacturers in Germany, who now send across a large number of these instruments every year, have realized this to the full, and to this is to be attributed their success in the trade. In the first case, the popular demand is for a small-sized case of about 4 feet 2 inches or 4 feet 3 inches high, and the general appearance as regards build and ornamentation must conform strictly to English ideas. German manufacturers are sending across an instrument exactly in accordance with these requirements—an instrument which, it is said, would, from its appearance, be little appreciated in the country of its manufacture. The piano to suit the demand of the working classes in this district, must, for its first consideration, be cheap, and secondly, of an appearance calculated to appeal to the popular taste. Indeed, the latter is looked upon by some dealers to be of more importance for this class of trade than the tone of the instrument itself.

—The men at bench work in the planing mill sometimes bring jobs to the band-sawyer that have nails in the path of the saw. Generally it is accident, pure and simple, but sometimes malice enters, and too frequently there is a sad lack of harmony and mutual consideration between the machine men and the bench men of the mill. The machine men are too ready to kick when a bench man wants to use a machine a few minutes, and the bench men are too ready to complain when a job of machine work is not as well done as it might be. Rub out the animosity, put co-operation in its place, and you will not only get along better with your work, but it will make you feel better, too.

—Some of the old-time vehicle wheelmakers knew how to make good wheels. A correspondent of the "Carriage Monthly" tells of seeing, three years ago, a set of wheels made in 1798, and still in use. Referring to the wheelmakers of that period. this correspondent says: "In order that they might succeed, it was no unusual thing to behold the proprietor and a number of hands shouldering the axe, the cross-cut saw, the wedge, the mall and the splitting-knife and marching into the forest. There they would cull and prepare the best materials for the wheels which nature afforded. The next step was to carry the timber to a dry and airy place and to pile it up where it would be left to season by the slow but natural process. This process was supposed at the time I write to require from eighteen months to two years. A sufficient stock was always supposed to cover the requirements for that period."

Saw Mill Department

WHY SAWS CRACK.

Wheels are sometimes too small in diameter for a 19-gauge saw 2½ inches wide, to stand the strain necessary to make the heavy cuts you must make in resawing for siding, ceiling, etc. This is one cause for cracks, because it puts you between two dilemmas: if you put in enough pitch to the front of the teeth to prevent the saw from "breasting" back on the wheels, it will make snakey lines, then when you take out the pitch to prevent the snaking you must put more strain on the blade to prevent this running back, with the result of pulling the tension out of the saw. In fact, excessive strain is the most prolific cause for cracks in band saws and is entirely unnecessary; it is a mistake to put more strain on a saw, thinking to make a bad-running saw run better, as it only aggravates the case. Look for the trouble elsewhere.

Fig. 1.

Another cause for cracks is sharp throats. Take a piece of steel wire (Fig. 1) and file a sharp notch in it as at C. Bend it back and straight (which is exactly what a band saw does four times at every revolution of itself), and it will break after a very few bendings. Now, make a notch as at D and it will stand perhaps twice as many bendings, and as you widen out the notch, as at E and F, the number of times it will bend and unbend will increase in proportion to the width of the notch. Now, the same cause will produce the same effect, whether in a wire or any other elongated piece of metal.

The reason a band saw cracks first at the lowest point in the throat, is that this is the weakest point and bends at a more acute angle at this point, the blade being stiffer at the tooth and in front of the gullet.

Fig 2.

Another cause for cracks in saws that run on covered wheels is lumps of sawdust and resin, oil or gum, forming on the wheels, and which make short bends in the blade at every revolution of the wheel, and as these lumps generally form on the wheels immediately under the throats of the teeth, they necessarily crack at that point. Take a sheet of No. 2½ sandpaper (not emery), double about four-fold, and, holding the round edge to the wheel cover, clean it off frequently, particularly the lower wheel. Another way to keep them clean is to fix a stiff-bristled scrub brush at an angle in position to brush the dust from the wheel. The brush should be so placed that it can be taken out and cleaned frequently. Do not allow the covers to get rounded off at the front edge, but keep the face of the wheel straight crosswise, the same as the steel wheels of log band mills should be kept. The 2½ sandpaper will cut the rubber cover away at the middle, if fastened onto a flat block and held firmly onto the wheel face a short time occasionally.

It is very important to keep the tension in your saws even if they have to be rolled every time they come off, as lack of tension is a fruitful cause of cracks in any kind of a saw. Form your throats as per dotted line at A, Fig. 2. Take out the gullet at G, as this carries the dust down onto the wheel, and if you have no more pitch than is shown by dotted line B, try a little more, but be careful to not get too much, or you will spoil lumber.

Finally, the best way out of the trouble is to put in a 54-inch machine, with iron or steel-rim wheels, and use 4, 5 or 6-inch saws, with no covers on the wheels. The tension will last four times as long, the gum will not accumulate on the wheels (use a little kerosene oil occasionally), and you can do twice the amount of work and do it better. And, finally, put in an automatic grinder or filer. Life is too short to do hand filing and gumming these days. You will then be happy, assuming that you have the skilled help necessary to take care of the machines and saws.

TENSION IN SHINGLE SAWS.

There is a difference in shingle saws, as well as in the amount of tension for saws. As to the amount of tension I put into a shingle saw, it depends somewhat on conditions. If I do the job for some one who does not keep a man to keep up his saws, I put in all the tension the saw will possibly stand and do good work. For this class of work I would recommend, on a 40-inch saw, 10 x 16-gauge, run at 1,600 per minute, about seven gauges of tension; or, in other words, tension the saw on both sides alike, and evenly as possible, so it will show tension, allowing a gray light to show under a three-inch straightedge when placed at edge of saw. By this method you are sure to find all fast spots, which generally occur near the edge, say, from one to two inches from edge. These spots must be taken out if you wish to have a good running saw. Then see that the tension is even throughout the plate. When this is done, take a straightedge forty inches long and let the saw lean at about a 45-degree angle, then apply the long straightedge, thus allowing seven gauges of space to be between the plate and the straightedge, which measure with a saw gauge, or, if you have none, measure with a rule and call it 3-16-inch, which is very close to a seven-gauge plate.

This is a rule I apply to most shingle saws, and, if followed, will give very nearly what you are after. A saw will, however, run with less tension than this, but not nearly as long as if tensioned as described. For horizontal machines I usually put a trifle more tension in the block or flat side of the saw, to allow for the weight of the rim, which hangs down, thus causing the saw to run out of the block more or less unless considerable lead is used to hold the saw into the block.

Should you be troubled in testing the tension on the bevelled side of the saw, place the saw, with flat or straight side up, upon the anvil, letting the rim drop, if so inclined.

Use straightedge over every inch of it. If it has tension on bevelled side it will cause your straightedge to rock, or the plate will show full under this test. If it does not show full or oval, the tension is not there, and the saw must be turned over and more tension put in. Be sure to have tension enough on bevelled side before you call your job done.

RESAWS CUTTING HOLLOW.

The firm by whom I am employed has a band saw which carries a 5½-inch blade. This machine is used principally to resaw green lumber from the mill, and on such lumber has not given any trouble. The saws are 19-gauge, swaged to cut 3-32 kerf. Some time ago we received an order for some thin spruce eight inches wide, surfaced two sides 5-16 thick, to be shipped east, and, as the lumber was to be used in the manufacture of butter boxes, it had to dress out smooth. As the lumber came from the drykiln it was over an inch in thickness, so I concluded I would have plenty of material to work on.

Since I had nothing to do with the band resaw, I inquired what the kerf was, and started to dress the stock two sides to ⅞-inch, which would allow ¼-inch for the resaw and planer to finish the stock. After I had just fairly got started the manager happened to come in, and, of course, asked me about what thickness I was dressing the stock to. Upon my telling him, he got rather excited and told me I wouldn't have material enough left to finish up after it went through the resaw. After I had shown him that ¾-inch had been allowed for resaw and planer, which was more than enough in my estimation, he still insisted that it would not be enough, so I concluded to let them try a load which had been resawed. I set the surfacer to finish 5-16-inch, and had some of the stock fed through. Imagine my surprise when the stock began to show rough in spots, and on some pieces would be rough in the centre the entire length of the board. The stock measured ⅜-inch full on the edge, but in the centre some of it was only ¼-inch full.

After expressing myself quite forcibly, the manager wanted to know why the resaw did this. I told him that band resaws had not been included in my mechanical education, but I had heard and read considerable about their doing tricks of this kind, and explained it to him as well as I possibly could that saws badly fitted, machine and rolls out of shape or out of line, might have a good deal to do with the saws cutting hollow.

The manager then sent for the millwright, and told him to level and line up the resaw, and to see that the rolls were lined with the saw. I made it a point to be on hand when the millwright started in on the machine, and kept a sharp lookout for everything that was out of shape. The wheels were first tested for line and found to be all right, needing only a slight adjustment of tilt and crossline to bring the top wheel to the proper position.

Meantime I was squinting between the feed rolls at the saw blade, which hung on the wheels without any strain, and concluded that the rolls would need considerable adjustment. Sure enough, when strain was put on the saw, a straightedge placed against the rolls on one side and allowed to project out a little beyond the saw, and measurements were made from the straightedge to the back and front edges of the saw blade, a difference of 1-16-inch was found. The rolls were lined, and then it was found they were not plumb with the saw, so they were tilted to bring them right. I made a measurement from the saw to both the top and bottom of the column that carried the top guide, and found the columns out nearly 1-16-inch, and pointed it out to the millwright, who proceeded to correct it.

After everything had been put in shape the machine was started and seemed to run all right. I noticed that the feeder, instead of using the tilting wheel to bring the saw to the right position on the wheels, would grab the cross-line. I did not say anything, however, as it was none of my funeral; still the saws cut hollow, but not quite so bad. At the first opportunity I measured the blades to find out what hook they had, and found it about 3½ inches in 5¼ inches width of blade, but as the saws started to crowd back on the wheels, the hook was afterwards increased to between 4 and 5 inches in 5¼ inches of width.

Shortly after this I had occasion to visit the mill filing room, and in conversation with the filer I made the remark that I thought he had too much hook and swage for dry lumber. "Why," said he, "don't you know that dry lumber requires more hook and swage than green lumber?" I remarked that it was certainly news to me, and that in all my experience with circular resaws I had never found it to work out that way.

To make a long story short, I was forced to run my stock 15-16 s. 2 s., and then had considerable of it show resaw marks. As the manager seemed satisfied, however, I could do nothing but think of the waste of good material that was going on while this stock was being run.

SCROLL SAW FITTING.

In one department of a shop which does its own filing there were 499 brazes in band scroll saws in the two years previous to installing the horizontal band saw filing machine now in use. The filing machine in use at the time caused most of the trouble. The foreman said he had done everything he could to stop the saws from breaking. We went over to the filer, and after looking it over went to the band sawing machine. The strain on saw was right, but the teeth were in bad shape, some of them having been filed much deeper than others; in fact, some of the ¼-inch blades were nearly filed in two, and at the brazes some teeth were entirely gone. Then, too, the teeth hadn't enough set for proper clearance.

The foreman was inclined to lay all the blame on the filing machine, but I told him I thought it capable of better work in better hands; also, that I thought another style of machine still better. He then ordered a filing machine of the make I recommended, and since installing it about all the breaks in small band saws have been caused by running them with insufficient set—a common fault with pattern-makers. It is all very well to do nice, smooth sawing and thereby save hand work, but this should not be done at the expense of the saws. A scroll band saw can be made to do nice work and still have plenty of clearance by setting lightly and often. The idea that a scroll saw only needs setting occasionally is a very poor one.

Personally, I prefer a horizontal filer to the rotary type of machine, from the fact that a more positive feed can be attained with the saw "lying" in a horizontal position than when "standing" in a vertical position. This is very important in the matter of uniformity of teeth, as the least bit of motion either forward or backward, after the feed finger has pushed the tooth into position, will change the spacing and probably spoil the tooth.

The main points to observe in scroll saw fitting are these: First, keen points and set enough to insure plenty of clearance to manipulate the blade in short or long circle work; second, the teeth should all be the same length and spacing, and hook enough to insure good work—not too much; third, the back of blade should be kept perfectly straight at all times, which means a true cutting edge.

Being sure the back is straight, put the saw on the wheels and start up. Get a piece of broken emery wheel. Now, throw the belt on loose pulley and hold the emery just close enough to touch the points of the teeth. Don't hold the emery in one position; move it sideways. Now stop the machine by running a line or two in a piece of soft wood. If all the teeth have been touched, all right; if not, repeat the operation until all are touched. If it would require too much filing to do this at one operation, strike the teeth off again when the saw needs filing.

FITTING CIRCULAR SAWS.

A friend of mine recently stated that he had no use for the cross-face hammer in fitting band saws. I have myself practically discarded the cross-face hammer on circular saws for some years now, in fact ever since I began hammering saws to run at a high speed. I think most filers will agree that a saw running 12,000 feet per minute on the rim requires to be hammered quite as correctly (in fact, more so) as a saw running 9,000 feet per minute.

My experience has been that a saw running 12,000, with fast feed and plenty of power requires so much tension that it will only stand straight when in motion; and if a saw won't stand straight on the floor I see no use for the straightedge and cross-face hammer. I always hammer to tension gauge. While I do not claim to be able to make a large saw fit a tension gauge exactly, and am doubtful if anyone else can, I can get very close to it, and am always careful that no light ever shows under ends of gauge.

Before commencing to hammer a saw I examine it with tension gauge, and if one side shows more tension than the other, I mark all high places on that (the hollow) side with crayon. I then turn saw over and go over the other (high) side with tension gauge and mark all high places with chalk. I then hammer on all the chalk marks, rub them out, turn saw over and hammer on crayon marks. My reason for marking both sides of saw before commencing to hammer is this: If I hammer on one side of saw and try for tension on the other side, the saw will be dished, and the gauge will often fail to show the places that really require to be hammered, as the centre of gauge only will rest on saw. If I were to hammer round the saw on one line I could not distribute the tension evenly and would cause the saw to be lumpy.

My experience has convinced me that a saw, to do good work, must be evenly tensioned and free from lumps around the collar line. I always examine the collar line with a very short straightedge, as, unless that portion of saw is true, I think it impossible to get good results. Of course, I have to use the long and cross-face hammer on all other saws, but only in case a saw meets with an accident do I use it on a circular. If I were to mark the side of saw which I hammer last with chalk, the marks would get rubbed off on anvil, but crayon does not rub off easily.

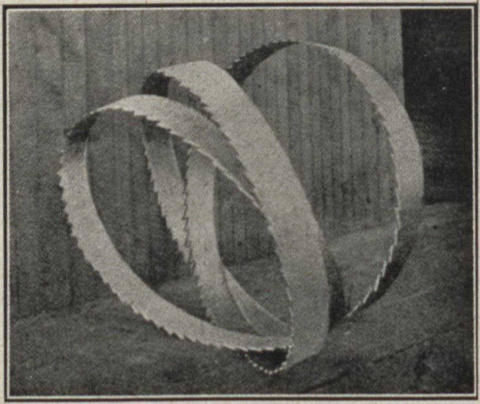
Some sawmakers ask customers, when ordering saws, to state, among other things, the horse-power that will be used to drive the saw, and I have read in one instance where a man who had saws to sell stated that it was very important to specify the number of horse-power, as a saw put up to work at 30 horse-power would not work at 100 horse-power. It would be hard to give the horse-power for each saw in the country, as many of the mills are driven by one engine, and, of course, all the saws, machines, etc., may be in work at one moment and only one saw the next. I believe in having sufficient power to drive the saw at about the same speed while in the cut as when running idle. So long as there is sufficient power to do that it is enough, but another 500 horse-power could be added, provided the speed and feed of saw were not increased, and there would be no need to alter the tension of the saw. We have recently doubled the horse-power of this mill with the object of adding more machinery later on, and it has made no difference with the saws. My saws make as much and as good lumber as any.

TWISTS IN SAWS.

These two photos of a band resaw, 19-gauge, show what happened when it came in contact with a 20-penny spike that was driven in the centre of the edge of a three-inch plank. The saw hit the spike from head to point, took out fifty-seven teeth, and the saw was outside the plank before the sawyer could stop the feed. When the saw was taken off the wheels it coiled up like a watch spring.

Before Treatment.

I would like to have some of the cross-face and long-face filers tell me which way this saw "lops," and what kind of a hammer they would use to remove it, as I do not take a twist out that way; neither do I use a slotted stick nor irons attached to my rolls. I simply levelled the saw and



After Treatment.

rolled it, made the back uniform, gave it the proper tension, set it on the floor, and took another photo, which, it seems to me, might induce some of these filers to try more modern methods. I think the best way the easiest and the quickest.

FITTING LOG BAND SAWS.

Some claim that the tension should only be in the centre of the saw blade, and that only three tons' weight should be carried on the saw. Many of the most successful filers to-day open up their saws from edge to edge, and carry from six to seven tons' weight on the saws. No amount of strain will make a poorly-fitted saw stand up to its work and make good lumber; such a saw will crack, regardless of what strain is carried.

The writer knows of a mill that makes very poor lumber, although the filer thinks his saws are doing fine work. I have seen his saws run out on a four-inch cant. This filer is not in favor of carrying much strain on his saws, and claims that about three tons' weight is sufficient for a saw twelve inches wide. One thing certain, his saws either dodge for want of strain, or they are not properly levelled after tensioning. My opinion is that they dodge on account of not having the proper strain. If he carried about five tons' weight, and still his saws dodged, then I would say it was because of not properly levelling the blade. I also noticed that his saws flutter. What causes this fluttering? I think it is because of not having the proper degree of tension the same distance from the edges throughout the entire length of the blade. A saw that flutters will crack if run very long in this condition.

Some filers are astonished when their saws crack through the centre portion of the blade, and claim this cracking is caused by the saw getting "slivered," as they call it, but I do not think this is the cause, but rather that these centre cracks are caused by these places in the saw blade being expanded the most. Places in a band saw that are expanded most are subjected to the least strain, and the continued striking of the saw, or this portion of it, against the guides, causes the blade to crack.

The tensioning of a band saw is very important, for if it has not the proper tension it will not stand up to its work. A band saw should be given all the tension it will hold, and at the same time lie perfectly flat on the hammering bench. Some filers claim a band saw should be tensioned to suit the face of the wheels; that a saw does not need much tension in it for flat-face wheels. This idea is wrong. It stands to reason that if the mill on which the saws are run has a strong power, and the feed is fast, the saw must be given all the tension it will hold; if not, the saws will not stand up to the feed, for a saw without proper tension will not strain up evenly on the wheels; in other words, the middle of the blade will be stiff and the edges loose, and a saw in this condition will dodge and run in and out of the cut. My experience has been that whether the wheels are flat or crowning, the saw must be given all the tension it will hold for fast-cutting mills.

It is absolutely necessary that the saw be perfectly level on both sides and free from lumps. Lumps very often cause centre cracks, but these centre cracks do not amount to much if they are punched and properly levelled and tensioned. It is the same with a saw having edge cracks: if proper care is given them, the cracks can be checked from going farther. A filer is not always to blame for saws cracking, for sawmakers are not beyond making mistakes themselves; they are just as liable to make mistakes as is the filer in the mill. When a saw shows a tendency to crack, it may sometimes be traced to flaws in the steel. When a saw commences to crack it is the surest evidence that something is wrong, and right then the filer should make investigation as to the cause, for the fault may be in the mill and not in the fitting of the saws at all, though I feel perfectly safe in saying that a good many more saws crack from improper tensioning and fitting of the teeth than from defects in the steel. I know from personal experience that as soon as one gets a little careless in tensioning and in the fitting of the teeth, the first thing he knows he will have a cracked saw, and perhaps several cracks will appear in the same saw. Under these conditions I generally know where the trouble lies, but when I know that my saws have been properly fitted, and they still crack, I at once investigate to find the trouble. A filer should never condemn a saw because it cracks until he is sure the trouble is in the steel and not in the tensioning and fitting of the teeth. T. B.

SPONTANEOUS COMBUSTION.

The following are actual cases where waste accumulating in piles has led to fire:—

The first instance was in the glazing-room, where a barrel of boiled linseed oil was kept on tap, and the drip was allowed to fall into a box of sawdust, which was supposed to be cleaned out at regular intervals and the contents burned in the furnace. It seems this duty had been neglected, and one night after dark the watchman detected the smell of smoke, but failed to locate its source until the contents of the box had burst into a blaze—and the fire department was called in to put out the fire.

The second instance was in a storeroom, where a large heap of sawdust was kept for sale to butchers or saloon-keepers. In some careless manner an oily substance was dumped in the heap, presumably droppings from the bearings having saturated some of the sawdust. The shipper's helper had noticed a smoky odor all one day, and the next day, in passing through the room, I asked him if he did not notice it, when he remarked that he had smelt it for two days. He procured a bucket or two of water at my request, and we examined the sawdust heap, as the odor seemed to come from it. Upon stirring it up with a stick, the red glow of slow combustion was seen and a little white smoke curled up. We quickly doused the heap with plenty of water, and upon examination it showed a large mass of the sawdust burnt to a crisp. It is a great wonder that it had not burst into a blaze before we discovered and put it out.

The third instance was a case where a painter had been polishing a bar top with pumicestone and oil. He carelessly put the oily rags or waste he had been using to wipe off his work into a box and closed the lid. Our superintendent noticed the odor of smoke, and, after some hunting, found the box. He took the painter to where the box was, and as he opened the lid the oily rags were aglow and just about to blaze up.

A more recent instance was a new house we were building. In finishing the woodwork we were using an oil stain, wiping off the surplus to show the grain through the varnish. When nearly done, the oily rags were gathered up, put into a sack and placed in the pantry, with the intention of taking them away to be burnt. They were overlooked, however, and left behind. About nine o'clock that evening we were told that our house was afire. We hurried over, to find that a neighbor had forced his way into the house and put out the fire with the aid of his garden hose. Thanks to his promptness, a serious fire was averted. If this is not sufficient evidence of how inflammable materials produce spontaneous combustion, I have two or three other instances I might relate.

The points to be guarded against around mills of all kinds are, allowing sawdust, waste or rags that have become saturated with oil, and especially boiled linseed oil, to accumulate, or particularly to inclose them in boxes, barrels, sacks or any close room where the oil cannot evaporate. Heated steam pipes, or bearings on shafting or machines that have run hot, should be cooled off before leaving, to be certain that no fire will result.

WASTE AT THE DRAG SAW.

It looks like in veneer cutting there are more different allowances made for trimming, and more waste incident thereto, than in any other line of wood products. In the first place, the blocks must be cut longer than the veneer wanted, so that it can be trimmed to suit the size, and then the veneer should be cut larger than the panels wanted, at least one inch each way, so there can be enough material to trim and square up on, so the work will finish nicely after it is put up.

The most liberal allowance is generally made at the drag saw, and the drag sawyer that doesn't pay close attention to his business can waste enough material to pay his wages. The allowance made in cutting blocks for the squaring up by the scoring knives probably varies considerably with the size of the logs and with the peculiarities of the drag saw and the operator—possibly two inches on an ordinary block, say, four inches in length, is about the average allowance. And some sawyers, in cutting larger blocks, allow at times three inches and four inches, and even then there doesn't seem to be any room to spare, because the blocks are not cut square, and the scoring knives will take off on one side a piece probably four inches wide and on the other side only about one inch. It is easy to see from this that economy in drag-saw work consists, first, in having the log to be cut so set that the drag saw will cut perfectly square, not only across, but down through it.

It is comparatively easy to arrange for cutting squarely across the log, because, usually, if the log is mounted on a truck, and the truck is made square with the line of the drag- saw, all that is required is to get the log straight with the truck. If it is a straight log, the cutting will be square across. If it is a crooked log and has a bow to it, the log should be shifted on the truck so that part presented to the saw each time is practically square with it. Then, also, it should be seen to that the saw cuts straight down and is not filed or set so that it leans to one side. Then the log should be arranged on the truck so that its centre is practically level from end to end. On a log that swells much this means blocking up the small end, and involves a little more work than it would take to just roll it on and cut it any way, but these are things that must be looked after if one desires to economize at the drag-saw and reduce the allowance in trimming to the minimum.

HOW LUMBER SHRINKS.

Too much air, heat or sun on lumber will cause lumber to warp and crack and shrink. As to the benefit, if any, that is derived from boring columns would say that our firm, a few years ago, received a lot of poplar squares, 8, 10 and 12-inch, right from the saw mill, and in perfect condition except that they were green.

The squares were taken into the mill and a 2-inch hole bored entirely through each one. They were then piled on the yard in neat piles, with sticks between them, to season. We have a lot of them on the yard now, and every one is so badly cracked that they are unfit to make columns of, some of the cracks being so large that a man can lay his finger in them. Boring did not seem to do these squares any good.

A few months ago we had a lot of 10-inch colonial columns to turn out, and bought 10-inch poplar squares for the job. The squares were a long way from being dry and were not bored. We turned the columns and they lay in the shop several days before being sent out to the job. I saw these columns a short while ago, and they had shown no cracks at all.

We have an idle pulley that tightens the heavy saw belt. We made it out of a gum log. It is about 16 inches diameter by 12 inches long, has run several years, and there is not a crack or a check in it. The piece of gum that this idler was turned from was kept covered up in sawdust for about a year before it was turned. We have another piece of the same log that has been covered in sawdust about three years, and shows no cracks.

About ten years ago I turned a lot of 12-inch columns. It was specified that they have a 3-inch hole bored through the center lengthwise, a ¾-inch hole bored near the bottom of the shaft and a ¾-inch hole bored near the top of the neck, these holes to intersect the hole in centre and allow air to pass freely through the column. These columns were turned from North Carolina heart pine and had a few season checks in them. After they were painted the checks closed, and to-day they are without a check or crack.

These few examples, I think, will show that boring columns has very little effect on them one way or another. Of course, if a column is bored as those last mentioned, so that air can circulate freely on the inside of the column and the outside have a good coat of paint, so that the drying process will take place slowly, entirely from the inside, it is almost impossible for it to show cracks from the outside. If squares are piled in a house, where the sun, heat or strong draughts of air are excluded, thus allowing the wood to dry very slowly, the wood will show no cracks.

No doubt many readers remember cutting up a piece of quartered oak that was dried too quickly, and found, to their dismay, that there was a big hollow crack on the inside of the board, extending nearly its whole length; but what reader remembers cutting into a plain oak board and finding a crack that did not show on the outside? I have cut into fireproofed quartered oak that looked perfect to all outside appearances, and found cracks on the inside that I could hide a 2-foot rule in. I have cut up fireproofed quartered oak that was 2 inches thick on the edges and would not dress 1¼-inch in the center of the 10-inch board. Wiser heads than mine must explain this last freak.

TO PRESERVE HARD MAPLE FLOORS.

The best treatment for hard maple floors, when the natural color of the wood is to be well preserved, is to apply not less than two coats of bleached shellac varnish to the floor, and three coats are recommended for absolutely good work. As the floor becomes worn, it should be gone over with floor oil at least once a month, the floor oil being composed of eight pints of raw linseed oil, two pints of turpentine, and one pint of white or orange shellac varnish. This should be applied with a brush, and rubbed in by wrapping a cloth around a weighted floor brush, so that it will become hard over night, and will not remain sticky. Paraffine oil, used in the same manner, will also clean and freshen up the floor, and in that way prolong the life of the shellac varnish.

SPEED OF SAWS.

We all know there is a great difference of opinion among filers as to speed. Some claim that saws will crack if the speed is high; others claim the speed of the saw has nothing to do with the saw cracking. Centrifugal force does not enter into the problem of band saws as it does in circular saws, nor does the speed of the band saw have anything to do with cracking or the tensioning of the saws, although the speed of the band has much to do with the working of the saws, also with the life of the saws, as a band improperly speeded will have a tendency to induce cracks.

It is impossible for a saw of any kind to do good work under heavy feed if it hasn't proper speed. In cutting timber, such as ash, oak, maple or birch, a speed of about 8,500 feet per minute is sufficient, although the writer has run as high as 9,000 feet per minute with the very best results. For saws that cut practically all kinds of timber, wet or dry, a speed of about 8,932 feet per minute is safe to tie to; it will be found that the saw will run much easier than at less speed.

The writer recently visited several mills, and among them found only one mill that had what I would call the proper speed. The saws in this mill run 8,000 feet per minute, doing nice work in hard maple logs. In the other mills the saws run only about 6,500 feet, and were doing very poor work in hemlock logs. I will not say the speed of the saws in some of the mills is the cause of the poor work, for they had neither the proper hook nor throat room to chamber the sawdust, and hook and the shape of the teeth and throat have as much to do with the work of the saws as does the speed. If the throat is very small, it will fill up with sawdust and cause the saw to heat, and then the saw is bound to be forced out of its line when in the cut. I have found a great many instances where persons in charge of band saws pay no regard to the shape of the teeth or the throat; some get the teeth into all kinds of shapes but the right one. Many saws break and do poor work on account of the shape of teeth and throat.

Some filers claim that a speed of about 6,500 is best for cutting all kinds of timber. Others say a low speed will cut the evenest timber. This may be true where, say, only 20,000 feet are cut per day, but what would a low-speed saw do in a mill where, say, 70,000 feet are cut in ten hours? If one should undertake to saw this much lumber with a saw having low speed, the saw would be all over the log. One thing certain is, where the feed is strong the saw must have plenty of speed; if not, there will be trouble, either in the saw cracking, or in making very poor lumber, and sometimes both.

Some sawmakers claim that saws will crack and run off the wheels if run at too high a speed, and say they then get the blame. There are cases where the sawmakers are to blame, also cases where the filer at the mill is to blame for the saws cracking. I never blame the sawmakers when a saw commences to crack until I am sure that they are to blame, but I notice that the sawmakers do not hesitate to blame the filer.

CRACKING SAW.

While it is hardly possible to say why a particular saw has cracked, without seeing it or having a very complete description of it and the wheels it is running on, there can be a number of reasons given why it cracks and its mates do not. Same causes produce like effects, so that if three saws of the same make are each run the same length of time on the same wheels, in the same relative position, the same results may be expected, provided, however, that all three of them were tensioned exactly the same and in all other respects treated alike. But suppose one of them is allowed to get "fast" under the teeth, or is opened up too much at this point, or the throats are case-hardened in the bottom, or in numerous other ways this saw receives bad treatment by the filer, or the sawyer, not knowing how quickly he can ruin a blade, gives the wheels excessive crossline and tips the top wheel back to counteract it, twisting the life (crystallizing the steel) out of the saw in a few minutes' run, or in many other ways injuring the one saw that the foreman never hears of, or "gets onto," as the boys call it. The man who causes the trouble, whether it be the filer, sawyer, or a green hand put on temporarily, is not going to publish his carelessness or ignorance, as the case may be.

PAPER BIRCH.

The paper birch is a tree, the importance of which in the lumber and woodworking industries of the country is often not fully appreciated. In comparison with such trees as the Southern pines, Douglas fir, and other important conifers, or even with the principal hardwood lumbers, such as oak and ash, its total annual cut is very small, indeed. Probably there are some people who do not realize that it is used at all except for fuel, birch bark canoes, baskets and other similar useful and ornamental articles. As a matter of fact, however, it is an exceedingly important wood in a number of woodworking industries, and there are certain articles for the manufacture of which no satisfactory substitute has yet been found.

Paper birch is used principally in the manufacture of spools, shoe pegs and shanks, toothpicks, etc.

The dowel and novelty mills also use paper birch very largely in their work, although many of these also use other hardwoods to a limited extent. The bobbin and shuttle manufacturers may also be included in this same class, which altogether consumes nearly as much paper birch as the spool industry.—Exchange

—We regret to learn of the death of John A. McCann, founder and editor of the National Coopers' Journal. He was one of the best known men in the cooperage business.

—A correspondent of the "Southern Lumberman" brings up a question that has puzzled many sawmill men. He says: "Why does thick lumber sell for more than thin lumber, grade for grade? Ash, oak, or even poplar, three and four-inch stock, under normal market conditions, sells for anywhere from $5 to $8 more than one-inch stock. Why is this? The thin lumber has to be just as long and just as wide. Under inspection the grade is just as hard on the thin lumber as it is on the thick lumber, and usually a little harder. It takes six lines of the saw to cut six one-inch boards. It takes two lines of the saw to cut two three-inch boards. Look at how much more sawdust waste there is in cutting the thin lumber. It looks like the thick stock could be manufactured much cheaper and would be sold cheaper. Where is the difference?"

Furniture and Cabinet Making

WOOD TRANSFORMATION.

It is stated that a system has been invented for transforming the pigment in wood, with the result that the physical properties are in no wise impaired, but the coloring and figure are very much enhanced. For many years there have been numerous attempts to impregnate woods with various coloring material to render the tone uniform throughout, but up to this effort none has been successful.

According to the explanation of W. A. Hall, 1 Madison Avenue, New York, the inventor, the transformation of wood consists in a combined chemical and mechanical treatment whereby it is changed throughout in color, and its grain and figure developed to a remarkable extent. In fact, the change in color is almost secondary to the figure development. Both are produced naturally without the use of dyes or the imparting of any artificial figure, for both the coloring matter and the physical characteristics which produce the figure exist in the wood itself, although not readily discernible in the untransformed lumber.

In transformed lumber the more porous portions, such as concentric rings and open cellular vessels, are filled with a natural pigment deposit of deep, dark colors, derived from the lignin of the wood, and which produces substantially the grain effect of tropical woods, and develops a figure which one would hardly suppose the wood itself to naturally possess. Some of the plainest domestic woods can be readily transformed in this manner to resemble the remarkable figure of old mahogany, or of rosewood, or Circassian walnut, and at the same time a similar change in color is produced.

This is not a process of dyeing, but one of conversion. The natural coloring matter contained in the ligno-cellulose structure of the wood is developed into rich reds, grays and browns, and even blacks, and deposited in the cellular vessels as an insoluble precipitate completely throughout the structure regardless of its thickness—whether the lumber under treatment be logs, planks, boards or veneers.

These colors are absolutely permanent and unfading; in fact, many of them cannot be bleached.

The working qualities of the wood are unaltered; if there be any physical change at all, it is a lessening of the tendency to shrink, which is due to the filling of the porous and open vessels, making them thereby more homogeneous. These transformed woods are now being largely used in the manufacture of mechanical instruments, T squares, triangles, and for purposes where the greatest stability is required.

Transformed wood is actually a more natural product than the so-called "natural" cabinet woods now in use, in that no filler or stain is required in their finishing, whereas the largest part of the mahogany now in use is naturally of a light color, and its dark, rich red is obtained by filling and staining. The same is true to an even greater extent with quartered oak, cherry and sycamore. The deep, rich red of old Santo Domingo mahogany is almost unobtainable to-day. Mahogany is not much darker than cedar, and stains generally have a tendency to fade. This can readily be seen by examining the trim around windows where it has been exposed to the sun, and comparing it with the same trim in other locations in the same room.

Where transformed woods are used there is no fading, for the colors are produced in the structure of the wood itself. They are natural wood colors, and not mineral dyes applied to the surface. About the only imported cabinet woods now in use that are not surface-stained are Circassian walnut, rosewood, ebony and a few of the very expensive South American woods.

A most valuable feature of transformed wood is that no surface filler is required, which is always objectionable; surface fillers are mineral compositions which are absolutely unnatural, having an entirely different composition from the wood itself, but it is generally necessary to use them in order to produce a surface that will receive and hold varnishes and shellacs. In transformed woods the filler is produced from wood itself, is deposited naturally throughout its entire thickness in every vessel, which makes it much more stable and enduring; transformed woods are thus cheaper to finish, requiring nothing but a coat or two of white shellac; in many cases even a wax finish will answer.

For the finest interior trim transformed wood is said to be unsurpassed. It is furnished in excellent representations of mahogany, Circassian, French and black walnut, rosewood, cocobola and ebony; also in antique and cathedral oak and mission wood, of uniform color throughout its entire thickness. It is said to be well adapted for the finest furniture and carvings, for the best cabinet work, for floorings, marquetry and inlays. In cost they are far below the highest class of imported woods, averaging about the same as quartered oak, and in addition savings are made in finishing. It is certainly a great advantage to possess a lumber of uniform color throughout, which will not fade, and which can show no light underbody if scratched or worn.

Of local trees adapted for this purpose the best are maple and yellow birch, though almost any American wood can be transformed into a higher class of lumber. The demand for high-class finishing and cabinet woods is rapidly increasing, due to the great improvements in interior decoration and more cultivated taste; but America has been considered as rather devoid of suitable raw material for this purpose. In large commercial quantities only three high-class natural woods are indigenous to this country: Black walnut, cherry and white oak. The former two have to a great extent disappeared, and what little remains commands prices approximately as high as that of mahogany. Quartered white oak is a very fine product, but is also growing scarce, and to-day is quite dear; besides, it is a wood that can be used for interior trim and cabinet work only to a limited extent, owing to the character of its figure, and, being a naturally light-colored wood, it is frequently surface stained. Many of our other woods possess a greater variety of figure when transformed, giving them a wide field of utilization.

IMITATIONS OF HARDWOODS.

Probably no people are more wide awake to the rapidly depleting lumber supply than are the manufacturers of furniture, and they are preparing themselves as fast as they can to meet the exigencies of the future by perfecting to a high degree methods of imitating oak, walnut and the other expensive and rapidly disappearing hardwoods which are so popular for high-class furniture work. Not only do they practice economy by the use of imitations wherever possible, but they employ veneer to a great extent, thus not only actually improving the quality and stability of their manufactured articles, but effecting a marvellous saving in the use of expensive woods.

During the last few years the great increase in the price of hardwoods, which has become necessary on account of their growing scarcity, has created a strong demand for satisfactory substitutes which can be used in manufacturing imitations. The two kinds most often successfully imitated are mahogany and quartered oak in the golden and darker finishes, but comparatively little deception is attempted by manufacturers, and they market the goods for exactly what they are, or under some special trade name which they have coined.

For imitating mahogany, cherry was formerly used almost entirely, but, of course, that wood itself is now one of the scarce ones, and its consequent increased price has led manufacturers to seek a material which lends itself more readily to the stain, shows the grain, and holds the gloss. Birch best fulfills these requirements, although in some parts of furniture maple, beech and gum are used as substitutes for mahogany. Even in the better grades of furniture, birch is often used for posts and frames—panels, tops and other parts being of mahogany veneer. It is, indeed, a pity that birch finds its chief function in furniture work, and even inside finish, as a substitute for mahogany, for its beautiful grain, color, and the high finish which it will take eminently fit it for a high place of its own in work of this character. In making imitation quartered oak many woods can be used, as the original grain is first covered with a filler, and then the quartering is imprinted in dark ink by the use of actual quartered oak prepared by a special process. Birch, maple, and poplar are much used for this purpose, and after finishing and polishing, it sometimes takes an expert to detect the difference between the real and the spurious.

There are certain woods used in fine furniture construction which are exceedingly expensive owing to the difficulty of obtaining pieces with a good grain, of sufficient size for working. Such a wood, for instance, is the Circassian walnut, which comes from the Ural Mountains, and which is so popular at present. It makes handsome veneers for table-tops, beds and dressers, and forms one of the most costly furniture "novelties" on the market to-day. The core or backing is sometimes made of American walnut in the natural finish, and again of red gum, or satin walnut, as it is called by the English trade, which has a texture very similar to Circassian walnut, while its grain is also very much like it.—Hardwood Record.

FACTS ABOUT MAHOGANY.

Mahogany is all the fashion for high-grade furniture. The United States is not a mahogany-growing country, unless Cuba may now be said to be a part of the United States. It is a tropical wood. Its home is in Central America and in Cuba, Jamaica and San Domingo. These islands give the smallest but heaviest and prettiest wood. British Honduras, Guatemala and Nicaragua give the most and Mexico the largest timber. The richer, solid, heavy varieties come from the islands. These will not float. They are susceptible of a high degree of polish, and the wood has a rich, wavy figure. These pretty-figured pieces of wood are of great value. A six-foot piece (which included the crotch of a tree) in a certain shipment will bring $500 when cut into veneers.

No matter where a shipment of the wood comes from, or of what variety it is, there are always more or less of the fine, flaky sticks that make veneer. Mahogany is a phenomenal wood, in that it does not warp under any conditions of weather, use or age; neither does it shrink. It is of great beauty, hardness and durability. In no other wood can these qualities be found, combined with large size, uniformity of grain and richness of color and figure. The island timbers are eight to ten feet in length by twelve in diameter; some from Cuba, however, reaching thirty-five feet in length by two feet in diameter. Honduras squared timbers are as long as forty feet by two feet in diameter, and the three-foot and four-foot timbers come from Mexico. The softer mahogany comes from the swampy lands. There are no mahogany forests; the trees are not grouped that way, the individual trees being more or less widely separated. Like other trees, the core is the poorest part, often being worthless.

A schooner load represents an expenditure of about $13,000. That is not all, for the timber, the labor and freight, a considerable part of it representing "grease" to the Spanish customs officers, whose favor is not obtained by a smile. There are no sawmills in the mahogany-growing countries. The trees when cut down are squared by hand. An Indianapolis company is going to have them hewn in octagon shapes hereafter instead of squares, believing it will get 25 per cent. more timber out of them this way. Oxen are used for the haul to the water, and the timbers are rafted and floated to larger streams, where larger rafts are made and sent to a loading port. Having arrived there, the lumberman's trouble and expenses are not half over.

The coming and going of ships to these small ports is not regulated like the running of railroad trains. It may be announced that a ship will be there on the 4th, and there is great scurrying to get the timber ready. When the ships do get there, they will not wait for the arrival of their timber cargo, but will sail away without it if it is not ready. So the rafts are anchored. There is a worm, or marine borer, that likes mahogany, and he goes promptly to work. If the ship does not arrive on time, and is not sighted within a day or two, the timbers must all be hauled on to the beach or every timber turned over daily. The worm does not make fast time in boring, and if the side he is working on is turned to the hot sun before the borer gets more than an inch or so in, it scorches him to death.—Furniture Worker.

If the teeth of a saw swage out nicely and evenly all around, and hold the edge the usual length of time, there is no reasonably honest man who is onto his job as filer that will condemn the steel,but it is so easy to lay the trouble onto the saw that a lazy, ignorant or dishonest workman will, like electricity, always take the easiest route out of the trouble. My experience is that almost without exception the trouble is not in the steel. In an experience of forty years in using almost all classes of saws for use in wood, I have only condemned ten feet of one band saw and two large circular saws. I have always had my doubts about the circular saws, too—that the hammering was not at fault, as they broke around the collar; not claiming, however, that there may not have been some few of them defective in steel or temper. I have in nearly all cases found other causes for the trouble, either in the mill or in the handling of the saw.

J. L.

THE GOOD MACHINIST.

As the workman who operates the machine or any other part of a woodworking plant is more essential to the welfare of the business than the machines themselves, it might be well to discuss his merits and his failings just as we discuss the good and bad features of a machine. The workman in some respects is very similar to the machine. His behavior, like the machine, depends to a great extent upon the handling he receives.

Put a foreman over him who is incompetent in the handling of men, and no matter how good material there is in the man and how willing he may be to do his duty, it won't be long till he is ready for the scrapheap, so to speak. First, the keen edge of his aspirations begins to wear off, then he gets loose in his bearings or his habits, and the fact that he is out of order soon shows in his work. Instead of a little adjustment of some difficulty in one place and a little oil where something is running dry, he gets nothing but the tight belt of fault-finding, and he grinds away for a time, and finally goes all to pieces and is discarded for another, to be used in the same manner.

The ideal workman, finding himself in the hands of a reasonably good employer and a sensible foreman, will show the material there is in him. You will find him on hand about ten minutes before the whistle blows in the morning, with his working clothes on, ready for business when the power starts, instead of coming in about a minute after the whistle stops blowing, and getting his things on and his machine started about ten minutes after seven.

When he commences a job, what is he thinking about? Is it that little racket he had last night? Not a bit of it. He devotes his mind to studying as he goes on with his job, to see if there is not some method by which he can do that work a little easier, quicker and better. He reasons in this manner: If I use my head to save my hands, I will be making it easier for myself, improving myself as a workman and making my work more profitable for my employers, and if they are like the majority of employers they will notice and appreciate it.

We frequently see our man turn out twice the amount of work in an hour that another man does at the same price, simply by placing a truckload of material right close at his hand and running two pieces at a time, while the other man doesn't care if he runs 500 pieces in a day or 50. He would much prefer to run only 50, as it would save him so much. As long as he gets his pay for to-day he does not know enough to look forward to his chances for to-morrow, so he places his truck 6 feet away and runs one piece at a time, any way to get his time in. If he is allowed to stay any length of time he soon begins to think he must be getting very valuable to his employers, so asks for a raise of pay, and is much grieved when he is told to watch out or he will not have what he is already getting very long.

The ideal workman goes about his business and keeps his mouth shut. He does not consider it his duty every time a fellow-workman comes near where he is at work to hold him up in order to talk and visit. If there is anything he wishes to know concerning the work he goes to the foreman instead of going to some of the men and stopping them from their work to ask their opinion on the matter. The foreman can always find him steadily pegging away at his work any time that he takes the trouble to look for him. In other words, he is entirely reliable, and if the foreman is obliged to step down to the office for an hour, or for any reason his back is turned, he has the satisfaction of knowing that this man, at any rate, is attending to his business. When the foreman comes back he does not find him gone from his job on a tour of investigation and visitation to some part of the works where he has no business.

The ideal workman will devote his mind to improving his work, both in quality and quantity. If he feels that he is not getting as much pay as he ought he will ask for an increase, and if, for any reason, his employers are not able to grant the same, he will not say, "Well, I won't tear my shirt; if they won't pay me but a dollar I guess I won't earn but a dollar." He will continue to do his best just as long as he remains in the establishment, and if he sees that there is no prospect of improvement, then he will begin a still hunt for a better position. When he has located one he will give his employers a week's notice and go quietly away to his new place.

Before making a change, however, he will be sure that he is making a change for the better, as it is poor policy to go traveling about the country unless there is opportunity for improvement by so doing. Each time that he changes, if he is observing, persevering, and applies himself to the principal end in view, he will gain experience and knowledge that is more valuable than money, for it makes him independent and self-reliant. However, it is easy for him to make a mistake if he is not on his guard, and think because he has had some experience and acquired some little proficiency in his profession, he can command any price or condition that he may demand, with the assurance of getting it.

In order to be successful he must put all egotism behind him and bear in mind that, although he may have had years of experience, yet he is only beginning to learn a little about his business. Quite frequently some shop boy or helper will tell him something he never thought of before, thereby convincing him again that he does not know it all. It is frequently the case that there are men employed at the same work who are getting more pay than he, and are not doing as much work, but are inclined to shirk. This fact, however, must not take him on his feet; he must continue to do his best, and not think that he is doing himself harm by doing more and better work for less pay than some other man, for instead he is improving himself and making himself a more valuable man to himself and his employers.

He must bear in mind that it is only by such methods as these that he can fit himself for a successful foreman, and by this means to the position of superintendent, and from that to general manager and partner or owner. He must continually look forward to something better and remember that the Lord helps the man who helps himself.—Exchange.

GOVERNMENT TESTS FOR COMMERCIAL WOODS.

It is doubtful if any of the laboratories maintained by the Government for scientific research are more unique in character, and yet bear promise of more important results than one which has just been established in Washington by the United States forest service for investigating the structure of commercially important woods.

Laymen will not understand the significance of the proposed investigations carried on in this laboratory so quickly as architects, builders and other wood users, who in these days of growing scarcity of the more valuable woods, are seriously preplexed in identifying substitutes. Mistakes of this kind in identification have, in the last few years, in several instances, meant the loss of thousands of dollars and many embarrassing lawsuits.

Many of these woods look alike, even to the trained eye of the millman or the builder, and yet they are widely different in value for certain purposes, and it is the greatest importance to be able to distinguish them quickly and certainly. Again, a new wood may come to a man's notice for the first time, and it may be necessary for him to decide what it is and what it is worth.

The Government has been helping individual lumber users for some time, but the facilities have not been near so complete as they are now. It is to meet such needs and answer such questions that the forest service has established the laboratory and placed it in charge of a trained dendrologist. Architects, lumbermen, manufacturers and makers of woodware are already sending in samples of wood for identification, and asking if there are not some structural characters by means of which such woods may be conveniently separated from relative species having greater or less value for some specific purpose.

The laboratory will investigate in a practical way. The structure of the woods, sections lengthwise and crosswise, will be studied so as to separate by structure alone the various species of a genus. Analytical keys to the trees of each group will be worked out. These will be based on the arrangement and character of the pores discernible to the naked eye or by a hand lens.

COOPERAGE STOCK MARKET.

(Report by James Innes, Chatham, Ont.)

May 26th, 1908.

There has been very little change in the cooperage stock situation during the past month. The weather has not been very favorable for getting out material, except during the last 10 days. All the mills are running full, at the present, but a great many of them are shutting down at the end of this month, for lack of material, and will not be able to start again till the fall; in other words, until they can get into the woods, and truck timber to the mills.

Prices are, however, firm, with a slight upward tendency, more especially on hoops, which are very short, at the present time.

The demand for apple barrel stock is now commencing, and coopers are laying in a car or two, to make up barrels ahead, as indications are excellent for a good apple crop. Reports from all over Canada are, that the trees have come through the winter in first-class condition; the bloom is heavy, and with the exception of the report in some districts that the Baldwins are going to be light, a bumper crop should result this year.

The sugar refiners are running a little heavier than usual on barrels, and the flour mills are running strong, since the opening of navigation and using large quantities of barrels.

The salt and lime trade is also opening up, and there is very little indication of trade depression this year.

At the present time, we are certainly inclined to be optimistic, as everything points to one of the most prosperous years we have had in Canada. Crops never looked better; fruit promises an abundant harvest, and the general trade of the country is beginning to boom again.

CONSERVATION OF FORESTS.

"The development of our waterways and the conservation of our forests are the two most pressing physical needs of the country," said President Roosevelt in a special message to Congress, February 26th, transmitting the preliminary report of his Inland Waterways Commission. "They are interdependent questions," he declares, "and should be met vigorously, together, and at once. The questions of organization, powers and appropriations are now before Congress. There is urgent need for prompt and decisive action!"

The President believes that no right involving water-power should be granted to any corporations in perpetuity, but only for a length of time sufficient to allow them to conduct their business profitably; that the improvement of the inland waterways can and should be made to pay for itself from the incidental proceeds from water-power and other uses, although navigation should, of course, be free; but that the greatest return will come from the increased commerce, growth and prosperity of the people. "For this work," he continues, "'we have waited too long; adequate funds should be provided by bond issue if necessary, and the work delayed no further."

In the report of the commission it was recommended that the president be authorized to appoint and organize a national waterways commission to bring into co-ordination the corps of engineers of the army, the bureau of soils, the forest service, the bureau of corporations, the reclamation service, and other branches of the public service in so far as their work relates to inland waterways; and that the permanent commission continue the investigation of all questions relating to the development, improvement and utilization of the inland waterways, and the conservation of our resources related thereto; and to consider matters of irrigation, swamp land reclamation, control of floods, extension of forests, relations between waterways and railroads, etc.

Even the bitterest opponents of President Roosevelt must accord him full credit—as will future generations—for a policy of broad and far-seeing statesmanship looking toward the regulation, improvement and extension of traffic, and the conservation of our natural assets. His remarkable grasp of the subjects at hand and his energy and persistence in bringing to the attention of the public and Congress, various feasible projects for the accomplishment of his plans, will mark his administration as one in which notable progress has been made in too-long neglected lines.

However, in spite of the "strenuous" efforts of Mr. Roosevelt and the attempts of other public-spirited men to secure "a square deal" for the nation, and although the intelligent citizens of a whole country are calling for the passage of the Appalachian-White mountain forest reserve bill—it seems that Congress, or rather a few petty congressmen, aided and abetted by the czar of the House—are going to allow the measure to be side-tracked for another year. It must be concluded their ability to accomplish this lies in the fact that the majority of members of both Houses are either indifferent just now, or are not thoroughly familiar with the facts regarding our timber supply, and the consequent importance of the bill, so have allowed themselves to be silenced by pretended doubts as to the constitutionality of it—raised by a few demagogues who for personal, or worse reasons, have learned enough about the measure to fight it down for a while at least.

It seems hardly probable that ignorance can be attributed to the congressmen, but indifference may play some part, inasmuch as the great game of national politics is now on in full swing, and they are less interested in analyzing and meeting the needs of the country. So that when J. Cannon gravely shook his head over the legality of the forest bill, and supported the doubts of his rooters down in front—the measure went over to the judiciary committee, in whose none too solicitous care it will probably remain indefinitely. What the speaker's objections to it were, neither he nor anybody else seems to know, but inasmuch as he seems to be for J. Cannon first, last and all the time, they are probably sufficient unto himself.—Hardwood Record.

THE PROFITABLE SAWMILL.

A friend of mine recently requested me to go with him to look over a sawmill plant which had been built some sixteen years ago, but which had been standing idle for the last six years. This gentleman has quite an extensive plant situated right alongside this idle one, and, having a desire to expand, wished to remodel the old mill and make it up-to-date. After we had looked it over and under pretty thoroughly, and had found as much in the underlooking as in the overlooking, which did not commend the proposition to one who has been up against the like before, he asked me what I thought of it. I replied that as an ashpile it would be of much more value to him than as a mill. He rather stared at me, but when I explained that out of an ash pile there might arise a good mill, but out of this old structure, filled with antiquated machinery, he would find that his pleasant dreams of an up-to-date sawmill would vanish into the bitterest of disappointments, he agreed after some little discussion that it would not be just the proper thing to try to convert this plant into the kind of mill he had been thinking of, and, like a wise man, abandoned the idea then and there.

Many a man who might make money out of a good plant, is struggling along with old machinery in an unsuitable building. This is all wrong. The man who makes money to-day is the man who does not allow any one to get ahead of him. If you have to stop and jack up some part of your building occasionally, and line up your shafting and machines six times as often as the other fellow, yet not half as often as you should, you are going to have a pretty hard time to keep him from going on and leaving you behind. It always seems to me a great pity to see modern machinery placed in an old rattle-trap of a building. Take it in the instance of a band mill. If you put modern machinery in a mill where the alignment is changed every time a different wind blows, you are not going to get any satisfaction, even with a good man looking after it; but under such conditions the good man is not often found looking after the machines, for once he knows the conditions—and it does not usually take him long to find them out—he will not stay, and then the machines are subjected to all kinds of abuses by the transient throng which follows. If we would be found anywhere near the head of the procession, give us a modern mill, equipped with modern machines, run by men of modern ideas under modern management.

I heard the statement made by a manufacturer's agent, not many days ago, that in his observations in travelling among mills throughout the country, he had found that more than half the steam plants were not taxed to more than half their capacity. This man represents one of our largest manufacturers of mill-working machinery, as well as steam engines and boilers, and he certainly ought to know what he is talking about; and yet his statement in this regard is just the reverse to what I have found in my travels. It may be that I have just happened to find the mills that he missed, but be this as it may, I have found more mills that could use extra power if they had it than that had power to spare. I will say, however, that I have found many mills lacking power more through lack of modern methods of developing it than from the power plant being light, and it may be that this was also his finding and warranty for making the assertion.

In a sawmill plant where fuel is not considered as an item of expense, it is far better to have 200 or 300 horse-power more than we think we need at the start, than to have that money in the bank. Of course, from the above it will be understood that I am speaking of a plant of from 500 to 1,000 horse-power, for in a plant of 50 or 100 horse-power, 300 of a reserve would be out of all reason; but take a plant of the size first above mentioned, and if you start in without a reserve you will soon find you have not enough, and the longer you run the worse it gets, because we add a machine here and another there, and before we know it we have used up our little surplus, if we had any to use, and quite a lot besides, and as a result we find the whole mill lagging at times. Too much power, where one of the great questions is how to get rid of the by-product, is a mistake made on the right side, but a mistake which is not made as often as it should be, as many have found out to their sorrow.—N.E.

BE UP-TO-DATE.

That a manager of a new furniture factory should for a moment think of leaving a shavings exhaust fan out of his factory equipment, otherwise strictly up-to-date, is rather surprising, to say the least, and yet that was just what a manager with whom I am acquainted, did. I happened at the factory just before it was ready to start, and noting the absence of the fan and piping, asked the manager about it. He said he hadn't ordered a dust and shavings handling outfit because he considered it more of a luxury than a necessity. He, however, showed he wasn't entirely satisfied on this point by asking what I thought about it. I told him I wouldn't work in a factory that hadn't such outfit, and didn't believe any other man who cared for his health would. I then pointed out to him that it would take all of one man's time keeping the place clean, to say nothing of the filth that would accumulate on the machines. He told me such an outfit would cost $1,000, and I pointed out to him that $60, the interest on that sum for one year at 6 per cent., wouldn't go very far towards keeping the place clean. I also pointed out the fact that the fire risk must necessarily be much greater because of dust and shavings everywhere, and that the men would do so much more work in a clean shop as to practically pay for the dust and shavings handling apparatus in a single year. Fans on certain machines—the sander, for instance—were absolutely necessary, anyway, since the men couldn't stand the dust. When I wound up by telling him that a plant minus this part of what should by all means be its equipment, would probably be a losing investment, he became greatly interested, resulting in taking the matter up with his company and the installation of a very complete plant. G. H.

—D. G. Courtney, manufacturer of white oak cooperage, railroad ties and lumber, Charleston, West Virginia, has opened up a distributing yard in Toledo, Ohio, under supervision of W. T. Hubbard, who is well-known in the lumber trade. He does this with a view of being able to make shipments more promptly than direct from the mill; he will also be able to fill orders for mixed cars to better advantage. They will yard a complete stock of poplar, oak, basswood, chestnut, ash, cypress and gum, and make a specialty of pane poplar in most any width or thickness.

Boxes and Cooperage

NEW IDEAS IN THE BOX FACTORY.*

By C. A. Stafford.

As far as I am acquainted with the different factories the short lumber at the present time is all piled in yards by different methods and air-dried; but I think the modern suggestion is: Direct from the sorter to a dry kiln and then to the factory. The short lumber is taken on platform trucks directly from the yard to the surfacers. In transit, however, all stock is weighed and charged to the factory as so many feet, based on the results of frequent tests. This, I think, gives the most correct per cent. of waste, as you have the feetage shipped by scale and also by railroad weight. This can be carried still farther to advantage and the finished stock weighed before loading in cars. This would give us a check against railroad weights and a fair test as to the contents of the car.

The modern factory, if practical, should be on one floor, all shafting in the basement and machines driven from below; or, better still, I think, each machine driven by an individual motor giving the operator positive control of his machine, thereby avoiding many accidents and doing away with the expense of belting, shafting and incidentals.

Stock going first to the surfacers should thereafter be handled as far as possible on conveyors to the saws or different departments. I think on this question of conveyors the box man has been especially slow. There is no other manufacturing business with which I am familiar where this labor-saving device is so little developed. With the proper conveyors our trucking could be reduced to a minimum.

Where handling short to any extent—and I am not sure but in all box factories, regardless of the class of lumber used—the rippers and cut-off saws should be "divorced" and handled entirely separate, and each operator forced to stand on his own record. This plan would permit stock to be carried by movable conveyors from the surfacers direct to the rippers, or, where necessary, to the cut-off saws, where, after being sized, it can go to the matcher and squeezer. If using short lumber I would suggest, directly back of the squeezer, connected by a conveyor, a double cut-off saw, on which could be used two or three saws, where one man can easily trim the output of two or three ripsaws. This gives an absolutely square piece of lumber. From this point a conveyor carries the stock to a horizontal re-saw, printer or nailer.

The dividing or separating of the box factory into departments or sections and systematizing all parts of the business will go far toward increasing our output and thereby decreasing the manufacturing cost per thousand feet. The time has come, with high-priced labor and increasing expenses, that we must look in every direction for this increased capacity.

In the sawmill the one high-priced man, the sawyer, forces the balance of the crew to handle the increased production; but in the box factory we have no one man who can occupy this place. This leads me to the belief that piece work is the coming and necessary system. Were we to analyze the individual work of our rippers and cut-off men I think there is a surprise in store for nearly all of us. We will find that each and every man is of greatly different value, and when they know we are analyzing and comparing their daily productiveness it will lead to greater endeavor.

The question of piece work is perhaps not applicable to all departments, but, with the proper system, it could be applied to nearly every machine in the box factory. I think our association could well afford to appoint a committee to investigate this important question of system and, by comparing the different methods employed by the 150 or 200 factories represented here, they could offer us a general plan, which by slight modification to suit special requirements, would be of value to all of us. This applies more especially, of course, to what we will term the clerical work of the factory; but as we systematize that part it will lead to the correction of many faults in our manufacturing.

To illustrate my meaning, we will suppose a factory built with the surfacers at the front, and the cut-off saws in one department between the surfacers and rip saws, but arranged in such a way that, where advisable, stock can be trucked to either of the cut-off saws or rip saws. In front of the rip saws come the matchers, horizontal resaws, printers, nails, etc., in their proper order. I find in many factories the rippers are paid from $2 to $2.25 per day, and the cut-off men from $1.75 to $2 per day. A ripper can size more than he receives where he is paid by the day, for he is not in a position to force the cut-off man supplying him to greater endeavor, and there are times that he is short of stock. If we planned as above and pay our cut-off men by the thousand feet, according to the lengths and widths cut, and have our saws located so that the stock from two or three cut-off saws could be carried to any one rip saw, we put the ripper in a position of always having surplus stock. By arranging the same system for the ripper and paying him by the thousand feet—cut based on size, all lumber figured surface measure—there is no question that the average operator of any machine who finds his stock piling up on him naturally increases his speed; and if we give him an added incentive of more money or a premium over a certain production it will go far toward reaching a maximum output of our factories.

On the important question of waste we have our past reports and percentages. I think we ought to acknowledge that the question of waste is largely in the hands of our sawmen. If our waste has averaged 20 per cent. for the past year and our lumber is worth $20 per thousand, would it not pay us to make a report to our employees each month as to the waste, and where it has been cut to 12 per cent., or, as some of our friends have reached, a desired point of 10 per cent., we have saved 10 per cent. of our lumber bill. Why not divide a certain per cent. of this saving among the men, through whose efforts we have saved this amount of money?

There is no use in my suggesting any new machinery to you as our friends of that department are very prompt to call our attention to their new devices, but are we not prone to investigate their machines as applicable to our plants as they now stand, instead of considering the new machines as applying to new methods and new systems of manufacturing?

*Read before the Convention of National Association of Box Manufacturers, Cleveland, Ohio, February 26th, 27th and 28th.

IMPERFECTIONS IN VENEER LOGS.

Rotary veneer cutting has its little worries, like any other industry—and sometimes it has its big ones, too. It is the imperfections in timber that make a man operating a veneer machine keep his thinking-cap on, and, as there are no absolutely perfect logs, the thinking apparatus of the veneer man is kept moving along pretty steadily. The operator of a veneer machine has a task that is at the outset similar to that of the sawyer in a sawmill—to work the log to the best advantage and get all the good stock possible out of it—but as soon as the actual work begins the task before the veneer man takes on some of the peculiarities of rotary-cutting. When a sawyer observes a crack in a log he turns it so as to bring that crack either straight up and down on the carriage, or else levels it up horizontally, much depending on the nature of the special work on hand at the time, and thus the fault in the log is kept within comparatively narrow limits. With the veneer man, however, there is no chance to do anything of this kind, for the process of cutting takes in every part of a log's surface, defects and all, at every revolution.

It is obvious, says "Barrel and Box," that when working for large sheets of veneer there is more waste from cracks and faults than when working for narrow stuff, especially as far as the sheets themselves are concerned. There is the opportunity left to make into smaller dimensions such matter as the defects spoil for the larger ones, but that involves more or less expense, and frequently it is more, but it is the larger sheets that are in the mind of the operator for the time being. Let us assume for example, that after the block is rounded up and the cutting fairly started, that one revolution of the log will produce a sheet that will trim and make two of the size on the order. We can also assume that just at this point the block is free from serious faults, that the crack has not extended near the outside. It will be plain sailing in this case till the crack shows up, and then it takes some thinking—thinking which involves the manner in which the veneer is handled after it leaves the machine.

If the veneer goes directly onto an endless-bed table, where it is piled up to several inches thick and is then cut out to dimensions, the problem involved when a crack develops under the above conditions is that of so placing these short lengths that they will make stock instead of waste. When the log was larger it would make two sheets of stock from one revolution, but it has been growing smaller at every revolution, and by the time the crack is tapped it is too small to make the two pieces. Then suppose that a sheet is so placed in the pile on the table that in cutting out at the clipper it will be cut near the centre; the result is nothing but two pieces of waste, at least so far as the work in hand is concerned, where at least one good piece might have been secured if it had been properly placed. Still, the proper placing of stock of this kind may at times so hamper the operations of the veneer machine that the time lost is of more value than the piece of veneer, and it is just as important for the operator to keep this in mind as it is to try and reduce the waste pile, for profit is the goal in business.

In some factories they get around the matter of hampering the operations of the veneer machine by loading all stock on trucks and taking it entirely away from the rotary cutting machine to do the clipping, and in working fine wood—where the value of the timber is the important item—it is frequently, one might say generally, necessary to do this, but the making of fine veneer is a special industry, and the present discourse has to do especially with the making of plain veneer from the cheaper woods of to-day, and in work of this kind, especially where the stock cut is thin, it simplifies matters wonderfully to be able to draw it out on a table direct from the machine. It is quite common, too, in this work for the machine crew to cut up blocks enough to make a "table full," and then let the rotary stand while they gather up the odds and ends that were obtained in rounding up, etc., place them properly on the table, ripping out the faulty spots, and reduce it to dimensions on the clipper. There is a way to avoid this, though, when it is desired to keep the rotary moving steadily, by having a "clipper crew" and providing two lengths of endless table. Of course, in this case there is no clipper on the first length, it being used merely to pile on as the stock comes from the machine. As soon as a pile accumulates on the first table of the required size for clipping out to the best advantage, this table is put in motion—it may be either by hand or by power appliance—and the whole pile is shifted to the other table, which stands at the end as if it were a continuation of the first table. By this arrangement the cutting crew works continuously filling the one table as the other is being emptied.

But the veneer man's troubles do not end with the question of cracks in the sheet, not by a whole lot. About the time a crack gets well acquainted with the knife of the machine off will come a few innocent-looking splinters, and the tenacity with which a splinter can cling to the edge of a knife is demonstrated then and there, and the section of knife embraced by these splinters immediately goes out of business for the time being—until the splinters are removed. Did you ever stop and study about what would likely happen with a block revolving and a knife-carriage being fed to it with a rigid power feed if something should suddenly block the cutting qualities of a section of the knife? The carriage moves on—there is no stopping it unless something breaks or the feed is thrown off, the other portion of the knife cuts, and that which is hampered with splinters simply gets up an enormous pressure as it keeps squeezing back the wood it cannot cut. Of course, if the veneer man did not keep an eye out for such things as this something would happen pretty soon after the conditions outlined developed, and then the veneer man and the office would have an unpleasant half-hour together. The amount of energy expended in punching at splinters with a strip and in backing out and cleaning splinters off the knife in the industry would operate the biggest machine built, and it is pleasant to note that the machinery men are now striving to so build machines as to save some of this work and worry.

Nor are splinters the only thing, for there are hard, curly places and knots of all sizes and degrees of hardness. Sometimes a hard lump in a block will cause the knife to shy a little, strain back and cut the stock a little thin, and maybe on the next round the knife will hook under the hard place at the start and cut a little thick. Frequently this would not be a matter for the veneer man to worry over, and again it might. If the stock should be for the glue-room, where it is to be made into built-up lumber and faced with fine veneer, there is a chance for trouble. This fine veneer facing is usually very thin, and some time in the process of converting the built-up wood into a finished article it will be put into machines for finishing and polishing, and wherever there is too much unevenness in the stock the entire facing of fine veneer will be cut away before the whole surface is finished. This means that the stock is spoiled after it reaches the stage where it is most valuable. The veneer man may not be there at the time, but the chances are that the information will get around to him, and that he will be "jacked up" about it.

The little, hard knot, that is not much in point of size, but has a degree of hardness that no amount of boiling will touch, makes trouble, too. It may be only a little nick that it breaks out of the knife edge, but that nick leaves its mark on the veneer, and that makes trouble. Then, to get rid of that nick, no matter what the size, involves grinding the full length of the knife till it disappears, and that costs money, as well as time, for those long knives that make up the business end of a rotary-cutting veneer machine are expensive articles. With all its worries, however, the veneer industry is a great and a growing one, and it really has no more troubles than any other industry, but they are of a somewhat peculiar character. By-and-by, when those in the industry get more accustomed to the peculiarities of these troubles, they will get simpler, and the task of operating a veneer machine will not present the obstacles to the ordinary mechanic that it does to-day. The industry is now at a stage where we might compare the expert veneer men to the expert sawyers in the early days of big sawmills, and, like in the sawmill industry, knowledge of how to master the difficulties will spread and their peculiarities will disappear.

REQUIREMENTS OF A VENEER PLANT.

One is sometimes asked by those contemplating the establishment of a plant to manufacture box shooks, crate slats, etc., what machinery is required. Such an enquiry is answered in "Veneers" in the following fashion. It should be understood that there is quite a difference existing between a veneer mill and one for cutting up box shooks. There is some sawed veneer made into box shooks, but the majority of veneer sawing is done in making fine quartered oak veneer, and it is very tedious, expensive work, requiring the finest kind of adjustment, and a veneer sawing mill is not convertible to any other use. The cheapest way to make veneer for thin box shooks and for crate slats, is to make it on a rotary veneer cutting machine, and the equipment required in a plant operating one veneer machine of this kind depends somewhat on the kind of work you want to do. In making veneer, pure and simple, it requires in the way of machinery a drag-saw to cut the logs into block lengths, a veneer machine, a veneer clipper, and, if you expect to dry your veneer artificially, a veneer dryer. To this may be added rip saws and cross-cuts for saw-sizing veneer; even if the majority of the box shooks are cut to proper size at the machine and the clipper, these are useful, because some of the waste can be worked over on the rip saws and cross-cut saws into other sizes. It is quite a common practice to include with a veneer plant a sawmill of some kind. Some use short-log mills, and some use one kind and some another, depending on the amount of work they expect to do with the sawmill end, and by having a small sawmill and rip saws and cross-cuts, you can, in addition to making veneer with such a plant, manufacture small dimension stock out of the cores from the veneer machine, and make lumber, too, if it is desired. This will probably be the cheapest and best equipment in the way of a veneer plant for making box shooks, crate slats, etc.; that is, have a rotary veneer machine, drag-saw, clipper, cross-cut and rip saws, and a small sawmill rig for working up material that doesn't work well in the veneer machine, thus converting the cores into strips of small dimension. Of course, a power plant equipment sufficient to drive the machinery is understood to be installed.

THE CANADIAN COOPERAGE INDUSTRY.

By James Innes.

Next to trapping and fishing, the cooperage industry is probably the oldest trade on the continent of America. Newfoundland is undoubtedly the cradle of the industry, as when the hardy Scotchmen and Frenchmen came there to gather in the harvest of the seas they had to have receptacles to hold their pickled herrings and salted codfish, and naturally used the packages they were accustomed to at home, the barrel. Barrels are still the principle packages used there for herrings for export, for seal oil, cod liver oil, pickling codfish, and tubs of every description for handling the green fish and shipping the dry fish.

While Chatham, Ont., can hardly claim to have had the first cooperage stock manufacturing mill, Iroquois probably having this honor, there is no doubt that Chatham was the first centre for manufacturing staves, hoops and heading by machinery on a large scale, and for thirty years has held this supremacy. Forty years ago it was also the largest market for oak staves. Old residents tell me that forty to fifty years ago McGregor's Creek at Chatham every spring was full of butt, pipe and hogshead staves, vessels being loaded there for Quebec, and in some cases going through to Great Britain. While oak staves are no longer manufactured to any extent in Canada, the oak being almost a thing of the past, the names, commercially, still linger, and Canada butts and Quebec pipe staves are still going forward from the Southern States to all parts of the world.

Twenty years ago there were more slack barrel staves made in Canada than the United States, nearly every station on the Michigan Central Railway from Essex to St. Thomas, from St. Thomas to Courtright, and on the Grand Trunk from Windsor to London, London to Sarnia, Sarnia to St. Mary's, having its stave mill. Dozens of these mills are now out of existence. Fifteen or twenty years ago a stave dealer would have no trouble to purchase fifty million staves in a few days; now it would be quite as difficult to purchase five. While at least 100,000,000 of staves at that time were yearly exported to the United States, now 10,000,000 is a good year's export. The consumption in Canada has, of course, increased; in fact, Canada in an ordinary year can use 90 per cent. of the output of staves, hoops and heading manufactured in the country.

Elm—the principal timber for slack staves and hoops, is fast disappearing; basswood, for heading, is almost a thing of the past, so that it is only a question of a short time when hardwood staves and heading, half-round or iron hoops will go to make the barrels of all kinds not requiring to hold liquids, while we will have to continue importing our oak staves from the United States. Unless the Government takes up the reforesting movement energetically and grows the timber necessary, fifty years from now we will have no timber to make cooperage stock, and a barrel will be a museum curiosity, instead of the most universally used, handiest and best package on earth for carrying liquids without leaking and solids without contamination.

UTILIZING THE REFUSE.

Sawdust shavings in the box factory are gold dust. They have got actual value, and, if you do not save them, you have got something yet to learn in the box business. I will cite an instance of this. In the upper peninsula of Michigan, in the 90's, I built a box factory. I did not know much about the box business, but I did know something about engines and boilers, and I had a hobby in my head that I would not operate a plant unless I had a Corliss engine. I put one in. There were a lot of wise old sawmill men about the town, and there were at that time about ten or a dozen burners burning up the refuse, and they all quoted the old proverb about the fool and his money, and told me I had better go to work and buy a second-hand engine and go to burning up those shavings; that they would be in my way anyway, if I did save them—and such was the fact. I gave them to the farmers and to the livery stables and begged people to come and haul them away. Then, I hired a team and had them hauled to a wet place behind the building, and dumped them there until the insurance people came to me and said I was creating a fire hazard, and I saw I was getting in trouble. But I began to look around, and I found a market for fuel shavings; I found a market for clean resaw dust in carload lots and sold them—and I didn't take them to the city, either. So that at the expiration of three years my fuel account showed a net profit that offset the total cost of the Corliss engine and all the equipments that I had to buy to utilize my waste. If you really want to do it, you can find a way to utilize that waste.—Z.

THE ARGUMENT FOR BARRELS.

One of the strongest arguments for the use of the barrel, and a justification as well of all that has been said against packing flour in sacks, is the following from the "Northwestern Miller":—

Says an Indiana miller:—

"We manufacture soft winter wheat flour, and handle spring wheat for bakers' trade. The last part of a car we sold, which was stored in our warehouse, was damaged by rats. Many of the sacks were torn, and some of them were tunnelled. The writer examined the flour carefully, and found some unfit for use, while the most of it looked all right.

"We sold the good of this to a baker. He made several bakings of bread, and it appears that the third baking was complained of. On receiving the complaints they examined the fourth baking, still in the shop, and found occasional rat filth; also its presence in some of the bread called in from selling points. The baker knows to a certainty of three or four families who, having had the foul bread, have not patronized him since. He asks for a 'fair settlement.' We grant his right to one, and offered to cancel the invoice. He asks 'damages' instead, to more than the value of his shop."

This case was submitted to William Furst, a Minneapolis attorney, who gives special attention to milling litigation, and he replied:—

"If the purchaser examined the flour before purchasing, or had an opportunity to do so and no fraud was used, he cannot be heard to complain as to any defects.

"In order that a man may have a legal claim for damages, by reason of a defect in an article sold to him, two facts must exist. In the first place, deception must be used in the sale, and in the second place, the purchaser must have relied on the deceptive representations.

"In this case, neither of these elements is apparent, if the letter is read correctly. The miller should not have granted the baker's right to a settlement. The baker has no such right.

"We take it from our experience in such cases, that the buyer thought he had a chance to get some flour cheap, and after an inspection, he bought it, but it proved to be much inferior to what he thought it was. That is his lookout."

The "Northwestern Miller" prints the above under the heading, "No Recourse." We do not doubt for a moment that the lawyer to whom the matter was referred understands the law. We believe, however, that the purchaser of the filthy flour has a recourse, and one which he should take for philanthropic as well as for selfish reasons, and that is, to insist that his flour come to him in the good old-fashioned packages which is by nature intended for flour—the barrel of our daddies. Nobody should ever buy flour in bags if he can afford to buy a barrel of flour at a time. The best housekeepers everywhere are learning this. Grocers and other dealers should take the fact to heart that the barrel is the only practical sanitary package for the staple food product, and they should tell their customers so. It is the right thing to do, and it pays.

GOOD CEMENT FOR WOODTURNERS.

(1) Mix and melt together: One part of resin; 1 part of potash; 2 parts of beeswax, and brickdust to make of the desired consistence.

(2) Mix equal weights of resin, pitch, whiting, and yellow wax.

(3) Use 8 parts of resin and 1 part of wax.

(4) Melt together 4 parts of resin and 1 part of pitch, then add enough brickdust to make the melted mass hard when a little is dropped on a stone. This will hold wood in the chuck, and is easy of removal by a smart tap with the hammer. An application of benzine will remove all trace of the cement from the wood. To use the cement, take sufficient of it to cover the chuck one-sixteenth of an inch. Lay it over the surface to be cemented, mixing it with one-eighth of an inch of its bulk of guttapercha cut up in thin slices, then heat an iron to a dull red heat, and hold it over the chuck until the mixture and guttapercha are mixed, stir the mixture until it is well mixed, chuck the work, lay on a weight to keep it in contact, and in twenty minutes it will be perfectly cemented.

—The "National Coopers' Journal," Philadelphia, Pa., gives the "Canadian Woodworker" some very nice compliments on its typography, general make-up, etc. It, however, criticizes a statement in an article on the "Slack Barrel" in our April issue to the effect that "if only 25 per cent. of the volume of the log was utilized for slack heading, as stated by the 'Canadian Woodworker,' we fear the manufacturers would soon go to the bow-wows." We may say that this estimate was derived from a circular issued by the Forest Service of the United States Department of Agriculture. We may also add, for the information of our esteemed contemporary, that in this country the bulk of the straight grade timber is put into lumber and only the balance put into heading.

—Somehow the substitutes for wooden packing-boxes have not materialized to any appreciable extent, probably because the wooden box is still the best obtainable, and cheap enough.

Machinery and Mill Equipment

RUNNING BELTS SLACK.

Some do not realize the real import ot the practice of running slack belts. Now I very much doubt if many cases occur where belts are run slack for a fad, as it is sometimes called. There is a big operative economy in this practice, as I have had some experience in knowing.

Why does any man run belts tight? Simply to overcome loss of power from slipping—to get power to run the machines. But to get this power the extra load of tightening strain must also be carried by the belt in question, other belts which drive this one, and, last, the engine. The usual rule of practice puts this tightening strain at 65 pounds per inch of width for single belts and 85 pounds for double belts. So a single 6-inch belt has not only its shop load to carry, but almost 400 pounds of tension as well. A 12-inch double belt would have over 1,000 pounds of this extra load, and the engine has to carry the sum of all this on every belt in the mill. It's like putting a big stone on a horse's back and then trying to drive him to work.

This tension is the largest part of what is known as the "friction load" of a mill, and is a most important element in the operative expenses of a mill. All these tight belts mean high friction in bearings, requiring a large amount of lubrication to overcome; they often mean hot boxes, and they constantly mean work on belts, breaking of lacings or the belt itself, stoppages (often during busy hours) to take up belts, shafting pulled out of line, and always short-lived belts. Every man of practical mill experience knows these troubles, and they are bound to follow in the train of tight belts.

The writer knows of a long series of trials which some of the largest cotton mills of New England have been making with a prominent oil company to cut down their friction load by more perfect lubrication. I have seen a number of the reports, and they have succeeded in reducing it from 12 to 20 per cent. They realize what a constant expense it is. An eminent mill engineer is quoted as saying that the power necessary to turn the shafting alone in eight of the best New England mills varied from 22 to 39 per cent. of their engine power. These were the best mills, not the worst. Machine shop friction load runs higher; woodworking plants average high, also. This friction load is a clear loss and tight belts form its largest element.

It is all put up with simply because it has been necessary to keep belts tight to overcome slipping. Now, if any man finds something which will overcome slipping, and not injure his belts in the doing, I look upon that man as very much in the advance, and his slack belts are not a fad, but an indication that he is not using up a third of his power between his engine and his machines; and, furthermore, every practical engineer knows that the more contact a belt has on a pulley the more power that belt can transmit. If you decrease the point of contact to, say, one-eighth of the pulley circumference, you wouldn't get much power. So, if you increase it, by the wrap which a slack running belt has, to two-thirds the circumference of the pulley, you are bound to get more power from that drive. D.

LOOSE PULLEY.

We have a shavings exhauster driven by a cast iron pulley on a countershaft. The pulley was babbitted on the counter and is held in place by two setscrews. Some time since this pulley worked loose and twisted around on shaft, scoring shaft badly. I loosened the setscrews, but couldn't move the pulley one particle, though it had moved 1½ inches out of line of fan. With a rope I tied the pulley to the hangers, and, with a pipe wrench and pipe-extension handle, turned the shaft back in the pulley. It required two men to turn the shaft, but it finally turned. I drove hardwood wedges between the driving and driven pulleys to prevent the pulley moving back again, nailing the wedges to the driven pulley. Had there not been another pulley close to the cast iron one, we should have had to take down the entire shaft and rebushed the pulley. The best way to do, when the bore of pulley is larger than shaft, is to use a cast iron bushing to fit bore and keyed on shaft, or buy a new pulley or larger shaft. No more babbit or setscrews for me. W. W.

PATCHING BAND SAWS.

I have been patching centre cracks successfully for a number of years in this manner: Place the saw on hammering bench and overhead brackets, put a block four inches thick under saw at the crack, and apply two clamps on each side, bending the saw as in dressing a braze. Now file across the crack perfectly level until almost through the blade. I always leave the place filed off about ⅝-inch wide, which can be regulated by bending the saw and filing until almost through. File square to end of crack, then bevel back ⅛-inch, take out block and level saw, and there is a perfect groove almost through the blade. Now take a strip of saw blade one gauge thicker for patch, and file or grind it to fit the groove and braze. If a little care is taken in dressing down there will be a patch that will be hard to find. I have used this method successfully for a number of years for centre and edge cracks, and prefer it to any patch machine I ever saw. I think the objection some filers have to patching a crack is caused by a lack of proper care in applying the patch or the manner of holding it. For an edge crack I always make the patch long enough to bend to one side and apply clamp, which will hold it perfectly solid; for a centre crack I press the patch firmly in the groove and hold it there with a thin strip of pine wood held by clamp. As soon as the irons are applied the wood will burn up and cause no inconvenience. J. W.

—Man is a tool-using animal. He can use tools, can devise tools; with these, granite mountains melt into light dust before him; he kneads iron as if it were soft paste; seas are his smooth highway, winds and fire his unwearying steeds. Nowhere do you find him without tools; without tools he is nothing, with tools he is all.—Thomas Carlyle.

Woodworking News from all Canada

Readers of the "Canadian Woodworker" are cordially invited to forward to the Editor items of interest to the trade, particularly those relating to the erection or extension of woodworking establishments.

Arthur Sewell is erecting a sawmill at Gibson, N.B.

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M. W. White and Co. will erect a mill at Beaver Cove this year.

* * * *

The Cooke Lumber Co. will erect a sawmill at Nelson, B.C.

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The sawmills of McLachlin Bros. at Arnprior are now running full blast.

* * * *

The Imperial Furniture Co.'s factory at Hull, Que., has been burned down.

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C. J. Moore, Victoria, B.C., will erect a sawmill at Prince Rupert.

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The Danville, Que., Lumber Company's sawmill has been burned down. Loss, $25,000.

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Brown, McMillan & Calder will erect a sash and door factory at Welland, Ont.

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The Wm. Scott Lumber Co.'s sawmill, near Fredericton, N.B., was destroyed by fire.

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Tilton & Raymond's steam shingle mill at Smith's Mills, Que., was totally destroyed by fire.

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James Hamilton, the well-known carriage wheel manufacturer, Lindsay, died suddenly of heart trouble.

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Loftus Bros. are putting up a plant near Boundary Falls, B.C., for the manufacture of fruit boxes.

* * * *

The sawmill of F. D. Sadlier, Rowena, N.B., was destroyed by fire at a loss of $5,000.

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Christie Hughes, an employee of the Shawville sawmill, had a couple of fingers badly cut while operating a saw.

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W. T. Farrell is removing his large sawmill from False Creek, near Vancouver, to the Capilano River, B.C.

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Taylor & Jamieson will rebuild their sawmill at Scotstown, Que., on an extended scale.

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The Renous Bridge Lumber Co.'s sawmill at Millerton, N.B., has started operations again.

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The Kettle River Lumber Co. have put up a box mill at Grand Forks, B.C., for the manufacture of fruit boxes.

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The Canadian Cooperage Co., of Galetta, Ont., have started up their stave mill at Galetta and their hoop plant at Sand Point.

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The North American Land and Lumber Co., Dubuque, Iowa, operating the Cedar Valley mill, Fernie, B.C., will enlarge their plant.

J. D. Sinclair has sold his sawmill plant and timber limits, including water rights, etc., at Roy, B.C., to Davidson, Ward & Co., Seattle, Wash.

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D. McKackon's entire planing and stave mill at Highgate, Ont., has been destroyed by fire. Loss, about $10,000; insured for $4,000.

* * * *

Dumas & Grughel Bros., of Eganville, have purchased the sash and door factory there, and are making some extensive improvements to the factory.

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Geo. Tennant has purchased the Bracebridge, Ont., Furniture Co.'s factory, and will convert it into a sawmill and woodworking factory.

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The large sawmill at Bathurst, N.B., belonging to the Bathurst Lumber Co., was destroyed by fire, including a quantity of new machinery.

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The Eastern British Columbia Lumber Co., Ltd., Fernie, B.C., is making extensions to the plant and completely overhauling the mill.

* * * *

A. Cushing & Co.'s lumber mill business a Moncton, N.B., is being turned into a joint stock company with a capital of $350,000.

* * * *

The Fraser River Sawmills, Millside, B.C., are being fitted with a new steel refuse burner, made by the Vancouver Engineering Works, Limited.

* * * *

The timber limits, sawmill, etc., of the East Templeton Lumber Co., Limited, East Templeton, Que., will be sold by public auction at Ottawa on September 15th next.

* * * *

Robert Watt, Toronto, will erect a planing mill and factory at the corner of Campbell Avenue and Tennyson Avenue, Toronto, and establish a general lumber business

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The Selkirk Saw and Planing Mill, Warsaw, Ont., began operations for the first time on the 12th inst. The planing department will start up in a few days.

* * * *

The Foley & Gardiner Manufacturing Co. have leased a factory on Orillia Street, Toronto, for the manufacture of meat and bandsaw filing and jointing machines.

* * * *

The Vancouver Sash and Door Factory has secured a site from the C.P.R. for the erection of a new plant, and plans for the building are now being prepared.

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An appeal was made to the High Court, Toronto, to have the sale of the Cornwall Furniture Co.'s factory and plant to M. F. Beach declared irregular. The appeal was made on behalf of some of the shareholders of the Company. Settlement re the lien of the Bank of Montreal on the stock of the Company for $10,000 was deferred until a later date.

The factory, site, buildings and water power privileges of the Canada Cabinet Co., Limited, Gananoque, Ont., will be disposed of by public auction this month, the Company being in liquidation.

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Efforts are being made to establish lodges of the Brotherhood of Lumbermen at different points in the Ottawa Valley, particularly where large sawmills are located. The headquarters of the Brotherhood are at Pembroke.

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J. C. Seaman, of Wiarton, Ont., is negotiating for the purchase of the Collingwood, Ont., Furniture Co.'s plant, that concern having gone into liquidation some months ago. He would begin operations at once.

* * * *

J. & D. Harquail's lumber mill at Campbellton, N.B., has been totally destroyed by fire along with several houses filled with lumber and large piles of sawn lumber. One hundred men are thrown out of employment. The insurance amounts to $34,400.

* * * *

The Pigeon River (B.C.) Saw Mills are now again in operation after a shutdown of some months. A large amount of new machinery has been installed and all of the machinery been overhauled and made as efficient as new, increasing the capacity of the plant from 200,000 to 225,000 feet.

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The Canadian Manufacturers' Association has received an enquiry for collapsible furniture and canoes for the export trade on the West African coast. The enquirer is Henry G. Halin, 19 Pelzerstrasse, Hamburg, Germany.

* * * *

William Henderson, employed in the Canada Furniture Co.'s factory at Seaforth, Ont., was carrying a board in the factory, when one end of it caught in a belt, causing the other end to strike him violently in the face, giving him a bad cut across the cheek.

* * * *

Albert Hindle, eighteen years of age, employed in Curran Bros.' portable sawmill at Singhampton, Ont., undertook to free a saw which had jammed in a big log. The saw started and Hindle's right arm was almost severed from the body, a couple of ribs were cut through, and the skull cut into by the saw.

* * * *

W. A. Caton is organizing in Danville, P.Q., a company called the Danville Furniture Co., with an authorized capital of $100,000. The citizens of that place will shortly vote on a by-law to loan the Company $25,000. The factory is to be in operation within twelve months, and must employ at least twenty-five hands within a year and seventy-five after the third year.

* * * *

M. J. Scanlon, of the Scanlon-Brooks Lumber Co., Minneapolis, the largest individual lumber operator in the United States next to Weyerhauser, has closed a deal in Vancouver for the purchase of forty-seven limits in the Harrison Lake district. He is paying $520,000 for the timber. Next year he will construct two mills, one at Harrison and one at Vancouver, to jointly cut 350,000 feet of lumber per day, and to cost $750,000 for the plants.

* * * *

We regret to hear of the accident to Robert MacGregor, senior member of the well-known machinery manufacturing firm of MacGregor, Gourlay Co, Limited, Galt, Ont. Mr. MacGregor, in company with Hon. James Young, was driving to a funeral when the horse shied at a load of hay, throwing Mr. MacGregor out. He alighted rather heavily, and struck his head against a tree. At last reports the patient was resting easily, and it is hoped his recovery will be soon.

* * * *

D. Van Wagener, of London, Eng., and J. G. Fitch, of Los Angeles, Cal., have completed a timber deal involving 250,000,000 feet of lumber, comprising cedar, fir, hemlock and spruce, on a site four miles from Vancouver, B.C., being on Manquim Creek, on the Squamish Valley, and will build three large mills. One of the sellers is J. McShane, of Vancouver. The new plant will be erected on the limit, and the raw lumber will be conveyed in flumes. Trade will be opened up with the Orient and Australia, and the cyprus cut will be shipped direct to California.

NEW COMPANIES.

Vancouver Island Logging and Mill Co., Limited.—Capital, $10,000.

Victoria Tie and Timber Co., Limited, Victoria, B.C.—Capital, $10,000.

Lippert Furniture Co., Limited, Berlin, Ont.—Capital, $100,000. G. F. Lippert, Berlin.

Valley Timber Company, Limited, Vancouver, B.C.—Capital, $25,000. G. F. Gibson.

Western Lumber Co., Limited, Fernie, B.C.—Capital, $50,000. R. W. Wood.

Watkins Logging and General Contract Co., Limited, Vancouver, B.C.—Capital, $100,000.

Terminal Lumber and Shingle Co., Limited, Vancouver, B.C.—Capital, $100,000. T. F. Paterson.

Wilson Logging and Timber Co., Limited.—Capital, $50,000. P. A. Wilson, 45 Davis Chambers, Vancouver, B.C.

River Valley Lumber Co., Limited, Oronocto, N.B.—Capital, $24,000. Robt. B. Smith, Central Blissville, N.B.

Pennsylvania Lumber and Mineral Co., Limited, Toronto, Ont.—Capital, $100,000. J. F. Ancona, of Reading, Penn.

Malcolm Lumber Co., Limited, Vancouver.—Capital, $500,000. To carry on a sawmill and deal in wood of all kinds

Sanderson Moore Lumber Co., Limited, Vancouver, B.C.—To carry on a lumber and woodworking business. Capital, $100,000.

Hurdman Lumber Co., Limited, Ottawa.—Capital, $20,000. To carry on a lumber business, make furniture, etc. G. J. Hurdman, Ottawa.

W. T. Glover Manufacturing Co., Limited, Burlington, Ont.—Capital, $20,000. To make baskets, boxes, crates, barrels and veneer. E. W. Lewis of Burlington, and W. T. Glover, of Nelson, Ont.

Westholme Lumber Co., Limited.—Capital, $25,000. To take over the lumber manufacturing business of Frank Lloyd, Westholme, Vancouver. Chas. D. McNab, of Cranbrook, B.C.

Holton Lumber Co., Limited, Belleville, Ont.—Capital, $40,000. To manufacture and deal in builders' materials, boxes, sash, doors, windows, etc. Sir Mackenzie Bowell and G. H. Holton, of Belleville.

Scotland Box and Manufacturing Co., Limited, Oakland, Ont.—Capital, $40,000. To make crates, caskets, boxes, hay-racks, washing machinery, wheelbarrows, etc. J. E. Elliott and W. E Stuart, Oakland, Ont.

CEDAR FOR LEAD PENCILS.

Red cedar has a soft, straight grain, and when grown under best conditions is very free from defects. Because of its peculiar qualities no equally good substitute for it has ever been found, and it is doubtful if any other wood-using industry is so dependent upon a single species as the pencil industry is dependent upon red cedar. In fact, red cedar suitable for pencil manufacture is the only wood the price of which is always quoted by the pound.

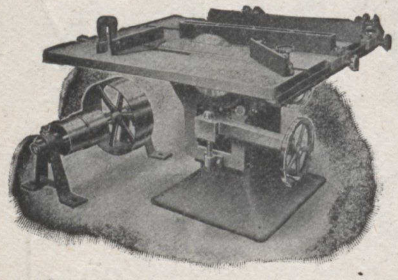
The lead pencil is one of the most common articles in everyday use, and nearly 320,000,000 pencils are manufactured in the United States every year. To manufacture these millions of pencils there are required 110,000 tons, or 7,300,000 cubic feet of wood, so that each day in the year 300 tons, or 20,000 cubic feet of wood are used for pencils. Since practically all of the wood is red cedar, and since the pencil industry is steadily growing, the supply of red cedar is greatly depleted; yet no substitute has been found for it. Leaving out of consideration the imported pencils, the average educated American over ten years of age uses six pencils of home manufacture each year. Ten years ago he used less than five.

Strange as it may seem, no steps have heretofore been taken to provide for a future supply of red cedar. This has been largely due to a lack of information on the rate of growth and the habits of the tree, and to the widespread belief that second-growth red cedar never reaches merchantable size.

In accordance with its policy toward the conservation and economic use of commercial woods the Forest Service has made a careful study of red cedar, and has come to the conclusion that it can profitably be grown in regions of its development. Several changes are recommended in present forest management in order to secure the desired growth. In the Southern forests the cedar will have to be given a better chance instead of being considered, as now, a negligible quantity in its younger stages, and many of the forest-grown trees which are now cut for fence posts can profitably be left to attain their full development, and thus become available for pencil wood.

ADVERTISERS' INDEX

DEFIANCE LINE OF WOOD WORKING MACHINERY



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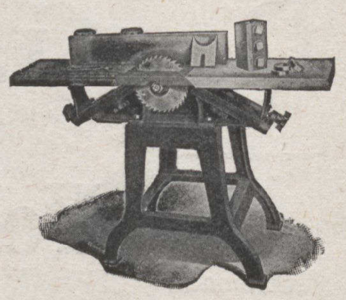

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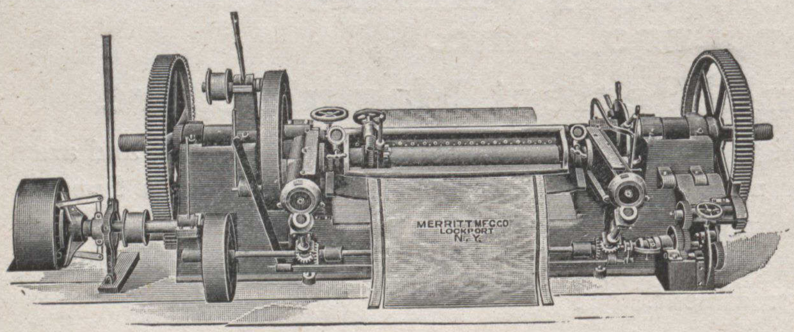

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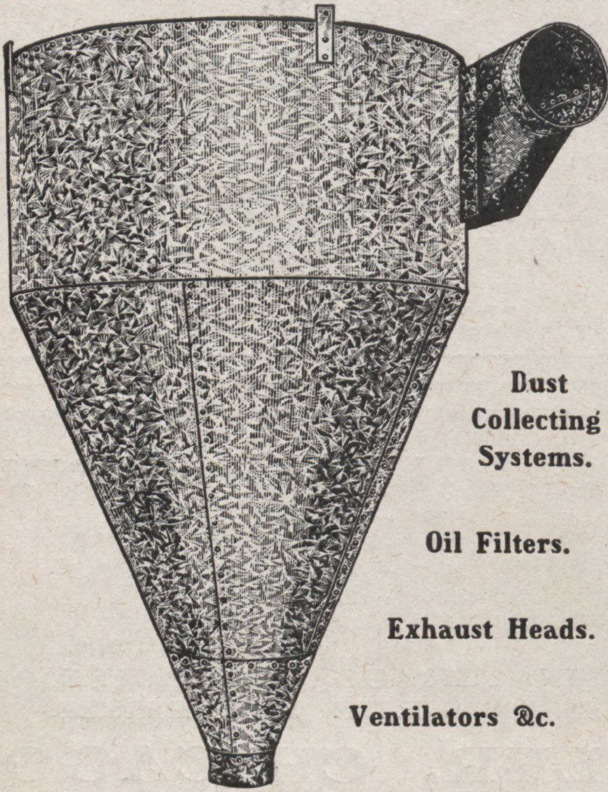

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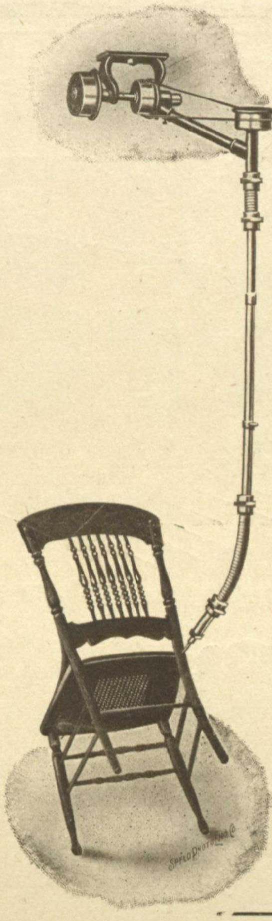

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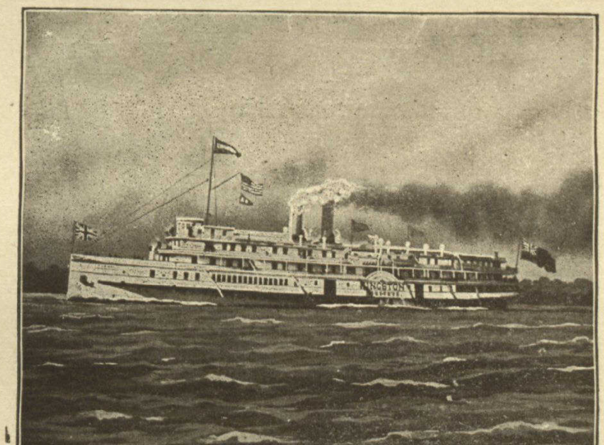

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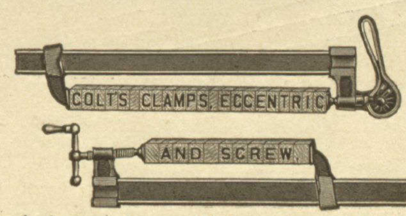

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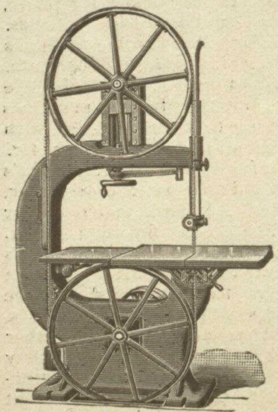

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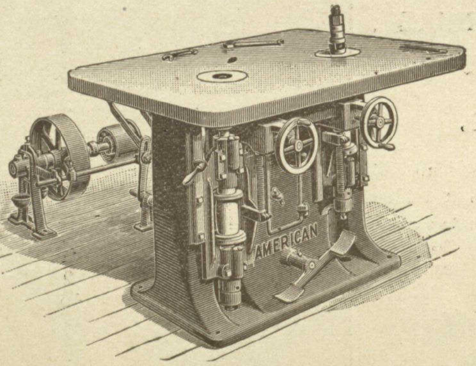

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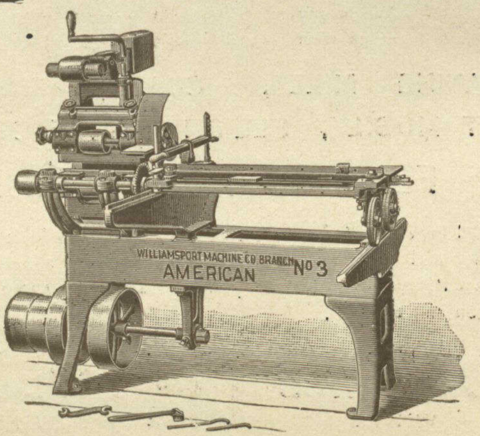

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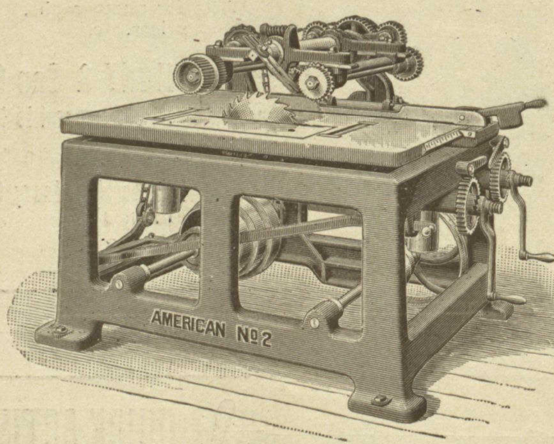

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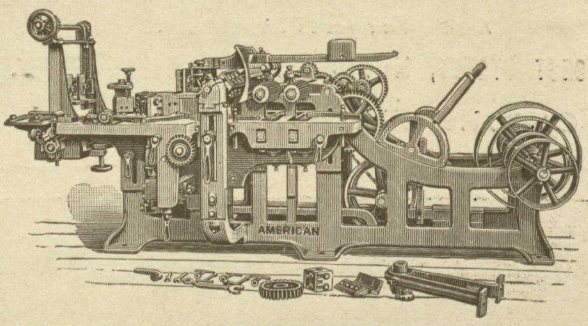

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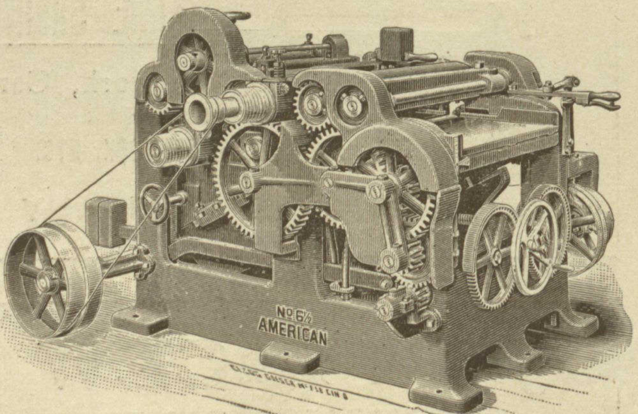

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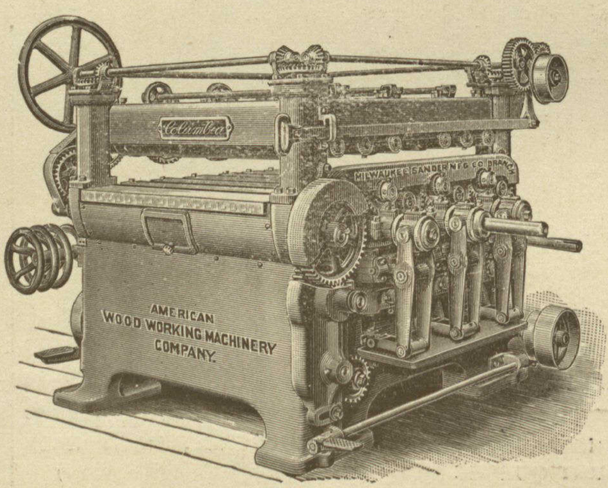

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