CANADIAN WOODWORKER

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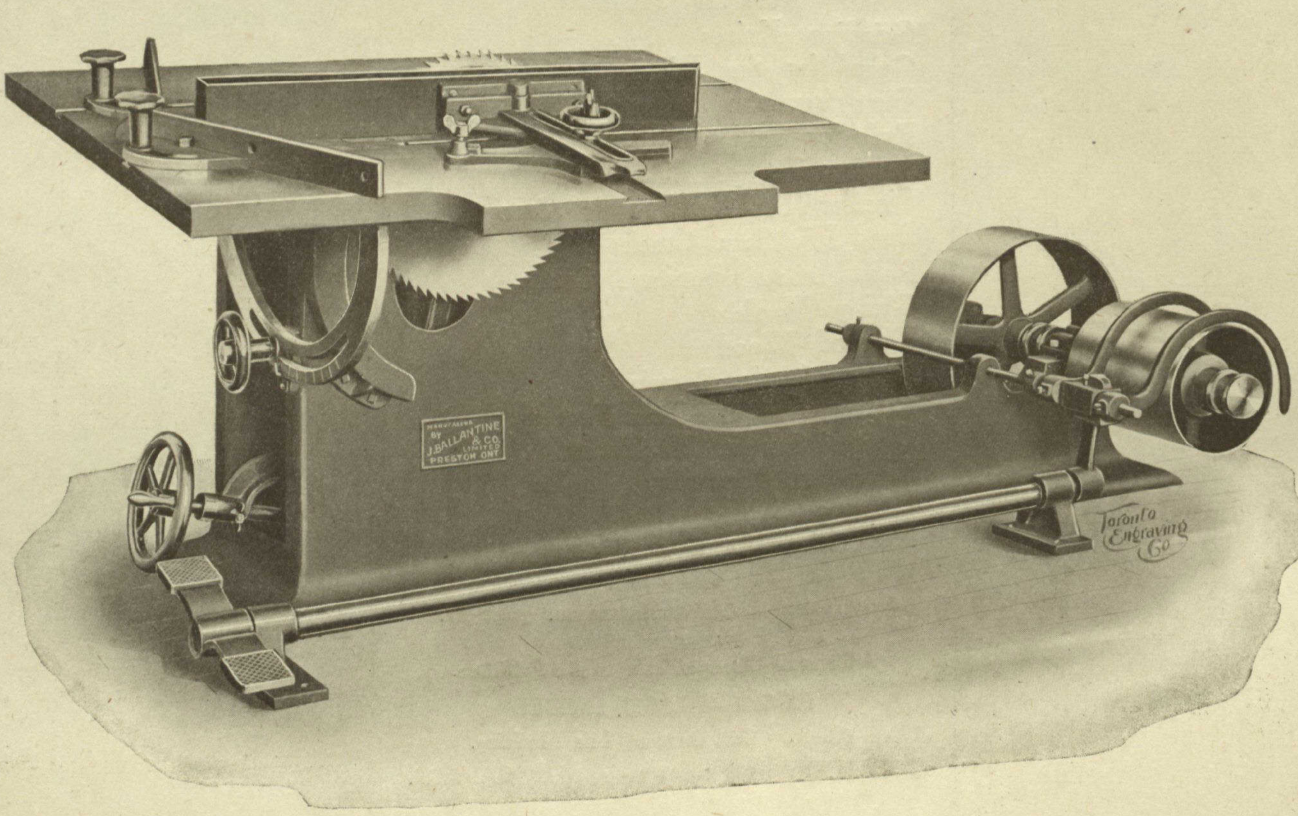

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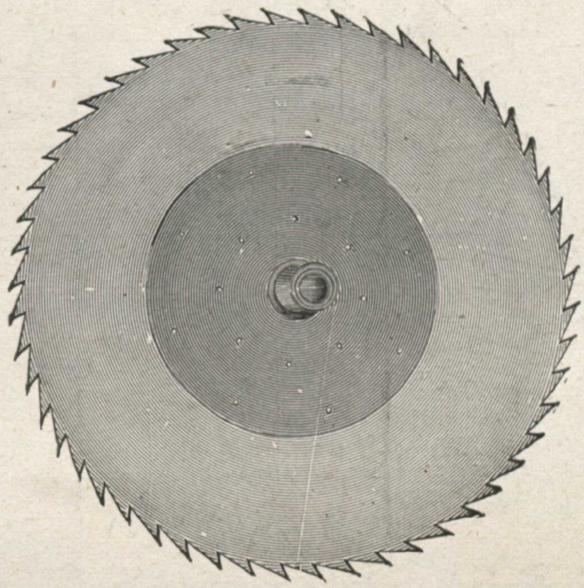

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Canadian Woodworker

A MONTHLY JOURNAL
FOR ALL CLASSES OF WOODWORKERS

Vol. 1 TORONTO, NOVEMBER, 1908 No. 9

CANADIAN WOODWORKER

A Monthly Journal for all classes of Woodworkers.

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When changing their Post Office address subscribers will oblige by notifying the publishers.

VENEER MILLS IN CANADA.

In last issue we referred to the seeming incongruity of Canada, the greatest wood-producing country on earth, importing furniture and woodenware goods from other places. It is a curious fact that the number of veneer mills in Canada is so limited; and this is a fact which strikes outside observers as well as ourselves. Our American contemporary, "Veneers," speaking of the Province of Quebec, remarks:—

"There seems no good reason why there should not be several large veneer plants in the Province of Quebec, to say nothing of the other Provinces of Canada. It simply needs some concerns with a little enterprise and capital to organize a most profitable business, for there is an immense quantity of first-class timber and more market than several good-sized plants can supply. I know of just one furniture factory that would like to use about a car of veneer per month, but is unable to do so because it can't get it; it is obliged to wait two months at a time for a carload."

There would be no experiment or guesswork about starting a veneer industry in any good timber district in Canada. There are any number of furniture factories that would be very glad to get a regular supply of veneers for drawer bottoms, panels, backing for cases, and thin veneers for seats of all kinds of opera chairs, school seats, and a dozen other purposes, but they must either buy in the United States, where people do business, or else go without; and when they have paid duties and big freight rates it makes the veneer cost them so much there is no profit left. For instance, when the veneer manufacturer in the United States buys his timber in Canada, and freights it over into the United States, as a good many of them are doing, cuts and dries the veneer and ships it back again into Canada, it would look as if some one is dull in that country not to start an industry there and do a profitable business.

"There are other lines that should be more extensively manufactured for the trade in Canada, such as butter boxes, used by the retail grocer to put butter in for his customers, berry and fruit baskets of different sizes, picnic and restaurant plates, and a good many small wares that enable the veneer manufacturer to work up timber that would go to waste if made in large sheets."

The journal above quoted says that for some reason Canada seems to lack this industry, but she does not lack for a supply of good timber. All she needs is a few men with some capital and a little business enterprise to put in operation an industry that any one can see is badly needed and cannot fail to pay a good dividend on investment, owing to the fact that there are so many good locations where timber may be obtained without the expense of long-distance hauling or freight bills; also because labor is cheaper and there is practically no competition.

LOSSES THROUGH FOREST FIRES.

It is simply appalling to think of the devastation which has been caused during the last two months of drouth in practically every section of Canada through forest fires. The tribute that the fire enemy draws forth from the gifts with which Nature endowed Canada every year is serious beyond measure; but when this reaches the extent that it has done recently it surely should be sufficient to bring Canadians of all classes and all parties to a realization that something has absolutely to be done to prevent or minimize the waste. The phase of the matter which most affects our readers is, of course, the destruction of standing timber, which means, in time, higher, and eventually prohibitive, prices for lumber. But this is only one of the evils which a forest fire brings in its train. Water powers, upon which the industrial future of our country depends, are ruined. The soil, that basis of our agricultural prosperity, becomes eroded and the fertility destroyed. The Dominion and Provincial Governments are doing something to protect the forests, but recent evidence proves beyond question that it is far from being sufficient. The public feeling is growing that, with the expenditure of one tithe of the amounts spent in improper, or at any rate doubtful undertakings, a vast deal more could be done to conserve our natural forest wealth.

Planing and Molding

GRINDING KNIVES.

It is contended by knife manufacturers that where there is trouble with knives it is generally found that more harm is done to the temper and to the cutting edge by improper grinding than there are faults in the knives primarily. There has been considerably more emphasis put on this matter of proper knife-grinding since the advent of the modern knife-grinding machines, than before. Still, even where grindstones are used it is found that sometimes the temper of the knife is spoiled just the same as when using a rapidly-running emery wheel. As a rule, grindstones are operated at very low speed as compared to the emery wheels, but wherever there is pressure brought to bear when grinding against an abrasive surface, no matter whether it is a grindstone, emery wheel or what, heat is generated and the knife is injured in two ways; it may have the temper drawn, or the edge may be burned and it will then crumble.

It would seem that by this time, from what has been written and said about knife-grinding, almost everybody would understand that it is not only easy, but the average grinder is likely to draw the temper or burn the edge of the knife unless he exercises great care. Yet here is a little squib that the writer came across only a few days ago, showing that people still have funny ideas and misconstrue points that have been demonstrated. The little squib has to do with the effect of the sun on the temper of knives and tools, and is as follows:—"The carpenter hurriedly pushed the chisel out of the white, vibrating sunshine into the cool blue shade. 'Do you want to spoil the tool's temper in all that heat?' he growled. But the other carpenter, smiling scornfully, retorted:—'I thought you were above the silly superstition that the summer sun could hurt the temper of our tools. Why, man, you might triple the sun's heat, and still our tools could lie in the full blaze unharmed. To temper a chisel the steel is heate' to 490 degrees. To temper axes and planes, a heat of 510 degrees is applied. Fine saws and augers take 560 degrees, and hand and pit saws take 600 degrees. Of course, the tempered steel can't be affected until the heat of its tempering is applied to it. Throw back, then, old man, your chisel into the sun. Proof against 49 degrees, what can 110 or so out on the sand do to it?' "

Where people take an attitude like this, that a tool or knife must be heated to a temperature above that which it was subjected to in preparation for tempering, it is difficult to impress on their minds a correct understanding of things until they get relieved of some of these mistaken ideas. The idea that a knife must be heated beyond the original heat of tempering before the temper begins to draw, is one that can be dispelled by a visit to any place where tempering is being done. You don't need to go to a knife factory; you can go to a blacksmith shop and see steel being hardened and then afterward drawn to the proper temper by light heating over the fire. This just goes to show, though, what queer ideas people will get, and there is plenty of evidence furnished by knifemakers and by observing among the knife-users, that knives are injured in the process of grinding, and possibly the average knife-grinder doesn't realize how much harm he is doing and how much better work he can get out of a knife by taking more time and more pains about the grinding.

To manufacturers of abrasive wheels themselves, while they have given a wonderful lot of time and experiment to the subject of how to make and operate wheels to cut any given substance so as to get the best results, probably have not given as much time to the specific study of knife-grinding as the subject needs, because knife-grinding wheels are a very small item in the abrasive wheel market. The great majority of wheels are used in machine shops and foundries and for doing metal-working of various kinds. These make up so much more in point of volume of business than the items of wheels for grinding wood-working knives and tools, that the latter is only a minor subject with them. The people who have given most attention to them, therefore, are the knife manufacturers, because they have come to realize that the success of a knife frequently depends on its treatment in grinding. Generally, when they have a complaint about a knife, the first place where they look for trouble is in the grinding, and about nine times out of ten they find it there, too. Knifemakers are not perfect, any more than other human beings, nor is their process of making and tempering so absolutely sure and well in hand that they never make a mistake, yet flaws in the material and mistakes in the tempering are less frequent by long odds than the complaints about knives. The more general cause of these complaints is the ruining of knives in the grinding, and for this reason knifemakers and their representatives have been of late years looking pretty closely after this subject, and also the makers of knife-grinding machines of the automatic class have given the subject quite a lot of study.

It must not be inferred from all this that the men using veneer knives themselves have not given it thought, for they have, and in the most successful veneer-cutting establishments you will generally find men who give lots of thought and exercise lots of care in the grinding and whetting of their knives. Sometimes they even go to the point of devisng special grinding appliances of their own. The writer recalls finding a pioneer expert with a wooden wheel for grinding, on the face of which, in sections here and there, had been attached emery or some similar abrasive material. The idea was to have a little cutting by different parts of the face, and between these cutting parts vacant space for the air and for the knife to cool off. There is not much doubt, either, but what, as a dry-grinding proposition, it had its good points. Now, however, there is more turning to other things for a solution of the problem, and one of those other things is slower speed for the regulation knife-grinder.

Some years ago the cup-wheel knife-grinders were run at pretty high speed, nearly twice what the average speed is today, in fact; and it took some little time for the people interested to realize that too high speed will injure a knife, no matter how light a cut may be taken. This has finally come home to the trade, however, and as a result there has been a decided reduction in the average speed of grinding machines. It is a point, too, that every knife-grinder should make particular note of and should follow up by experimenting with even slower speeds than the average now is.

There is before the writer, now quoting from "Veneers," a treatise on grinding and polishing, which gives three sets of grindng wheel speeds, tabulated so as to show the number of revolutions to run a wheel of any given size to obtain so many feet of periphery speed per minute. The three speeds figured on are 4,000 feet, 5,000 feet, and 6,000 feet per minute. One of the foot notes connected therewith recommends that wheels used with water should usually not be run over 4,000 feet per minute, as it is difficult to keep the water on the surface at a higher speed. Now, it is the opinion of the writer that the speed given, 4,000 feet a minute, may well be cut in half and then give better results. This is said with full understanding that frequently the nature of the wheel itself has an influence on deciding the speed. Some wheels require a higher speed than others to cut freely, but it were better to decide about the right speed for the good of the knife, then experiment with wheels until you find one that will do good cutting at or near the speed desired. Taking a part of the figures in this table as a basis and adding to them another column for 2,000 feet a minute, the revolutions at which to operate the average wheel for attaining the speeds of 2,000 and 4,000 are shown in the following table:—

Diameter of Wheel in Inches.	Revolutions per Minute Required to Secure a Periphery Speed of 2,000 feet.	4,000 feet.
10	764	1,528
12	636.5	1,273
14	545.5	1,091
16	477.5	955
18	424.5	849
20	382	764

Figures based on 2,000 feet rim speed per minute are somewhat lower than the average speed recommended for knife-grinding to-day. This average speed generally figures out approximately 3,000 feet per minute of rim travel. Formerly the makers of knife-grinders listed them at much higher speed than they do now. They have learned better and have lowered their speed tables considerably, and it is the opinion of the writer that if they would lower them still more, and figure at a 2,000 basis, it would be better yet. Don't get the idea from this talk about speed that lowering the speed will solve all the problems of knife-grinding and eliminate all the danger of burning the knife or drawing the temper. It is merely one of the things that will assist in proper grinding. There are whole lots more, which include the use of water, the feed or the crowding of the grinder, the selection of wheels, etc. This whole problem is complicated a little in knife-grinding, as compared to other kinds of grinding, because of the fact that a wheel has to cut soft iron and tempered steel at the same time. The makers of emery wheels construct different wheels for cutting soft iron than those intended for cutting hard steel, and they usually figure on each being used for the work it was primarily intended. In knife-grinding, however, it is not possible to cut the iron with one kind of a wheel and the steel with another, so it complicates a little the problem of selecting the wheel for the work.

It should go without saying that in this work wheels with water or oil on them should work better than dry wheels and do less harm to the tempered steel edge. Yet there are men operating knife-grinders—not new men by any means, but men who have been at the work for years—that persist in using dry wheels. It would be interesting to hear their arguments in favor of this. The writer is open to argument and conviction on the subject, but carries now the general impression that it would be better to use water or oil on the wheels, and that no dry wheel should be used for the grinding of a veneer knife.

W. May & Son, who operate a planing mill at Weston, Ont., have assigned to E. R. C. Clarkson, Toronto.

GUARD FOR THE JOINTER.

A jointer guard has been invented that possesses certain novel features among the many and ingenious devices designed for the better protection of operators of machines having rotating cutter-heads.

However, Figs. 1 and 2 are vertical sections of the machine duly equipped with this protective piece of apparatus, the illustrations exhibiting the guard in two different positions. Fig. 3 shows a plan of the machine with a modified form of the guard.

The invention is characterized by a shield which closes or opens the gap between the tables in such a manner that the workmen cannot come in contact with the knives, at least that is the intention, and by a study of the following particulars it will be seen how the inventor proposes to carry his ideas into effect.

The cutter-head C has a shield K which is a segment of a circle and slides up and down in suitable curved guides located at each inner side of the machine. In the upper position as illustrated in Fig. 2, the guard or protecting shield is over the knives and the gap in the machine is closed. The guard K is operated through a bell crank, one arm E of the bell crank fitting loosely in a socket at G on the shield. The other member of the bell crank at D projects through an opening in the table at B.

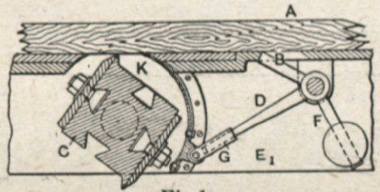


Fig.1

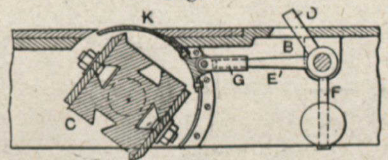


Fig.2

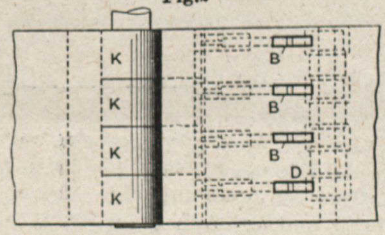


Fig. 3.

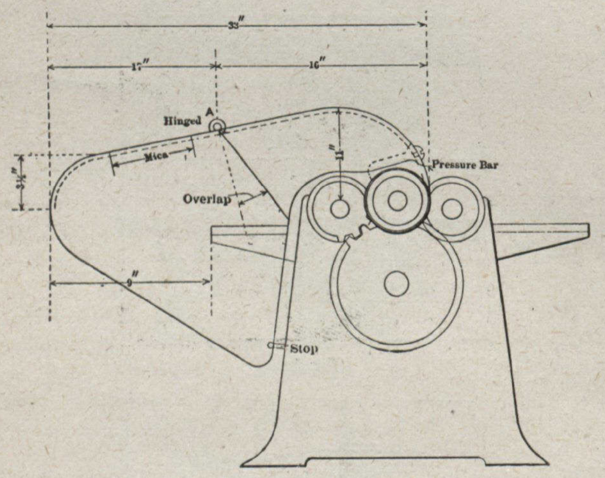
A weighted lever at F actuates the combined arms D and E and is heavy enough to carry the guard K upward and over the cutter-head C and thus bridge the gap between the tables. It will be noted that when the knives are thus guarded by the encircling shield K, the arm D projects through the opening in the table at B.

The latter position of the device is a key to Fig. 1 where the machine is illustrated when at work. The board A passes over the opening B and in moving from right to left, presses down the lever D and thus moves the guard out of the way. It would seem that the inventor depends upon the work A to hold back the shield when the opening B is uncovered by the moving board or whatever stock is in hand. But it is not quite clear how the guard K can be prevented from coming in contact with the work A as soon as the lever D is free, and then the guard and work moving in the same direction are the more surely interfering with the knives and before the end of the work is reached.

Fig. 3 illustrates the division of the guard K into adjoining sections. The several sections have their individual complements of levers and when narrow work is being done on the machine only so much of the guard moves out of the path of the stock as will allow the respective width of the knives to take effect.

DUST FROM THE PLANER.

Trouble is often experienced, and I will relate one which happened to me owing to the dust that comes from the planer. Something had to be done and that at once. A dust collector was just then out of the question. The next best thing was a hood which was made from sheet metal. This was made the width of planer, secured to the pressure bar with machine screws and extending back to hinge A and down the sides as indicated by dotted lines. This scheme only served to shoot the dust out from the back of machine owing to the



agitation of the air caused by the revolving cutter-head. To overcome this, an extension was made from hinge A and back 9 inches from the table top, the sides overlapping as shown. The top rounding down about 3½ inches left about 3 inches between top of table and bottom of this rounded edge. Through the top was cut an opening about 6 by 14 inches and in this was fastened a piece of mica such as is used for automobile shields; this made it possible to see the work as it came through the planer.

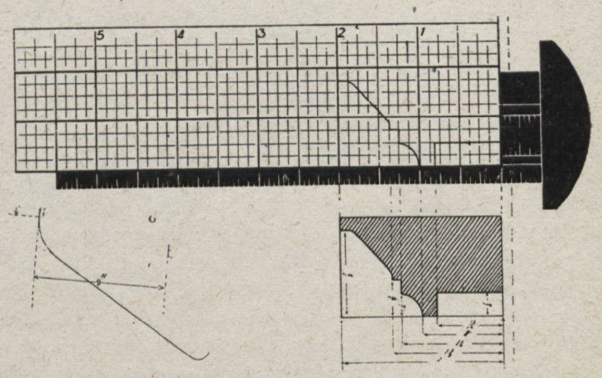
After this hood was put on you could not notice the dust six feet from the planer. When so desired, the back section can be folded up on top of front.—X. Z.

RULE FOR SETTING KNIVES.

This device is for accurately grinding and adjusting cutters in setting up molding machines and setting surface knives on planers and matchers. It is an invention for practical man by a practical man. The object has been to design a rule that will find all requirements and combine necessary adjustments, with the fewest parts possible, and doing away with complications. It has adjustable surface projections and extends laterally and longitudinally, also reversible scales which are accurate for cutterheads of all diameters. To reverse the scale or change projection is the work of a few seconds. It is guaranteed accurate to 1/1000-in. The following directions for using the device are taken from the printed matter of the makers.

To line up rule with machine, extend the blade the same distance the cutterhead projects over the guide line. If the head projects over ⅜-in., extend the blade in rule ½-in., allowing ⅛-in. for side head cutter, always remembering the distance blade is to be extended to line the scale with guide, and do not attempt to set cutters before this adjustment is obtained. After this adjustment is made, transform or extend the rule for any requirements.

To change surface projections, withdraw the blade and insert it in suitable groove. There are two projections, from 3/16 to 9/16-in., on each edge of blade. To reverse either scale, withdraw blade and insert from opposite end. Rule can be extended laterally any given distance according to standard scale on blade. Longitudinal extension is obtained from any projection by inserting blade in third groove from surface projections. To transform the rule into a square, withdraw blade and insert it in vertical grooves across abutment end. To set surface knives on matchers and planers with worn-



down lips, set knives against squaring edge and screw down one bolt on each end, enough to hold them in place, then extend rule and caliper across ends of knives from face of head to cutting edge on knives, and ascertain if cutting edges on all knives have uniform projection before knives are bolted down solidly.

To adjust molding cutters, square up and outline the pattern to be set on the scale (see sketch). Grind and set knives to these lines. For a simple pattern, when only one or two knives are to be set, this will not be necessary. Where two or more patterns have exactly the same members, but of different widths, like mullion casing, stops, detail work, etc., the cutters can be set over the same outlines by means of using the lateral extension. To set the cutters for a molding wider than length of scale, extend blade as many inches as necessary and proceed with the setting. The rule is good for all widths of moldings up to 11½ inches. To set cutters on moldings deeper than 1¼-in., insert blade in third groove from surface projection. The same rule applies on bottom and side heads as on top.

TRUING CUTTER-HEAD KNIVES.

Because a cutter-head shows itself to be absolutely true when standing still is no sign that all the knife edges will move in the same cutting circle when it is speeded up to four or five thousand revolutions per minute. It is then that centrifugal force gets in its powerful work. Even the slightest spring or distortion then shows the result on the finished work. The one knife which is most prominent takes the largest or perhaps the entire cut, and leaves as a record but a single pronounced mark for each revolution. With a four-knife head running 4,500 revolutions per minute and a feed of 90 feet per minute, these "revolution marks" would be about ¼-inch apart. True, there may be other less noticeable marks between, which merely confirm the fact that the knives are not all cutting alike.

In fact, such a condition is all that can be reasonably expected under the circumstances, for it is a mechanical impossibility to joint or true off the edges when standing still so that each will take an equal share of the cut when running.

If under the above conditions of speed and feed every knife had cut equally the "individual knife marks" would have been only about 1-16 of an inch apart. But to make every knife do its duty they must be trued off while running, as may now be done by the devices furnished with the best planers. The distorting effect of centrifugal force is then overcome, and the knives can be easily resharpened without removal from the machine or the necessity of resetting.

THE AMERICAN INVASION OF BRITISH COLUMBIA

With reference to the American capital going into British Columbia, Haywood Brown, a prominent capitalist of New York City, has this to say: "Within two years every New York capitalist interested in timber will have a finger in the British Columbia pie and will, as many wideawake American capitalists are doing now, wrest from the loose grasp of British Columbians the multifold opportunities with which this province abounds. Why do not British Columbians wake up and realize the value of their own timber before American capitalists reap benefits in advance of those who have lived the major portion of their lives in this province? The people in this country do not realize the value of the timber along the east and west coast of Vancouver Island and on the mainland, particularly in the western section of British Columbia, but it is gratifying to notice that British Columbians have at least learned a lesson from the mistake of Washington, Oregon and California, and are preserving the second growth. But you British Columbians who have been born and 'raised' in British Columbia do not appreciate or realize the value of your timber and probably will not until Americans have got ahead of those who had the first chance."—Another widely known American, formerly a railroad promoter, W. A. Kappler, of Cleveland, Ohio, expresses himself even more directly: "British Columbia is the American continent's last resort for timber. Michigan, of course, is a back number so far as timber is concerned, and the timber of Washington, California and Oregon is practically gone. Now the eyes of American capitalists are looking towards British Columbia, and should this province in time be unable to yield more, then Americans must build themselves mudhouses or invent some other substitute for timber."

COMPARATIVE ECONOMY OF LUBRICATING OILS AND GREASES.

The analysis of lubricating greases is a rather complicated procedure, and one which yields little information as to whether the sample is suitable for the purpose to which it is to be applied. It is possible, however, by determinations of the water and the ash present in greases to give important information regarding the presence of foreign materials. The variation in these constituents is clearly displayed in the following table from a report by Arthur D. Little, the Boston chemist. Designating letters have for obvious reasons been substituted for the actual names of the samples:—

Designation.	Cost. Cents.	Water. Per cent.	Ash. Per cent.
A	8	2.48	4.56
B	11	7.45	0.62
C	4	20.50	1.92
D	7	4.84	5.54
E	16	1.53	1.53
F	1¾	1.18	7.68
G	5	2.45	2.46
H	6	0.72	2.20
I	6	1.22	3.69
J	6	1.04	1.65
K	5	1.43	4.34
L	7	0.96	2.73
M	15	2.64	2.28

These greases are, on the whole of very good character, only one containing an excessive amount of water, but Mr. Little considered the prices excessive, and advised that six cents per pound was as high as need be paid. He further stated that the samples were practically all of greases made with a small amount of soap as a hardener or solidifier. In some of the cases an alkali soap was used, while others contained a lime or alumina soap.

A recent investigation of the quantity, quality and cost of oils used by various mills indicates conditions so varied as to point the moral of the value of expert advice in their purchase. In this case the chemist, Mr. Arthur D. Little, of Boston, by whose courtesy the results and conclusions are presented, found a range in the cost of machine, engine and special oils (exclusive of cylinder oils) from 14 to 48 cents per gallon, as appears from the following table:—

Name.	Price. Cents.	Sp. Gr.	Flash.	Fire.	Cold.
Machine	14	0.872	399	464	36
Machine "A"	16	0.872	388	462	36
Machine	14	0.926	329	361	28
Machine	15	0.932	352	385	17
Engine	23	0.914	410	470	8
Engine "B"	25	0.661	414	467	8
Special engine	48	0.907	405	446	10
Signal oil	45	0.845	265	283	30
Crank case	18	0.677	514	590	29

The real value of the oil is shown by the constants revealed by the investigation. With qualities almost identical there is material variation in the price, as, for instance, between the first and second samples and between the different engine oils. Mr. Little's opinion, based on extended experience in similar cases, was that 12 cents per gallon would be a fair price for these oils, taken as a whole. At this figure the mills investigated would be able to save nearly $1,200 per year by the use of the cheaper oil without detrimental results.

While operating a gang saw at the Carney Lumber Mills, Owen Sound, Ont., Antonio Leduc met with a serious accident. He was using an iron bar in order to remove a sliver from the gang saw. The machine was in motion, and when he loosened his grip upon the bar it recoiled and struck him a violent blow on the jaw, fracturing it in two places. A portion of his tongue was cut off as the result of his teeth coming together.

Saw Mill Department

REPAIR OF CIRCULAR SAWS.

The most useful of all tools in the woodworking shop is the circular saw. Likewise, it is the most abused tool of all the woodworker has to do with. Did you ever see a saw like the one shown by Fig. 1? Yes, you have seen such a saw. Did you ever see one like it in your own shop?

Well, that is "a cat of another color," altogether. And you need not answer embarrassing questions, or those which

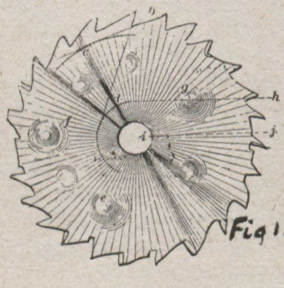


Fig 1.

tend to incriminate yourself. That's good law, even if it has nothing to do with woodworking. The saw shown by Fig. 1 really does look a little bit off-color, doesn't it? Makes a fellow think of that picture of the horse which had depicted in it every ill the horse ever was subject to.

But this old saw, bad as it looks, is not incurable. It can be fixed up nearly as good as new. The only question about fixing it is, will it not cost more for time than it would

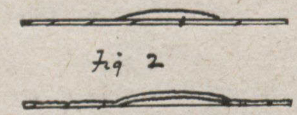


Fig 2

for a new saw? That question, however, depends entirely upon the diameter of the saw. If it were ten inches in diameter, the time would be worth the cost. Were the saw 48 inches in diameter it would pay well to put the saw in shape. It will require little if any more time to put the large saw in shape than it will to fix up the little ten-inch affair.

To begin with, what are the various troubles of the saw shown by Fig. 1? Well there are the teeth to begin with.

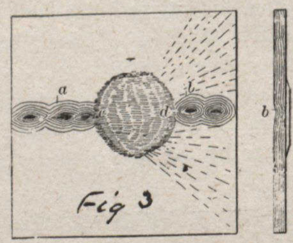


Fig 3

About the only perfect tooth appears to be at a and b, but it is comparatively easy to make new teeth for this saw. A case of severe jointing and the saw will be made round. Then the teeth may be spaced better and the spacing gradually improved by each and every filing or grinding. It does not pay to file saws, nowadays; files cost much more than emery wheels, and the use of a good emery grinder would soon cut these hideous and various teeth down to a semblance of uniformity, the flanks of the teeth being all laid out to the circle c, while the front of each tooth runs down tangent to circle d.

The next thing to be looked after is the condition of the saw-plate. Perhaps this will be looked after first, though it

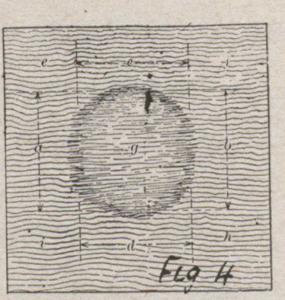
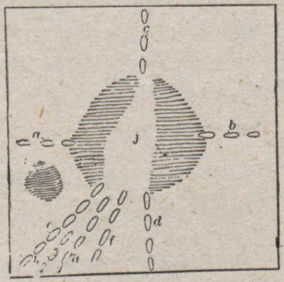


Fig 4

is doubtful, for no sawyer would dare work over a saw having teeth like that shown by Fig. 1. Those teeth look mean enough to bite—they are worse than the teeth of a bull pug, and homelier, too. The first thing is to use a straight-edge, apply that tool at d h, to discover the condition of things at several burned spots, e, f, g, etc. With the straight-edge at i j, it is noted that the tool lies fair with the blade from eye of saw to the rim, and that there are no humps or hollows or other defects to be found.

Next, the straight-edge is transferred to d h. At the blue spot g it is noted that the saw-plate does not touch the straight-edge at all. The saw has been heated, along the line or circle of e, f, g, and the straight-edge reveals several hollow places as shown by Fig. 2. In the section through i j (Fig. 1) it is shown that the blue spot in the saw actually bulged out, much like the fire sheet of a steam boiler, the sheet of which had been over-heated and expanded under the pressure of the steam. Perhaps some dirt and dried grease had collected on one side of the saw. This cause has, more than once, been known to cause severe buckling of the saw.

The section through d h indicates that the steel actually stretched as shown. The view, however, is greatly exaggerated in order to show much more clearly in the engraving



the manner in which the saw has been expanded through section d h (Fig. 1). There is too much metal in the saw at g, Fig. 1, and in order to flatten down the swellings as shown by Fig. 2, it will be necessary to stretch the remainder of the saw, all around the swollen places.

The manner in which a saw may be stretched so as to remove a swelled or stretched spot is shown by Fig. 3. As depicted at a, a single blow of a hammer has been struck while the saw was lying fair upon some hard surface like an anvil or some other flat steel object. It will be of no use for the would-be saw-hammerer to try stretching a saw by hammering it against a wooden block or any other elastic material.

With the saw-blade lying flat and fair against the anvil, it is evident that if a blow be struck with the peen of the hammer at a, the metal will be slightly depressed by the blow, being affected in every direction as shown by the wavy lines around the mark a, made by the hammer. When other blows are struck, see Fig. 3, it is evident that the saw-plate has been stretched entirely across the portions outside of the depression c d, and it is also in evidence that the stretching of the flat portions of the plate has eased the tension in one portion of the swelled spot, as shown by the absence of the shade lines at c d.

It is evident that, were the hammer blows to be judiciously distributed all over the flat portion of the saw-plate, the swelled spots would be removed entirely. At a, b, c and d, Fig. 4, may be seen the manner in which the hammering

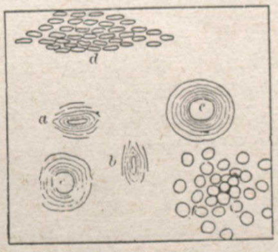


Fig. 6.

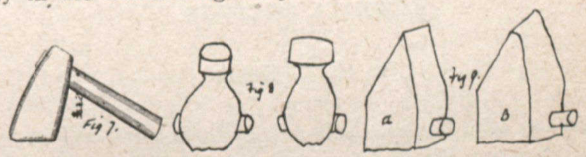
must be done to straighten a bulge. Blows applied in the spaces a and b must relieve the tension in certain portions of the swelled area g, and more blows at d and c will relieve the tension in another portion of the saw-plate. Then it will be necessary to hammer the small portions e, f, h and i in order to make the plate stay flat, for the tension created in hammering the saw in all its other parts must needs be relieved by hammering the corners also.

A clew to the proper arrangement of the necessary hammer blows is given by four channels through the swelled spot by means of the rows of hammer blows a b and c d is plainly shown, and the effect of other rows of hammer blows between and d is also apparent. It will be noted that the arrangement of the rows of hammer blows is symmetrical, all over the surface of the plate, the row at e being put in next after rows a, b, c, and d, then row g is made, and these rows are extended through other quarters of the saw-plate. Thus, row e is continued between rows c and b, and likewise made in the quarters a c and d f.

Next, the rows f and h are put in and distributed over the other quarters of the saw-plate. It is assumed that small pieces of saw-plate are being experimented with as shown by the engravings, Figs, 3, 4, 5 and 6, but when it comes to applying the hammer blows to the saw for the actual relief of the several swelled spots, there must be a considerable merging of the rows of blows into the territory occupied by the several swelled spots. Thus, were there another swelled spot at i, the same rows of hammer blows intended to relieve spot j would take care of the little spot i as well, and it would only be necessary to look out for the direction of the lines of blows when approaching another spot so as to make sure that the blows expended their effect in the proper direction.

A hammer blow can be made to expend itself, in either a lateral or a transverse direction. That is, the blows can be made to effect the plate either in a lengthwise or a crosswise direction. By referring again to Fig. 3, particularly to the side elevation, and to the marks b b on elevation and on plan, it will be noted that the blows expend their force nearly altogether in a longitudinal direction. The side elevation of the plate shows the stretching action of the blows; the plate being made a very little thinner at b and the metal thus made to move along leaves a thin place which is the measure of the stretching of the plate, thereby adding to its aggregate area the same amount that the swelled places have stretched, for they, too, must be thinner than the original plate.

The longitudinal or lateral effect of the hammer blows, however, is determined entirely by the shape of the hammer and the manner in which the hammer impinges upon the plate. Referring to Fig. 6, it will be seen that at a and b the stretching effects are at right angles to each other for the reason that the peen of the hammer is turned in the two directions mentioned. Thus at d the longitudinal effects of the blows have been massed in one direction, being entirely vertical. This is because the peen hammer is used exclusively in the hammering in question.



Should it be desired to stretch the plate uniformly in every direction, a ball-faced hammer must be used and the effect of the blows will be as at c, Fig. 6, where a single blow has been struck and the radiating effect of the blow surrounds the place of impact of the hammer. At d is shown the uniform grouping of blows. This would, if continued long enough in the same place, have the effect of forming exactly such a swelled place as we are trying to remove from a saw.

It is very necessary that all hammer blows be struck fairly, with the face of the hammer flat to the plate. The effect of such a blow is shown at c, Fig. 6, but when the hammer is permitted to cant a little, the effect is as at e, the blow being heavy on one side and light on the opposite side. Blows of this kind have a very bad effect upon the hammering of a saw.

A good deal of attention should be given to the selection of hammers for saw work. For a ball-faced hammer, the preference is largely for the "dog's-head" hammer which has most of the weight below the handle which is set at an angle as shown by Fig. 7. This tool is much liked by old-time saw hammerers, but is hardly used as much by the younger men. However desirable the dog's-head hammer may be, a good job can be done with an ordinary machinist's hammer, only care must be taken to have all the corners ground off as shown at B, Fig. 8.

A hammer with square corners, or edges like A, would quickly cause disaster by cracking the saw. The peen hammer should be selected or prepared in a similar manner as shown by Fig. 9, where the worthless form is at A, the correct peen being at B. If a hammer like A must be used, it should be ground off to look like B, so there is no danger of the corners cutting the plate.

RING BEARINGS FOR SHAFTING.

Of late considerable attention has been given to the improvement of shafting, bearings, and lubrication in sawmills, and a large amount of power hitherto lost is now turned to useful effect. For lubricating purposes ring bearings are a considerable improvement over the ordinary form. In these bearings a broad ring is fitted loosely to the shaft, revolves with it, and dips into an oil reservoir at the bottom of the bearing, and brings a certain amount of oil up to the top of the shaft, which flows over the bearing through oil ways and back into the collecting reservoir. It can be filtered and used over and over again, thus effecting considerable economy, and at the same time keeping the bearing thoroughly lubricated for a considerable time with little or no attention. The loose ring should be broad, and be made flat on the inside and rounded on its rim. Care must be taken that the oil is not allowed to get worn out or thick, or the ring may cease to revolve. For high speeds the rings should be smooth and without projections, which carry the air round and form air bubbles in the oil, which also oxidises quicker, but owing to the speed and consequent centrifugal force scrapers must be fitted in the bearing to deflect the oil into the oil ways; these must not, however, touch the ring or they will stop it revolving.

SAWMILL ENGINES.

By H. E. Welch.

To one who has watched the development of the sawmill industry during the past quarter of a century, there has been no part of the improvement in the appliances for the manufacture of lumber that has been of greater interest than the gradual introduction of the better types of engines and boilers into the power plants of the larger mills. Until within the past few years, there was no part of the sawmill equipment on which so little care and attention was bestowed as on the power end of the enterprise; this too in spite of the fact that its success from a mechanical—and often from a financial—point of view, was primarily dependent on the power being adequate to the proper driving of the mill machinery. It is probable that in no other line of manufacture, is the service exacted from the engine so severe as in the sawmill, the rolling mill being the only exception; these, however, are usually equipped with engines specially designed for heavy duty. While there was—and for that matter still is—a class of engines alleged to be " sawmill engines " yet this simply meant that they were so designed and built, that the price at which they could be profitably sold rendered them attractive to the purchaser. These engines were practically all of the slide-valve pattern, with throttling governors, requiring an enormous amount of steam per horse-power; so long as they performed the task of keeping the line shaft revolving with reasonable regularity they were entirely satisfactory to their owners. The boilers too, were as a rule, of a kind the chief merit of which was their ease of installation and small cost of maintenance, and the two flue boiler was for many years a favorite; that they required an immense amount of fuel as compared to the steam produced, was rather a point in their favor.

The reason for this condition of things was doubtless the fact that fuel was plentiful, and cost nothing; all improvement in the designing and construction of engines and boilers has been occasioned by the necessity for economy in fuel, and every new design that promised a saving in this item, at once received the earnest attention of power users, the result being that in most lines of manufacture requiring considerable quantities of power, both boilers and engines were of the latest and most economical type. Where the cost of the fuel consumed in a single year's operation was often greater than the cost of the boilers under which it was burned, and the engine driven by the steam it produced, the importance of the highest attainable duty per pound of coal is readily seen, and the Corliss or some form of automatic engine, together with high pressure boilers are now to be found in most of the manufacturing plants of to-day.

With the sawmill man, however, there was always a large surplus of refuse to be disposed of, and the more that was burned under the boilers, the less there was to be got rid of in some other, and usually more expensive manner, and the saving of something that was worse than useless to him, did not appeal to the mill owner. With the invention of the band mill, which so soon as it proved itself a success rapidly displaced the circular, a new condition confronted the mill operator who found his former surplus of sawdust no longer existed, and that owing to the reduction of the quantity produced resulting from the thinner kerf of the band, that the fuel supply must be supplemented from other sources. The introduction of the " Hog " supplied the deficiency in a fairly satisfactory manner, but the expense of its operation was a very tangible item in the cost sheet, and in the designing of new mills was taken into consideration and received its due share of attention in the effort to eliminate every element possible from the cost of operating the proposed plant. The result has been that in the more recently built mills the power plant is something of which any manufacturing enterprise might be justly proud; the equipment of boilers, engine, heater, etc., being equal to those in any other line, and surpassed only by such installations as those of a public nature, as street railways, electric lighting plants, which are of a permanent character, while a sawmill is by its nature of a comparatively short-lived duration. This result has been attained almost unnoticed even by those in close and continual touch with the sawmill industry during the entire time during which the transformation has been taking place. It is true that in some of the older mills there were to be found engines that were equal in every respect to the best that was known to the mechanical practice of their day. Nevertheless they were the exception to the general custom, and the result of the eccentricity of some wealthy lumbermen who took this method of expressing the tendency of human nature to want something different and better than his neighbor.. That they were economical of steam was incidental only, and a factor that received no consideration by the purchaser; they looked better than those in common use, and therefore were chosen by those who wanted something different.

The sawmill engine room to-day, with its up-to-date equipment, supplemented with the high pressure boiler demanded by economy, represents a purely business proposition, the expenditure of money that money may be saved, and economy in the use of fuel and its product, steam, is as closely watched by the sawmill operator, as it is in other lines of manufacture.

LINING UP THE MILL.

It may interest some inexperienced filers to know the main parts of lining up a mill, and as millwrights and filers do not agree on this subject, I will tell how I do it. I make no claim for it being the only way or the best way, but simply my way.

First, I nail a support at front end of the track, with the carriage back at log deck. Then I fasten a line on this support and on the carriage, taking a level to plumb the line with the track iron; take either edge of the "V" track, or, if the edges are much worn, strike a centre and use that. Square this with a line or a long straightedge; if a straightedge, it must be perfect. In squaring these lines use a triangle, as a square is too short to do accurate work, but is close enough to make a mill run.

Square the bottom wheel with this line by using two more lines, fastened on suitable supports. If straightedge is used, they can be fastened to that—one line for each edge of the wheel towards the log deck. When you have moved the wheel so that each edge measures the same from these two lines, the wheel will be in line with the track. I do not like to line from the face of the wheel, as sometimes a wheel will wear more on one edge than on the other, and one edge will measure more in circumference than the other, hence the wheels will hardly be alike on the face, unless just ground.

When this lower wheel is in line with the track, it is easy to line the top wheel with it. I fasten a stick on each edge of the wheel—towards the log deck—put a line on these, each exactly the same distance from the edge, and let it drop past the edges of the lower wheel, then move the top wheel until both lines measure the same distance from the edges of the lower wheel. In lining up I always have a saw on the wheels, under full strain, same as when running; this draws the wheels and boxes into the same position as they are in when running. I have found considerable difference when the strain was on and when it was not.

After getting the lower wheel in line with the front half of the track, I run the carriage up to the other end, out of the way, put my line on the back half of the track and see if it lines up exactly as the front half did. If not, there is a bend in the track, probably caused by the pounding of the nigger; this will show it quicker than a line the whole length of the track. Some prefer to line the top wheel with the track first, then set the bottom wheel with that, saving one set of lines, but I prefer to set the lower wheel first.

A number of writers speak about changing saws for hardwood or for hemlock, instead of having them able to cut both. One seems to think we change saws every time we change logs. The fact is, the saws will cut any kind of timber, no matter how mixed, at any time of year; but is that any reason to think they are doing their best in any one kind of timber? It is all right if you are always sawing mixed timber, but if you have a run of six months all on one kind of timber, and you do not experiment with any changes in your saws, how do you know that the saws are doing their best in this particular kind of wood? My saws will stand 16-inch feed in all kinds of mixed woods—maple, birch, ash, oak, hemlock and pine—but they will stand a great deal more than that in either of these woods when fitted for it. But for a few days' sawing I never make any changes no matter what the timber is, not even in the swaging. To-day we have cut at least a dozen different kinds of timber, all with a hemlock saw, and it was no trouble to find feed marks that measured 20 inches; but some of these logs could have been cut on much faster feed with a saw fitted for it. For these reasons I shall continue to change my saws whenever the timber is changed for any considerable length of time.

THE BAND SAW FILING MACHINE.

The filer and the setter are both most excellent machines. The setter cost $15, the filer $50. If I had to get along with only one and could not have the other, I would keep the setter, and file by hand. There are two styles of setters, one that strikes a hammer blow, and the other presses the tooth over to one side. Each machine has its champions, but I prefer the pressure set, which seems to me can be more accurately adjusted for setting small teeth, and after it is once adjusted, which takes not over ten minutes, you can operate it quite rapidly, more so, I believe, than the hammer-set machine. I have frequently adjusted machine and set a 20-ft. blade in less than twenty minutes.

We have our filer and setter both in line on a bench, so that saw may be fed through one machine and then the other while it is on the wheels. The setter is fastened on a block which is hinged to table so as to drop down out of the way when not in use. I would not be without these two machines for many times their cost. No man can file and set a small band saw and continue to keep it in as perfect condition as can be done on these machines, and when the question of time enters, then hand-fitting has to take a back seat. I know there are some men who have become expert at band saw filing, and aside from the time lost in loosening up the vise and slipping saw along there is not much difference in the length of time it takes to file by hand or by machine, unless your machine runs pretty fast, and it is not well to speed it up too fast, for a file does not do as well when pushed quickly over the work as when it goes at a moderate speed.

Someone said once that these machines are like a mischevious child and need constant watching. That is so to a certain extent on very small blades and fine teeth, but on the ordinary saw, if machine is properly adjusted and saw has been kept in order so there are no very long spaces between teeth, you can go away and let it work and come back to find your saw filed to the queen's taste.

There is only one point in which the filer is not perfection; that is, all teeth are filed from the same side, which naturally makes them a trifle sharper on one point than on the other. In this connection I have often thought it a pity that the really perfect machine which the inventor and maker told us of a year or so ago was never put on the market, for lack of friends, and because it was somewhat complicated and required that an instructor go along with each one sold to show the purchaser how to use it. It seems to me that if the machine was perfect it was the only one made, and that some manufacturer would have jumped at the chance to make it, also that it might have been possible to send out a book of instructions so the purchaser could have learned how to operate it. I have always been sorry it died, for I would like to have had one.—C. H.

INSTALLING A BAND SAW.

I have been having some experience with band resaws in setting up and starting them that may be of interest. The first one is a 72-inch machine, with the greatest amount of "overhang" that there is to any now built that I know of. This feature of the machine is so pronounced that if the foundation bolts were loosened, the machine would fall over on the wheel side of its own weight, and that is a good deal of overhang. Before the machine arrived, I was given twenty-four pieces of 12 by 12 oak, 12 feet long, of which twelve were for the new machine and twelve for a smaller resaw then in the factory but a much lighter machine and one that was properly balanced on the frame. I decided that I would rob the lighter machine for the benefit of the heavier one, and took eight of the timbers for the small foundation, and sixteen for that of the larger machine.

Owing to the peculiar nature of the soil I supported the bottom timbers by the ends only and ran a bedding of cement about two feet wide under each timber. The other timbers were framed into these sills and the whole bolted together through themselves and by the bolts through the frame of the machine.

After some time, the machine arrived and was set in place. The first thing to contend with was the mistakes in the blueprint that had been furnished to make the foundation. On the eight bolts to the frame, four only fitted to the template by which the bolt holes had been bored. After the machine had been set, it was necessary to move it to get at the timbers to bore new bolt holes for the four that were wrong. The template had been carefully checked by the print and a further checking showed that it had been made right according to the instructions sent ahead of the saw. After this part of the work was done, the belt drive was put in place and in putting in the lower shaft of the machine, I noticed that the pulley, a friction clutch, was ⅛-inch out of round, and from the fact that it was nearly six feet from the outer bearing of the lower wheel to the other bearing of the shaft on the frame. I knew this was going to give trouble and so started to one of the owners.

As soon as the machine was started, the trouble showed itself. The lower wheel trembled so much that our filer expressed his doubts at being able to fit a saw so it would not crack all up from this cause. When the saw was put in motion, the trembling became less as the weight of the lower wheel had a tendency to steady the shaft. But it has never been overcome though the machine is nearly a year old now.

After running for about two months, the machine began to shake pretty badly all over, and while it did not shake on the timbers, it shook the whole frame and foundation on the ground. At the floor level, the movement was ⅛-inch while the saw was running. I finally had to slow down the engine to a speed of about one quarter less than its usual travel to keep the top wheel of the machine from breaking out of its bearings, so violent had the movement become. After a time, it was decided that they had better let me fix it in some way. I cleaned out all the dust, took up part of the floor and laid a foundation of brick and cement, closely laid in and around all the exposed timbers. This foundation was extended for two feet each side of and behind the frame of the machine, leaving only the wheel pit the same as before. This remedied the trouble of the frame of the machine shaking, the top wheel now running steady at full speed, 425 revolutions per minute, but the shake has never been taken out of the clutch pulley nor will it be until it is taken off and balanced.

We recently added another saw of the same make and to avoid any of this trouble, I put in a solid brick and cement foundation for the new machine, used a plain pulley instead of a friction clutch, and had a bevel gear to drive the cross shaft overhead, using a swinging tightener to start and stop the machine. This new machine has been started up and so far there has been no trouble of any sort; the drive working well, and the machine running steady on the substantial foundation. The new machine is a 66-inch instead of a 72-inch and the lower shaft is much shorter between the bearings. One of the most troublesome things about these machines is the way the makers have of putting the lower wheel on the shaft, shrinking it on and finishing the wheel up with the shaft in place. If there is ever any necessity of turning off the journals, there is not a lathe this side of some big city that is big enough to swing 72 inches, and repairs to a machine of this kind will be a heavy burden. The machine is somewhat cheaper than the good sorts now on the market, and the good sorts are worth all the difference, and then some, if I know anything about this class of machinery.

But when a factory owner wants a band-sawing machine, and the cost gets up around the thousand mark, a difference of a couple of hundred dollars in first cost makes him an easy convert to the idea that the special claims and the good finish and careful work done on a good machine are merely "talking points." And at the same time, there is hardly any question but that these kinds of machines are made at about half the cost of a good machine, and the difference is about one quarter in price. They have the cheapest of rough gearing, castings and rollers full of blow holes, inferior shop work, poor boxes, no oil chambers too heavy bearings, and all the ear-marks of apprentice work at the shop. The first cost is less but what will the harvest be?

When a new machine is started for the first time, it should receive more than ordinary care, from the fact that the bearings have not been worn to a fit in the short time taken in limbering up in the shop where the machinew as made. Should any defect develop, it is the business of the operator to at once have it corrected. It will not do to run the machine at all, even if only partially disabled, as any further defect or trouble would be entirely outside of the maker's guarantee, no recourse being open to the purchaser other than that offered by the builders as a matter of courtesy or to protect their own reputation.—W. Wright.

SAWING TIP OR BUTT FIRST.

German sawyers are now discussing a question which often comes up on this continent, but which has never seemed even among these latter to have received a definite and final solution, for the triple reason that opinions differ on the subject, conditions vary in different mills and with different logs, and that there is always "a new crop" of sawyers who have not taken part in previous discussion or been informed as to their trend and result. It will, therefore, be interesting to hear what is said pro and con on the other side of the water, particularly in connection with sash (or frame) sawing, for in Europe in general the circular saw for large logs is conspicuous by its absence.

Many, of course, think that it is all the same whether the logs goes through the sash tip first or butt first. But, says a correspondent of "Der Holtkaufer," (whose name is not signed to his contribution, it does make a great deal of difference, as shown by practical experience, and for the following reasons:—

When logs are squared in the sash mill the tip should go first to the saws, because, despite all mechanical and other precautions, one is not so sure that the sash, when the log is through, will come out at the spot intended; and it can happen that the log in its course may be swerved laterally by bends or projections. For this reason it often happens that, despite all precautions, the log is sawed askew when the butt is presented first. If, however, the butt is the last to come in the sash there is space for setting over during the cut, to rectify any possible error caused by lateral divergence.

But in sawing logs into boards with a gang sash the log must be sawed butt first, as in order to use it to full advantage the number of saws is regulated by the diameter of the butt. Sawing from the butt end there are dropped slabs either of full or of half length, while all the other boards are of full length and thickness. If the log were cut tip first, as where it was merely to be squared, and if the number of saws was gauged by the tip diameter, there would result thick side slabs; and if all the saws were left spanned in the sash there would be a danger of sidewise swerving of the outer ones where they entered the log. Where the cut is made from the butt these slabs, etc., are thrown backwards on to the feed rolls; when, however, the tip enters the sash these pieces are thrown forward into the rolls or else they stick in the sash. It can happen that these loose pieces can cause bending or breakage of the gauge screws, and let the distance pieces between the saws come out. The broken off screws can damage the saws so that the partly cut log must be drawn out backwards in order to permit spanning one or more new blades, which, of course, is an aggravating and expensive proceeding. It often happens also that in sawing logs into boards with the tip end first the log, by reason of irregular projections thereon, is swerved sidewise, and this makes the boards "out of wind." Also, the passage of the log through the sash by means of the feed rolls is more difficult, and where the saws are dull the feed may refuse to act at all.

Where a horizontal sash is used the log must be run in butt first for all purposes, because every log, whether it is to be sawed into boards or merely squared, must be set to a certain gauge, horizontally, in order to make the first and the last cuts come out exactly right.

As, however, the local conditions vary so—as regards the taking the logs from the water or from the yard, for example—it is to be recommended that care be taken to turn the log, if necessary, before putting it on the trucks, so that the end may come first to the sash for which the special conditions call.

CIRCULAR TEETH AND THEIR CARE.

By A. M. St. Cyr.

I picked up a handbook by one of the largest and best manufacturers in the world and read as follows:—"The distance between points is so largely a matter of individual preference that we prefer to have it decided by our customers and noted in the order."

The maker of saws does not wish to commit himself to the opinions of A lest he miss a sale to B. The very indefiniteness of information in "handbooks" has led many to think that the spacing of teeth is of very minor importance, while in fact it is one of the "little things" that mean success or failure. There is one, and only one, best form of tooth and spacing.

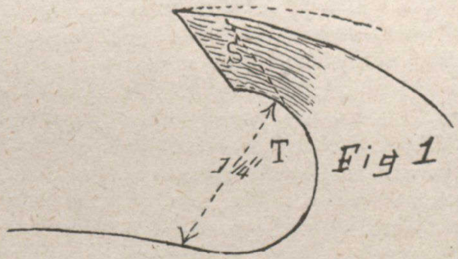


Fig 1

A series of experiments made by Mr. Biddle a few years ago showed the facts to be as follows:—

At the proper speed a tooth will cut one-twelfth of an inch very nearly as easy as one-thirty-second; that in the same kind of wood the teeth "held their edge" in proportion to the time in the log; and that the limits of speed were 6,000 and 14,000 feet per minute. It is doubtful if the experiment was conclusive, for in the 50,000 feet per day mills there is a very different tooth put on at "quartering time" from what we see in a 10,000 mill.

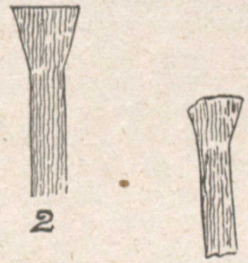
This article is not written for men who can command a filing room worth the price of a good sawmill, but for men who must do the best with the material at hand.

We will suppose that your boiler is not over-cylindered so that you can hold a uniform speed and that you wish to cut all the lumber possible from both hard and soft wood.

A sixty-inch saw with thirty-six teeth will give the best results on all round work.

This will give a spacing of 5 7-32 inches between points and without undue strain will stand a four-inch feed.

The form of tooth here figured will be found as nearly perfect as it is possible to make one; it has the form of a chisel, the shank "S" gives strength and the deep circular throat T gives ample room for circulation of dust. The saw once hung on the mandrel it must have a care that knows no cessation. In spite of all vigilance saws are worn out more by the file than by the log.


2 3

File square across the front, and cease filing when he tooth comes to a cutting edge. You cannot make it more than sharp. When you have filed away to the dotted line it is time to gum the saw.

If your business justifies a mill it will justify an eccentric swage and a tooth shaper.

The upset is good as an auxiliary, but it alone will not make the tooth shown in Fig 2.

I could almost advise a mill man to get a swage first and a saw with what money he had left. Long ago when I had a six by seven gauge saw, cut four to six thousand feet a day, I rounded up Saturdays. The rounder was a piece of sandstone. The saw would wobble and I would find some of the teeth as in Fig. 3. By the time they were squared up with the swage they were too short.

I have had good success with a piece of gas pipe held at right angles to the saw. It will bring the teeth down square.

But better than all is to never let the saw get "out of round."

A thin piece of board hollowed at one end to fit the collars gives a sure measure and the long teeth can be brought down with the file.

BAND RIP SAW CRACKS.

A certain planing mill had trouble with its band rip saw blades cracking. In spite of many suggestions offered, the saws kept on cracking, which kept the filer brazing about every time the saw was taken off. They were ripping 1 and 2-inch pipe stock, changing the saws twice each week. The stock was clean and bright, and the saws seemed to be all right with the exception of the cracks. They had taken off some of the weights, relieving the strain on the blades, with but little, if any, improvement. Finally a filer suggested changing saws oftener, and after much talking and figuring they concluded they would try the suggestion, though they had little faith in it. Much to their surprise, the change was just what they were looking for; the saws stopped cracking, the filer was happy and the owners well pleased. Having several resaws running and the filer being very busily engaged, it never dawned upon them that it was cheaper and quicker to sharpen often than to keep brazing.

Furniture and Cabinet Making

POINTS ABOUT GLUE.

One of the things that seem to puzzle not only the smaller fry among glue-users, but many of the larger ones, and the older heads in the business as well as the younger ones, is glue absorption; that is, the absorption of the glue by the wood on which it is spread. There is another matter about absorption in connection with glue which is based on the power of glue to absorb water. Probably this bears some relation to the other matter of the amount of glue that may be absorbed by the wood. Any given wood will absorb glue in proportion to what we term its (the glue's) thinness, all other things being equal. What we might term in common language the thinness of glue, however, is not the only thing that plays a part in the quantity of glue that may be absorbed or taken into the body of the wood on which it is being used. There are different textures of wood which take in different quantities, and the temperatures of the wood at the time of gluing, as well as the glue itself, have a lot to do with it.

The first thing that it seems necessary to get straight on, is to what extent the wood should absorb the glue. Evidently it must absorb a little, otherwise there is no chance for the glue to exercise its holding qualities and cement the two pieces of wood together. It would be interesting if we could have an illustrated explanation of just how glue exercises its holding power. It would give considerable light on the subject of whether or not it is necessary to have it penetrate into the body of the wood in making a glue joint. In some of the cements used in the building trade the method of cementation has been explained and illustrated. It consists largely in particles of the cement expanding, or rather sending out arms or branches in different directions under the influence of water, and these interlocking with each other and around the grains of sand, either individually or on the stone face, form the holding qualities. To get strength and likewise density it is desirable to have the particles so distributed that there will be room for all of them to send forth as many of these tentacles or branches as they may be inclined to, and at the same time to have them fill up as nearly as possible all the different voids incident to the joining. After one has seen the idea illustrated by magnified drawings and pictures it is easy to understand where and how such articles as cement and lime get their holding or cementing qualities, or rather how they exercise them. Does glue exercise its holding qualities in the same manner, and, if so, how far should glue penetrate to encompass sufficient fibers of the adjoining wood to make the best glue joint? These are questions that it is hard to answer, but it is very likely they depend somewhat on the nature of the wood and the comparative fineness and coarseness of its fibers and general structure. Reasoning from this hypothesis, we might well argue that in the finer and closer grained woods there is no need for so much penetration to get the holding power wanted, or for the glue to get the proper grip on the face of the wood. To a certain extent, therefore, the matter naturally adjusts itself, because the closer the grain of the wood the less tendency there will be to penetrate by glue of the same consistency, and the more it will be inclined to penetrate the more open or coarser-grained woods.

In the foregoing we might argue that glue should be of the same consistency for the finer-grained woods as for the coarse, and in a general way the argument might hold good, too. There is another thing to be kept in mind, though, and that is the more glue that is absorbed into the face of the wood, the more must be put on to get the same result. Therefore, while glue of the same consistency might be used, it will be necessary to spread it more thickly on the coarser-grained wood. This is a pretty good point to make a note of and keep in mind. Also, it should be followed up by a study of different woods by way of experiment, because quite frequently woods of what might be termed practically the same class as to coarseness of fiber, may be so differently bonded together within themselves that some of them will absorb glue much more readily than it will white oak. This has been demon-is of somewhat the same structure as oak, and it will absorb glue much more freely. Also, glue will penetrate red oak more rapidly than it will white oak. This has been demonstrated thoroughly in efforts to use red oak for barrels, which are required to be sized or have the pores of the wood filled with glue. The process resorted to in sizing or filling the pores of an oak barrel with glue is to pour a gallon or two of hot glue inside the new barrel, then put the bung in and roll the barrel around well, so that the glue comes in contact with the entire inside surface. While this is going on the heat in the barrel, from the glue, generates steam and other gases and creates pressure, and this pressure serves to force the glue into the pores of the wood thoroughly. When red oak is used, the glue is forced right out through the pores instead of just embedding itself in the wood and filling up and closing all the pores, and for this reason they can't use it for certain classes of tight-barrel work. All this is entirely aside from the use of glue in veneer work, except in that it demonstrates the difference between white oak and red oak as to the power of absorbing the glue. It would seem to follow naturally then, that for gluing red oak one should either use more glue or have it a little thicker than that used for white oak, to get equal penetration and satisfactory results.

Some authorities maintain, in connection with absorption of glue by wood, that there is quite a wide variation in the quantity of glue that any given wood will absorb at different temperatures. Glue, it is hardly necessary to state, is always used warm—that is, practically all glues made use of in veneer work. There are some special glues—some liquid glues and things of that kind—that are spread cold, but the glue under discussion here is always used warm. Its flowing qualities are partly due to the heat, and therefore anything that tends to cool it off reduces its flowing qualities and checks its penetration into the wood; so that, when using wood that is cold, the glue will be chilled and stop penetrating the wood much sooner than if the wood to be glued has been heated until it has something near the temperature of the glue. Quite frequently additional penetration is induced by the use of hot cauls, which, even after the glue is chilled somewhat from contact with the wood, warm the whole mass up and start the glue to flowing again. This helps out where there is too much glue left in the joint and not enough penetration into the wood. If, however, the glue has already penetrated the wood enough, and there is no surplus glue in the joint, to induce further penetration by the use of heat or hot cauls is likely to deduct from the strength of the joint. This should be kept in mind by people who do jobs of fancy veneering and sometimes go over them with hot cauls afterwards for some purpose or other. If it is expected to go over them this way, the glue had better be spread a little more liberally, lest the heat used to warm up cause the wood to absorb so much as to spoil the joint. Of course, it is better to avoid this heating with hot cauls afterwards if it can be done.

You will find, too, that the farther you get into this subject of absorption of glue into wood, and the relation of temperature to it, the more complications you will discover. For example, while it assists penetration to have the wood warmed, it is contended by authorities that it can easily be made too warm and the wood thus become what we might term "hungry" for water and absorb the moisture from the glue so quickly as to prevent the glue from even spreading or penetrating properly. That is how we sometimes get as a final result what are termed "blisters." It is maintained that moderate temperatures will produce the best penetration, and it has been pointed out heretofore that a common fault is to use glue at too high a temperature. One authority suggests that glue should be used with the temperature well below 160 degrees F., with the wood on which the glue is to be spread somewhere between 90 and 100 degrees. There are others, and especially those who don't try to raise the temperature of the wood much above the temperature of the glue room itself, who get about the same result sought above by using the glue at a lower temperature. The way they do this is to have two glue pots or receptacles, one in which the glue is heated primarily, in which the temperature may be about 160 degrees, and another one in which the glue, after being properly melted or cooked, is poured, and the temperature here is kept at about 100 degrees. This latter receptacle is the one from which the glue is used, so that if the wood is at a temperature of around 70 or 75 degrees, there shouldn't be enough difference to amount to much, and the wood will not be so hungry for moisture as if it were heated to a higher temperature, say 90 or 100 degrees.

Another complication in this connection is found in the effect the different seasons of the year have on the work in the glue room. In the hot period of midsummer, where the temperature naturally reaches from 80 to 95 degrees, and frequently will stand at 100 degrees and over in the glue room, the wood stays at a pretty high temperature without effort at raising it, and also the glue shows a tendency to keep up at a high notch of temperature. The result is that it generally takes more glue to do the same work in August than in the winter, or even during the cooler months of spring and fall. In other words, to get good results the glue must be spread a little more freely, and thus in the end will make the glue work cost more, as far as glue is concerned, in summer than in winter. It would not make any difference if the glue and the wood and the interior of the glue room were kept at the same temperature all the year round, but this we never do. The glue room may be warmed in the winter, but it is never kept in the same condition that prevails in the midsummer, therefore the same amount of glue may do more work because of the difference in absorption and penetration into the wood.

It is also argued that a difference of only 10 degrees in temperature of the stock being glued may affect the strength of the glue joint 50 per cent. This is a complication that it is pretty hard to figure out and see clearly all the way through. There are undoubtedly any number of other factors that enter, one of them being that of pressure. For example, if the conditions of the glue and the wood are just right, there is not a great deal of pressure required—just enough to press the wood together firmly. If, however, conditions are such that the tendency of the glue is to chill and remain in a thickened body between the layers of wood, an extra amount of pressure may relieve the situation by forcing the glue into the wood through pressure, and thus thin down the layer left between the sheets. It is better to have what might be termed a natural penetration rather than the forced, yet we must consider the commercial side as well as the technical, and if large quantities of built-up panels are being made, it is much better, easier and cheaper to furnish a little extra pressure than to take extra pains about the temperature of the wood. That is why the glue practice in big panel departments and cabinet shops differs so much, and why one who handles glue and learns only how it is handled in one place may be somewhat at a loss in another place until he has figured out the different local factors that enter into the work.

FURNITURE A SIGN OF CHARACTER.

With the downfall of Napoleon began the French decay, so let us look to America for the next change and comparison in style and character. Colonial is a native style, and is the most becoming style for the people of this continent, because of its historical connections and its beauty, and especially does it depict the solid gradeur from which it sprung. We never find it painted, gilded, or adorned with flaring brass, but in the elegance of its modesty standing for what it is. We often find it veneered upon a solid and stocky foundation, but the people also had a cloak of politeness, a picturesque attire and a quaintness of home surroundings which quickens our love and admiration for every figure and picture of colonial times.

It would seem that the standard of the mind and character of any period would leave its marks upon the furniture of that time, but what of the present? We have entered into a new period of activity. There is a new theology and a marked difference in our political aspect. We are living in the greatest inventive age the world has ever known, and this new activity is world-wide in its effects. Its theology is as broad as the brotherhood of man, and there is now one political party with the same name, object and ambition in all the countries of Europe and America. The activity of invention is also world-wide, and the great inventions of each nation are soon enjoyed by all. The designs in furniture corresponding to this activity are sometimes called new art, mission, arts and crafts, and its philosophy is grand in its simplicity. The philosophy of it is to follow the grain. At first thought it does not seem to imply much, but, as carving cuts across the grain, therefore weakening the stock, it is not much used, but marquetry in new designs and applied mounts of hammered brass and copper are used. Thus, dominating influence of our time might be summed up, truth and justice in theology and society, and simplicity in art. The cosy corner and the den were but forerunners of the bungalow. A large, airy living room now takes the place of the sitting-room and parlor, and the furniture of the new philosophy has already invaded the living room, dining-room and café, and is destined to be the leading style which marks the age in which we live. The standard of character is also climbing the ladder of advancement, fostered by the opportunities of free education from public schools, magazines and newspapers, the extent of which may be waiting for some national crisis to exhibit its true value, like a wrecked car, for new furniture show us the solid wood, brighter than the subdued surface which we are accustomed to in daily life. This is something that cannot be said of the furniture of any period but our own, because the furniture of all other times has been so embellished with carving, veneer, paint, varnish, gilt or glitter as to cloak the surface with something more showy than the stock itself.—Furniture Worker.

INTEREST IN ONE'S WORK.

In a lecture on "The Political Economy of Art," given by John Ruskin in Manchester, England, fifty years ago, he said:—"They will put twenty men to work to carve twenty capitals, and all shall be the same. If I could show the architects' yards in England just now, all open at once, perhaps you might see a thousand clever men, all employed in carving the same design. Of the degradation and deathfulness to the art intellect of the country involved in such a habit, I have been led to speak before now. When men are employed continually in carving the same ornaments they get into a monotonous and methodical habit of labor, precisely correspondent to that in which they would break stones or paint house walls. Of course, what they do so constantly they do easily, and if you excite them temporarily by an increase of wages you may get much work done by them in a little time. But, unless so stimulated, men condemned to a monotonous exertion work only at a tranquil rate, not producing by any means a maximum result in a given time. But if you allow them to vary their designs, and thus interest their heads and hearts in what they are doing, you will find they become eager, first to get their ideas expressed, and then to finish the expression of them, and the moral energy thus brought to bear on the market quickens, and therefore cheapens the production in a most important degree."

The best workers, then, do not work under compulsion. They put joy into it by believing that it is work that is worth doing. It is not what we do but how we do it.

IMITATION OF INLAYING, ETC.

The direct mechanical printing with fatty inks, of the kind used for printing on paper, card, tinplate, and similar materials, has not hitherto been practised on wood to any extent owing to the nature of the material to be printed upon, the adherence of the inks or colors varying according to the expansion and contraction of the material, and the hardness of the fibres, penetrating irregularly into the wood according to the varying porosity, and so producing irregularity of line and tone, besides concealing the natural grain of the wood. A Belgian is said to have invented a process whereby these difficulties are overcome. By this process he is enabled to obtain decorated wooden panels, by direct mechanical impression, which gives the effects of marquetry, intaglio, incrusted work, relief, enamel, painting, or any other mono- or polychromic decoration. In order to get rid of the difficulties in the way of directly printing on plates or panels of wood, the surface of the wood to be printed is rendered perfectly homogeneous and impermeable to moisture by means of composition filling the pores and covering the fibres of the wood, without altering the natural color of the wood or the effects of its structure, while at the same time adapting it to receive easily and retain the effect of the decorative impression, which may be applied directly by a lithographic, typographic, or other method.

GLUING MAPLE.

Maple veneer that has been air-dried during the summer does not prove to be in the best condition for gluing. Although one would think that of all years for air-drying veneers this surely must have been the best, there having been so few rains, yet after testing and gluing, the work does not prove satisfactory.

One reason undoubtedly is that the logs are fresh from the stump and contain quite a quantity of sap, and it takes longer to dry out say than it does water. This sap seems to have a bad effect on glue, causing it to spoil or lose its strength. This is shown from the fact that the veneer holds better when freshly taken from the bales than it does a few days later, especially where the panels are piled up solidly and left to stand in a warm room or during warm weather.

One solution of this problem is, there is a certain portion of the sap remaining in the wood, and possibly in the form of sugar, such as is obtained from the hard maple tree or sap thereof. When the water from the glue gets into the wood and comes in contact with this sugar, the sugar is dissolved and mixes with the glue in the joint, forming a compound which, if not rapidly dried, but is kept in a warm condition, soon ferments and will show mold on top, or rather on the outsides of the panels. Under these conditions the glue has lost its strength and the veneer is very easily pulled off the centres. To overcome this, pile the panels on sticks as lumber is piled to go into the drykiln. This will give the moisture a chance to get out and preserve the life of the glue.

Probably as many panels are spoiled by not having the proper care after the gluing is done, as are spoiled through bad gluing. Many of the little things which go to make either good or inferior work in connection with the glue room, are never taken into account, therefore one is at a loss to know the whys and wherefores of certain results.

Not long since I was in a certain shop where 50 per cent. of the panels were going bad, and awfully bad at that. Nobody knew what the trouble was, and they wouldn't pay the price for somebody who could put them right.—Exchange.

WARPED WOOD.

Wood will warp, and it is perhaps asking too much to say every man who works lumber in the machine room of a furniture plant should study these warping tendencies and so be able to place each piece of stock to the best advantage. The man that can and will do this is worth more to the institution than the one who either does not know or does not keep his mind on the subject. And even if the men do not know these things it is one of the duties of a factory foreman to keep himself informed on them, to point them out to the men, and be around the work enough to see that proper attention is given them.

When a top or board is warped it is difficult to keep it down flat on a shaper table, and frequently a poor job results, whereas if a raised center piece or ring is put around the spindle, the work becomes easy, with little chance of spoiling the job. The idea may be carried out differently in detail, depending somewhat on the work. If it is straight work, a thin strip tacked on the table will answer, but for round or oval work there should be a round rim, which might be made in two segments, of thin wood, carefully fitted around the spindle. There are several ways in which the idea can be carried out, and probably many are already up on this point, but to some it may contain a new suggestion and help ease the way around a bit of work which is sometimes provoking.

—Why is birch not more popular as a furniture wood? Everybody seems to agree that its native beauty and adaptability entitle it to a high place amongst furniture woods, and there has been a great deal said and published about its good qualities, but somehow it doesn't get the recognition it should.

Boxes and Cooperage

BETTER APPLE BARRELS.

There is no doubt that a good deal of complaint is heard among the farmers and fruit growers as to the quality of many of the barrels they buy for shipping their fruit. Many of the apple barrels are suitable and sufficiently strong for making one shipment even to England or for some other long distance. But there is a demand from growers, particularly those residing within a short distance of towns or cities for a package in which they can take their fruit to market and dump it. For this purpose a strong package is required, one that will take the fruit perhaps fifty times, and will last for years. It need hardly be said that, much of the stock which now has to be or is employed for barrel making does not lend itself to such durability. That it would, however, pay both the growers to demand such stock and for the coopers to produce it is beyond question.

In order to obtain the views of the trade upon this subject we took the question up with prominent members recently, and herewith present the manner in which they look at it:—

"There is no question," says one gentleman very well known in the cooperage stock trade, "but that a lot of poor barrels are supplied for this trade by the coopers. The fault, however, can hardly be laid at the door of the coopers, as some of the packers want the cheapest possible package they can get, and the coopers have to cater to this trade.

"The most of the Cooperative Associations are using very high grade packages, especially where they are using the Standard Apple Barrels, made from 28½-inch staves, with 17⅛ heading, as they buy either Mill Run or No. 2 flour barrel stock. Where they buy the No. 1, they have to be put up specially good grade, which makes barrels that will carry anywhere, and can be used afterwards for another purpose. There are, however, a lot of poor staves produced, made from all classes of timber, elm, black ash, maple, basswood, and in some cases, even tamarack, and cedar. The bolts are all steamed together, the consequence being that all of the nature is taken out of the soft wood. These bolts are cut up, and the staves sold for Mill Run quality. The hardwood and soft wood being worked together, makes a very unsatisfactory package; in fact, after the apples are taken out, it is good for nothing else, and the packers are lucky if their apples arrive in good fair condition, at all, when they use this package. I have had the matter up with Mr. McNeil, (of the Dominion Government Fruit Department), on several occasions, and he is doing his utmost to get the packers, both co-operative and individual, to use the standard barrel made from good elm staves, or even a good hardwood, and I believe that the barrels have improved principally through Mr. McNeil's efforts, during the last few years. It is simply up to the packers, the class of barrels they will use. The coopers or manufacturers have to cater to the wants of the packers, but if the packers will be guided by Mr. McNeil's advice, they will either use a good No. 2 elm stave, or a select mill run hardwood, in other words, the poor No. 2 staves, in the hardwood, would have to be taken out, otherwise they will not have nearly as good barrel as out of the No. 2 elm. As far as the heading is concerned, either basswood or hardwood makes a good head for apples, but black ash, pine, tamarack, or cedar should not be put in apple barrel heading. A good 6-hoop barrel is all right, but an 8-hoop barrel is 50 per cent. better. I could refer you to several of the Fruit Growers' Associations who use 8-hoop barrels, and also some individual packers who also use this package, and they will tell you that they rarely ever have a complaint on a single package at the other end, and where there is no complaint, the packages are good, and can be used again."

EXPENSES IN THE BOX FACTORY.

It is customary with many operators to include labor and expense in one amount generally termed the "work bill," when figuring for business. Those who do this, for the most part are fortified with statistics which enable them to tell with more or less exactitude just what proportion of the total expense properly belongs to labor; for while using a price per 1,000 feet to cover both labor and expense, this is done as a matter of convenience in figuring for business, and as a means of naming a basic price per 1,000 feet, which includes lumber, waste, labor, expense and profit.

Say lumber is $15, waste $3, labor $3, expense $1.50, profit $2.25, or a total of $24.75 per 1,000 feet, exclusive of delivery charges. It is much simpler to multiply the feetage of the box by the value of all items treated as a whole than make a number of calculations covering the various items in detail. I mention this as a very general practice, though I know of instances where detail figuring is the rule; for instance where a box is figured out on a printed form having items something like this:—

Lumber on yard.....— ft. in box, @ — per 1,000,	$——
Waste ....— ft. in box, @ — per 1,000,	——
Handling to factory..— ft. in box, @ — per 1,000,	——
Planing ....— ft. in box, @ — per 1,000,	——
Resawing ....— ft. in box, @ — per 1,000,	——
Cutting and ripping..— ft. in box, @ — per 1,000,	——
Matching ....— ft. in box, @ — per 1,000,	——
Nails	——
Lath, yarn or wire	——
Lockcorner	——
Glue	——
Printing	——
Trimming	——
Shipping	——
Cartage or freight	——
Total	$——
Add profit	——
Grand total	$——

By leaving a few blank lines at foot after cartage or freight, this form can be made to include everything in the shape of extra operations or expense of materials not covered by the printed schedule. Sometimes this record is in book form, giving a very handy reference for statistical and price purposes, and its arrangement while covering the made-up article, can also be used for shooks. The value of a printed form of some such design as this lies in the fact of having all or nearly all the known items of expense in connection with a large variety of work enumerated thereon so as to prevent possible forgetfulness to include some of the extras in the estimate, while for purposes of reference it is a positive time-saver.

In figuring for "expense," says J. M. Leaver, in "Packages," a strict line should be drawn so as to exclude those items which go properly under the head of materials, such as nails, lath, yarn, wire, glue, etc., etc., as these items are just as necessary to the construction of the box as is the 'umber, and it is important to make each box figured on bear its proper charge for all materials entering into its makeup. To lump these is to spread over the whole line of work done charges which have no right to be made in some cases, and to reduce the cost on those boxes which should alone bear these charges. Competition is too close to admit of figuring on general averages. The result of such figuring is to cut prices where averages have been unfairly applied to work which is saddled with some expense not properly belonging to it. Customers do not know how the figures are arrived at, but they do know when the quotations are out of whack with the other bids.

It takes more lath, yarn or wire to tie some car shooks as compared with others. It takes more and sometimes larger nails to cleat the ends of some shooks than others. Averages for tieing material may not get very far out of the way, yet three is a big difference in the nail matter, and it is better to be exact as far as possible than to make a guess.

Expense properly covers salaries of officers, superintendent, foremen, office force, office expense, interest, discount, travelling, etc., etc., in fact, all such items as do not properly belong to either materials or labor.

The aggregate of the "expense" account will, nearly always, be much larger than generally anticipated, and this account will be found to bear a very close relationship to the actual cost for labor, because the simpler and easier the labor problem, the less necessity for executive expense, which means that a cheaper organization can handle the business. And so if the operation is complicated, owing to a great variety of work, small quantites and matters of this nature which require much attention to keep in good shape, the executive cost is higher.

A very simple organization will turn our large quantities of large boxes made from one-inch lumber, say leaf tobacco boxes for instance. Yet when the resaw and the matcher, the lockcorner machines and the printing press, etc., etc., come into play and the thickness, lengths and widths and quantities vary from A to Z, then the organization has to be big enough to swing all these lines of work in a satisfactory manner. In other words, such organization is just the opposite of specialization, and it is well-known that the latter is a result of study of certain problems which are worked out on a large scale at reduced cost.

But whatever the organization may be, it is a fact that the larger the quantity of lumber put through the plant, the smaller the expense per 1,000 feet, and as this quantity is governed by the nature of the orders, so is the expense controlled by the actual labor cost, it being regulated by the volume, and therefore large feetage in a box and good-sized quantities of a size and kind have a decided bearing on this portion of the outlay for manufacturing.

Belting, oil, files, knives, saws, etc., repairs of all kinds and numerous other items of outlay that must be made in order to keep the plant going at high pressure form part of the "expense" account, and these amount to considerable in course of the year.

Depreciation of plant is another feature which has a bearing on "expense" account; there are various ways of looking at this. Some argue that as a going concern, if repairs and replacements are faithfully attended to, a plant is as good as new and therefore depreciation is not to be thought of. Others think a certain amount should be wrtiten off each year. This is one of the matters on which every man is a law unto himself, and properly speaking it is for the man who has invested his capital in the plant, to decide in any way he thinks best.

Necessarily, in any plant, however modern, some changes are made during the year; machines may be thrown out and replaced by others more suited to the demand of the trade. In such cases there is a loss which must be borne by some of the accounts. Yet manufacturers will differ as to how this should be done. In some shape or other the business must and does assume the difference, whether the amount is recovered by gain in product or by figuring it into "expense" and thus getting it back on the basis of quotations. To all such problems the manufacturer finds a solution satisfactory to himself and always will.

But a modern plant starting full blast to-day is by to-morrow a second-hand concern, to an outsider, and its worth is just what the insurance amounts to, if the fire fiend takes hold of it, or if the business changes hands very soon, or at any time, after starting it is not transferred at its full value, there is a loss and the seller absorbs it.

To the beginner a box is a box, neither more nor less. For him it contains no elements of risk, because he knows many concerns that have been making boxes for years and which appear to be doing a thriving business. In fact, he thinks these concerns veritable beehives of industry, and so in fact are they; must be or they could not exist. The pace is swift and staying qualities as well as speed are indispensable. When the beginner has mastered the practical points of buying stock and cutting it up cheaply with the smallest amount of waste, he has this "expense" item to understand, and it will take some thinking and watching to so apportion it to the various classes of work that the money thus expended will return. This is not really difficult to learn, it merely needs system and application similar to that given waste and labor.

In no item of the estimate of manufacturing cost is the beginner so likely to fall down as in getting a correct idea of "expense." In the matter of waste he can easily figure the difference between rough lumber used and its product. In regard to labor he has his payroll which contains dollars and cents results that do not lie. But in the getting together of "expense" items the tendency, nay even the desire, to underrate and minimize losses is usually so marked as to lead to error and a consequent vanishing of profit; and this is not to be wondered at because he has no previous experience to guide him, while the veteran who makes a study of the fine points can take you to his results year by year, showing the cost for every item.

The handling of the "expense" items will affect the "loss and gain" very materially. Investigation often discloses weak spots that can be strengthened, or it may show that a pernicious policy is really a costly plan and that a more liberal expenditure may increase product and profit. Let the beginner look at these matters from both sides and he will find out for himself the best way. The point may be illustrated by asking himself whether it is cheaper to pay for a new belt for a machine the full product of which is essential to keep other machines going full blast, than use a rotten old belt which breaks frequently and by the stops it causes, delays the work all round, as well as getting the men into careless and shiftless habits. There is no place in the box factory programme for avoidable stops. To keep the machines running full is to keep down "expense" account.

This account may very well be regarded as a subsidiary profit and loss account, and therefore it may be said to be a part of the salary of the boss. It is all right to keep it down, but if product suffers because of stinginess, depend upon it more money is lost in other ways than would be if "expense" were greater.

There is a medium, the middle ground between extravagance and penuriousness. The beginner may swing either way, but the middle course is best.

THE DEMAND FOR PACKAGES.

Boxes, crates, barrels, kegs, packages, bags and pails are so common and so widely used as to excite but little interest. To-day nearly everything except steel rails, ore, lumber, sand and like bulky and crude commodities is encased in some sort of package before being shipped. Some commodities are sent out in large bulk lots, later being put up in varying quantities for distribution to consumers. Tremendous quantities of tin, steel, wood, paper and coarse cloth are employed each year by those who make packages for the world's requirements.

Box manufacturers use the low grades, largely, in their product. In white pine, Nos. 3, 4 and 5 boards are turned over to the box factories for manufacture into shooks and for the assembling of the shooks into boxes. A piece of lumber which might appear worthless to the builder of the ordinary factory trade is valuable to the box people because with the machinery perfected to produce boxes it is possible to use to advantage every sound section of a piece, it might almost be said without respect to its size or shape, although of course there are some limitations along this line.

Of late years the box trade is using a great deal of low-grade hardwood stock—sycamore, cottonwood, poplar, red gum, basswood, birch, beech and other hardwoods. Yellow pine and western woods also are used. Spruce and western pines are the favorite materials on the Pacific coast. Poplar, always a favorite with the box makers, now is used principally in the manufacturing of special boxes of high-class. Low-grade poplar is used largely for such purposes.

It is practically impossible to reduce accurately to board feet the timber used by the box people. Of late a great deal of rotary cut veneer is employed, and while seemingly there is a great deal of waste in the factories when cutting dried veneers to the desired widths and lengths the product of good logs cut into veneers, reduced to board feet, would exceed slightly the log scale.

During 1906, for which year detailed figures have been compiled by the Forest Service, the production of tight cooperage stock amounted to 267,000,000 staves and 17,700,000 sets of heading. In slack cooperage the reported production was 1,097,063,000 staves, 129,555,000 sets of heading and 330,892,000 hoops. The hoops would be figured at five to the foot; the heading at about 2 feet to the set and the staves probably at ½ to ¾ of a foot. This would mean an aggregate consumption of timber by the cooperage stock manufacturers of more than 2,000,000,000 feet. Owing to the waste in the production of staves, however, the actual quantity of lumber used probably was greater, but how much greater it is not possible to determine with any degree of accuracy. The report of the Forest Service also shows 326,000,000 feet of timber, log scale, to have been employed in the production of veneers, one-fifth of which was red gum.

Packages of all sorts are just as necessary as buildings. Wooden packages have been given the preference, first, because the trade is accustomed to use them, and, second, because relatively they have been cheaper and once used could be disposed of for fuel or burned if an excess accumulated. The usefulness of a package does not end when it has been emptied of its contents. Many of them are given an additional lease on life by entering domestic service, being employed as flower pots and as receptacles for waste and for storage purposes around the house. In a broad way, however, material entering into the construction of boxes, crates and slack cooperage for the shipment of canned goods, fruit, meat, etc., is used but once. The amount of timber employed each year for these purposes necessarily is large, probably in excess of 3,000,000,000 feet, as the members of the National Association of Box Manufacturers claim to cut up about 1,000,000,000 feet of lumber and veneers. There are certain kinds of cooperage which are discarded after serving the first purpose. Other kinds are continued in service until no longer of use through wear and tear and are relegated to other utilitarian purposes.

Many attempts have been made to devise a collapsible package which, owing to the small space it would occupy, could be shipped to any part of the country, and after having been filled at the factory could be emptied at destination and the package returned to the concern using it when a sufficient quantity had accumulated to make shipment worth while. There is ample room in this direction for inventors to exercise their talents. So great has been the demand for packages that certain manufacturers have adopted some forms of tin or steel packages, sometimes protected from injury by a wooden jacket. Experience with such forms of packages has been fairly satisfactory, yet when iron or steel barrels or casks are used a drawback is found in the weight of the packages upon which shippers are required to pay freight.

The box trade is a distinct branch or subdivision of the lumber business. Ordinarily it is not considered a part of the lumber industry but of recent years some box manufacturers, to insure a supply of raw material, have taken up the manufacture of lumber, using the low-grade products and selling the better grades, and in this way becoming producers of lumber as well as of packages.

Another development of recent years which has brought the lumbermen and the package manufacturers closer together is witnessed in the dying out of the old antipathy which existed between the stave men and the lumbermen. Besides, they have done their part in shaping affairs by perfecting devices for utilizing material which would otherwise be classed as waste. Sawed lumber is used for some cooperage stock which at one time was made almost wholly of split staves. There is ample room for improvement along these lines.

Work of this kind is being taken up by the National Association of Box Manufacturers and similar organizations whose labors have resulted in bringing about a much better understanding of affairs generally; a better appreciation of the value of the products, of the worth of timber, and practical means of getting the value out of the timber. They have succeeded also in putting the industry on a fairly profitable basis by studying costs and developing correct systems of estimating.

A recent compilation shows approximately 1,500 box manufacturers in the United States and Canada. It is natural, of course, to look for the greatest number of package manufacturers in the distinctly manufacturing states. Massachusetts, for instance, stands at the head with 170 institutions; New York is second with 132, New Hampshire third with 77. Maine is credited with 75, Pennsylvania with 70, and Vermont with 51. California is the home of 61 manufacturers, who devote their attention largely to the production of orange, lemon and raisin boxes, peach baskets, fruit crates, etc. Illinois has only 46 institutions, Indiana 36 and Missouri 36. Michigan, a fruit state, has 49. Ohio has 61. Practically every state in the Union has one or more box or package manufacturing institutions.

Box shooks and boxes knocked down are shipped almost any distance, the distribution being determined by the competition from nearer and cheaper sources of supply.

NEW IDEAS IN BOXMAKING.

By C. A. Stafford.

My experience and experiments have all been with short lumber—namely, slabbed resawed stock, trimmings under 48-inch in length, combined to a greater or less degree with boards. In handling shorts one of the most important points, as we have found, is the sorting. For this we use a machine, patterned after the Linderman sorter that gives us approximately 128 different sizes. The stock is received in wagons and open cars and thrown on a chain that carries it into the sorter proper, where it is sorted to lengths. Then, dropping to a lower level on chains running horizontal, it is sorted to the different widths. This machine carries over 7,500 feet of chain and will sort about 60,000 feet of lumber per day, but it is driven by a 10-horse-power inclosed motor.

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 drykiln 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 boxman 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 shorts 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 resaw, 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 the cut-off saws or rip saws. In front of the rip saws come the matchers, horizontal resaws, printers, nailers, 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 of 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?

BOXES FOR APPLES.

The United States consul at Hull, England, speaking of the importations of apples from America and their sale and distribution in the British markets, says that apple shippers in most of the importing centres are very much interested in the growing popularity of the bushel box for the distribution of apples in their market. This box is also called a 40-lb box, but no details are given of its make-up. It seems to have been coming largely from Canada where the exporters last year shipped quite a lot of fruit in 40-lb boxes. At first there was some opposition to it among the British purchasers, but now it is claimed by the consul that it is found much more convenient than a barrel holding 3 bushels and that thousands of boxes of Canadian Greenings and Baldwins are being sold in boxes, and he thinks that next year the American box business will be increased at least five-fold.

He claims also that one Canadian exporter expresses the opinion that in the near future at least 50 per cent. of the Canadian apples shipped to the United Kingdom will be packed in 40-lb boxes. Also, it is claimed that the Tasmanian and Australian exporters favor the bushel box.

There is from time to time more or less inquiry from the fruit people in the United States about boxes, and occasionally some specially designed box is put on the market with individual compartments or layers and sometimes apples are packed in the regulation bushel basket. Just how large a volume these special boxes and special packages have assumed in the apple shipping trade it is difficult to estimate. If there is a continued tendency to use it either in the domestic or export market it would seem that the proper thing for the box manufacturers to do would be to make a study of the different packages offered and by experimenting settle on some standard pattern of bushel box for apples that will give the best service for the least money, and then concentrate on this by making it in quantities as it could then be made cheaper and pushed with better success. It must be kept in mind that while the apple shippers like convenience, they also like a cheap as well as substantial package and the item of cost is always an important one.

OPENINGS IN JAPAN.

According to a report by W. T. R. Preston, Canadian Trade Commissioner in Japan, shows great possibilities for Canada in the lumber and timber trade, especially for pine and British Columbia heavy timbers. There is, he says, a growing need for these in the railways and national works going on in Japan, especially in the imperial yards, where millions of feet of lumber will be needed during the next two or three years for building wharves, ships and so on. One million dollars' worth of lumber and timber will be needed in the ship yards alone during the next year. He shows how 288,000,000 feet of lumber can be used by Japan. A large part of this must be imported. The United States now gets the bulk of the import lumber trade. The coming great Japanese exposition, to be held in 1912, is also pointed to, as it is claimed 77,000,000 feet of lumber for buildings to be put up will be needed for it. The city of Tokio is practically being rebuilt, and there are vast possibilities there.

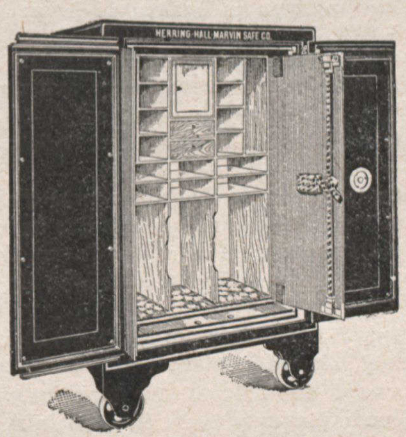
—Edgar Tripp, Canadian Commercial Agent at Trinidad, reports that the import of Canadian shooks, which in 1906-7 was nil, was in 1907-8 worth £400. Staves advanced from nil to £667 and wood hoops from nil to £371. The shooks consisted of molasses puncheons knocked down into shooks and returned at the cheaper rate of freight for refilling with molasses. The £667 worth of staves represent a new demand for barrels which has arisen in consequence of flour now being shipped in bags. Formerly the old flour barrels were used to pack the boiled asphalt, or Epure, of which large quantities are shipped from the Pitch Lake. The staves for these now have in some part to be imported, with the necessary wood hoops, and the number required is likely to increase annually.

PROTECTION FOR FUNDS AND DOCUMENTS.

The recent epidemic of disastrous fires and unprecedented number of burglaries of late in the Dominion, forcibly demonstrates the positive lack of protection now existing in the majority of business houses and manufacturing firms in Canada.

This amazing condition, caused by the evident absence of both Fire and Burglar Proof Safes illustrates the need of a line of first-class safes which can be sold at a reasonable price.

In the recent great Three Rivers Fire, the contents of approximately 80% of the buildings destroyed and the safes themselves were destroyed. One can readily understand the enormous loss that this lack of fire proof protection entailed and our business men owe it to themselves and their business, present and future, to immediately investigate the strength of their protection. It is well to remember that a poor safe



is worse than no safe at all, for it will misuse your trust and will not stand the test in time of need. If you are buying for fire or burglary protection, it should not be a question of how cheaply you can buy, but how well you can guard against loss.

The Herring-Hall-Narvin Safes embody twenty-two characteristic features which make strong convincing reasons proving their superiority. The most economical and shrewdest business men and corporations secure the greatest protection obtainable, by using these safes.

The Canadian Fairbanks Company will be pleased to show this high grade line of safes to intending purchasers, the latest type of safes being carried in stock at their warerooms, Montreal, St. John, Toronto, Winnipeg, Calgary, and Vancouver. Plans and specifications will be cheerfully submitted covering installations for new buildings, either for an ordinary safe of the most intricate Fire and Burglar Proof Safes or Vaults.

Machinery and Mill Equipment

DEPRECIATION IN MACHINERY.

By Walter B. Snow.

No hard and fast rule can be established for marking off the value of machinery. The percentage of depreciation depends only in part upon the age of the machine; to a far greater degree it is affected by contemporaneous progress in the line of manufacture which it was designed to promote. The effect of these and other factors is clearly presented in the following extract from a paper by the well-known mill engineer and architect, Mr. Charles T. Main, of Boston:—

"The two most important things which determine the market value of machinery are:

First. Its comparative ability to turn out a product in quantity and quality equal to that of the most improved machines.

"Second. Its actual condition with respect to wear and tear.

"Although a machine may not be worn out, or even may have been run but very little, it may be unprofitable to run, because other machines have been introduced which do much more or much better work. These machines may be used to advantage in some other concern, and may on this account have more value than scrap. Parts of machines have been improved so that these portions may be changed while leaving a portion of the machine as before; as for example, cotton spinning spindles, so that depreciation might be applied to a portion of a machine instead of to a machine as a whole

"The depreciation for actual wear and tear will vary with the severity of the work done, speed of the moving parts, the care taken in the running, and the amount laid out in repairs.

"It seems to me impossible to separate the depreciation from wear and tear altogether from that due to improvements in arriving at its present value, and it is customary to treat them in a general way, allowing a definite depreciation to cover both.

"Any concern which does not lay aside, at least, five per cent. of the total value of its plant if new, and apply the same at intervals towards the renewal and improvements, will find itself at the end of twenty years in a position not able to compete with success with modern equipped concerns, and it will be necessary to make radical changes at great expense calling for new capital.

"It is often stated that there is no depreciation during the first year of running that the machinery will do better work after it is limbered up and adjusted than when it is set to work. As a matter of fact, depreciation does begin immediately, although not perceptible. After the first year, depreciation is charged sometimes at a uniform rate of five per cent. over all the machinery, due allowance being made for any renewal of parts outside of ordinary repairs. I have used in several cases a depreciation of five per cent. up to the dressing room, and four per cent. for the dressing room and beyond. This view has been presented to me by a member of the Society of Mechanical Engineers, that after the first year the depreciation should be marked off five per cent. to ten per cent. a year until the value is brought down to one-half the original cost; then to maintain its value about level for a while, until it becomes apparent that it would soon be profitable to replace the machinery, when the depreciation goes on at a more rapid rate. This method may be profitable for a mill to pursue in its own book-keeping, but it is not quite definite enough in making up a valuation for purchase, etc. It is sometimes the case that some of the machinery is older than these rates would allow them to be in existence, but they may be still there, perhaps for the same reason that the bridge remained which the engineer had figured could not hold up its load. When asked how he explained the fact that it did stand up, he said that the only reason that he could give was that it stood from force of habit. Some machines remain and do work long after it would be profitable to replace them. The value of such machinery to a purchaser is practically nothing, except that it may complete the organization of the mill and allow it to run until it can be replaced by new machinery.

"If a sinking fund is created for replacing the machinery, three per cent. of the cost would replace it in twenty-four years. There is usually some value to machinery in a mill, even if the property were to be dismantled; but old machinery has no value except for scrap, which is very small, as the cost of taking down is about as much as the value of the scrap."

NOISE AND VIBRATION IN MACHINE FOUNDATIONS.

The question of the vibration and noise arising from running machinery is an important one, and has given rise to considerable litigation. It is also a difficult one to deal with in a short note, as much depends on the buildings and surrounding circumstances, type of machinery, speeds, etc. The remarks here given must therefore be considered as general, and not arbitrary.

The most difficult class of machinery to deal with is usually that with a reciprocating movement, such as power hammers, punching and shearing machines, log and deal frames, etc. Machines with a rotary motion, on the other hand, such as dynamos, wood-working machinery, etc., do not give so much trouble. Many buildings are in use that are more or less structurally weak, and excessive vibration is transmitted by the joists to the walls and by them from floor to floor; these are, of course, especially difficult to deal with.

Knocking or pounding in a gas engine may arise from a variety of causes, such as the premature firing of the charge before the end of the compression charge is reached, thus throwing a greater pressure than usual on the piston before it commences the power stroke, and causing a jar or knock as the crank turns the dead centre. It may also arise from late ignition, a misfire, the piston rings being loose, broken or gummed up, improper or insufficient lubrication, or from ridges or irregular wear in the cylinder. The engine may also thump fom too great a supply of gas, wear on the connecting rod bearings, or from their not being keyed up tight enough. Knocking may also arise from the key of the fly-wheel becoming loose, the crankshaft or cross-head being out of line, from the axes of the journals not being parallel, or the bearings requiring adjustment or lubrication. Worn valves will also cause knocking.

BALL-BEARINGS vs. BABBITTED BEARINGS ON A PLANING MILL EXHAUSTER.

Prof. Charles H. Chase, of the Tufts College engineering laboratories, has just made public the results of an interesting series of tests conducted to show the difference in power required to drive a fan equipped with ball-bearings as compared with one fitted with the ordinary type of babbitted bearings. For the purposes of the test there was taken from the regular stock of the Massachusetts Fan Co. one of their 35-inch standard ball-bearing exhausters. The wheel was of the long, shaving type, without side plates. Its diameter was 24 inches. Interchangeable bearings of the regular babbitted type were provided so that they could be substituted for the ball-bearings without disturbing the wheel, shaft or casing, which were the same in all the tests.

These were conducted at various speeds and with different areas of outlet. They invariably showed the ball-bearings to be more efficient, the saving in power averaging 8.3 per cent. The actual power with the babbitted bearings under working conditions at a fairly high speed corresponding to about 6 ounces pressure was about 12 horse-power. A saving of 8.3 per cent. on this particular fan would, therefore, mean about one horse-power. As a ball-bearing fan of the type tested can probably be bought for about the price of the ordinary type—possibly a little more—the saving is practically clear. It would undoubtedly be sufficient to pay for the fan in less than two years.

THE FIRE MENACE IN FAN BEARINGS.

The fire menace of the ordinary fan bearing, frequently overflowing with oil, is very practically recognized by the insurance companies. Various recommendations are made from time to time by inspectors and experimental bureaus looking to the elimination of this risk, especially where the materials in process in manufacturing plants are particularly inflammable and susceptible to ignition. The fan by its action is always in position to instantly spread the flames. There is no reason why this danger should longer prevail. From the crude journal, oiled direct, to the ring-oiled bearing, a definite progressive step was made. But to-day ball-bearing is available and already successfully applied in fan practice. With this type the presence of oil and collected dust is eliminated, overheating becomes impossible, and incidentally, but of great importance, frequency of attention is greatly reduced. Such a bearing, if properly designed, may run for six months without repacking. From every reasonable standpoint it appears that the ball-bearing fan should supersede all others.

CONE PULLEYS ON SAW SHARPENERS.

It is a good idea for saw sharpening machines to be fitted with cone pulleys so that the speed of the emery wheel can be increased in proportion as the diameter of the wheel is decreased by wear. There is no doubt that many emery wheels have been condemned as of poor quality when the fault has been caused through their not being run at the correct cutting speed. If a wheel be run too slowly it will wear away more quickly, at the same time it will cut less. Collars and leather washers—about a quarter of the diameter of the wheel—should in all cases be used, but care must be taken that they are not screwed up too tightly.

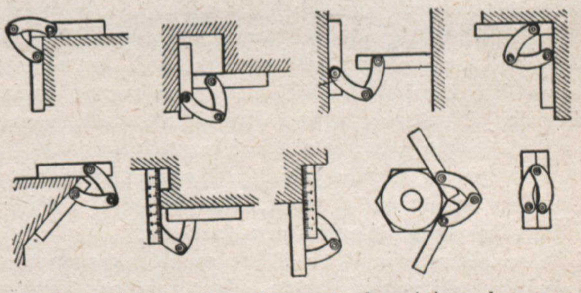
The best cutting speed will vary somewhat in wheels of different character, but for saw sharpening purposes, with a wheel of 12-in. diameter, 5,000 feet per minute may be taken as a standard. A moderate pressure is the best for grinding, and the wheel should be kept perfectly true.

SOFT WATER FOR BOILERS.

One of the greatest drawbacks, both in longevity of a steam boiler and its cost of working, arises from the use of hard water, which throws down a considerable amount of incrustation. The scale deposits usually consist largely of carbonate and sulphate of lime, which are very bad conductors of heat, and Rankine calculates that ¼-inch of scale requires the expenditure of 50 per cent., and ½-inch of 150 per cent. extra fuel to generate the same amount of steam as compared with a clean boiler. Although hard feed water can be modified to a certain extent by the employment of chemical compounds in the boiler, the proper remedy undoubtedly is to purify and soften the water before it enters the boiler, and several successful systems are now in use for this purpose.

A TOOL FOR MEASURING ANGLES.

The accompanying illustration shows a very simple, but at the same time a very ingenious, tool for measuring angles, strictly speaking, the tool is not intended for measuring angles but rather for comparing angles of the same size. The illustration shows so plainly both the construction and the application of the tool, that an explanation would be superfluous. It will be noticed that any angle conceivable can be obtained in an instant, and the tool can be clamped at this angle by



means of screws passing through the joints between the straight and curved parts of which the tool consists. Linear measurements can also be taken conveniently, one of the straight arms of the tool being graduated. As both of the arms which constitute the actual angle comparator are in the same plane, it is all the easier to make accurate comprisons.

GRASS FOR MATCHES.

The fact that lumber for the making of matches is becoming scarce in this country lends special interest to a report from British India that a grass is being successfully used for match stocks. The grass is cut into two-inch lengths, winnowed and screened to obtain uniform size and then boiled in paraffin for five minutes and dried in a revolving drum. They are dipped into a solution of chlorate of potash, sulphate of arsenic, potash of bichloride, powdered gypsum and gum arabic. Materials are so cheap that these matches sell for 26 cents per gross.

UTILIZING OF WASTE.

Five hundred manufacturers of explosives, pulp wood and similar products, have been asked by the U.S.A. national conservation commission for information as to all possible uses of sawdust. From this it will be seen the commission is going into fine details in its inventory of the natural resources of the country. Seven thousand lumbermen have been asked for their opinion as to the waste of lumber in saw mills, and more than two thousand lumber dealers and cooperage, veneer, furniture, box, vehicle and implement manufacturers have been asked to point out striking features of waste in their respective lines. Yet all this is only one part of the general scheme of hunting down waste which the commission is following in making its inventory. It is going after the little wastes here and there, which, added together, and put into dollars and cents, make an astonishing total.

For instance, take the making of veneer. At first blush it may not seem worthy of consideration with the manufacture of other products mentioned. Yet, the scarcity of the more attractive finishing woods in the last few years has led to the annual production of over 1,100,000,000 square feet of veneer. This, of course, has been made possible only by the introduction of new veneer-making machinery.

The use of veneer is generally regarded as exemplifying the scarcity of the finer woods and typifying the complete utilization of various kinds of woods, yet, from one of the schedules of the national conservation commission it is evident that the commission expects to discover great waste even in veneer manufacture.

Though the word veneer carries many meanings, from a glaze applied to pottery to the "polish" of a man of the world, it is most commonly employed as the name for the thin slices of wood now extensively used in the manufacture of all sorts of articles of use, such as wood plates, baskets, and the exterior finish of furniture and woodwork. The manufacture of veneer in the last few years has advanced by leaps and bounds.

The best veneer is sawed, but a great deal is sliced and still more is rotary cut. By the last-named process logs of the desired wood are steamed until they are soft and then fixed in a lathe-like machine, in which they are turned against a wood knife. As the log rotates against the knife, veneer of the desired thickness is peeled off in a continuous slice, as if you should pare an apple, going deeper at each complete turn, until nothing is left but the core. The centre of the log left after the veneer is cut is also called a "core."

The woods principally used for making veneer are red gum, maple, and yellow poplar, which together yield more than half of the total product. Red gum is largely used for baskets and maple for furniture. More valuable than these, however, are white oak and walnut veneer. Beech, which can be cut very thin, is used very largely for wooden plates. A number of other kinds of woods are used.

A good deal of waste occurs in the manufacture of veneer. It is always a problem, for instance, what use to make of the cores left by the rotary process. In many cases these are used for pulp wood, pillars, or panel headings, and they are largely used also for fuel, excelsior, crates, boxes and baskets.

In the schedule of inquiries which the national conservation commission, through the Forest Service, is sending out, several questions are aimed to secure information as to the amount of waste in veneer manufacture and the possibilities of fixing ways to utilize it.

Well informed veneer manufacturers are to-day taking the position that the veneer machine cannot turn out as much marketable stock from 1,000 feet of logs as can be gotten in lumber by the saw mill. This is a rather striking attitude, and is at variance with the original logic of veneering. It has nearly always been figured that the veneer machine saves that part of the log which is wasted in sawdust by the saw mill, consequently they produce more from the same amount of logs than can be gotten by converting them into lumber with the average saw mill. Generally, as is well-known, a quarter of the log or rather, specifically speaking, one-fifth, has been allowed for sawdust in compiling hand books for the measurement of logs to be converted into lumber. Also there is another allowance for slabs, so that taken altogether, slabs and sawdust represent quite an item of waste. In promoting the use of the veneer machine, the argument frequently put forward has been that one can save the slabs and the sawdust for the veneer machine cuts with a knife and makes no sawdust, consequently there should be no waste.

Now, in the face of this, comes some of the best-posted veneer manufacturers of the country, men who have been at the work practically all their lives, and assert that the saw mill as an advantage when it comes to getting quantity out of logs. This is so upsetting to original theories about veneer cutting that it makes one turn and study the subject again to see what has been overlooked in former estimates. The rotary veneer machine, properly operated, should undoubtedly get more stuff out of 1,000 feet of logs than can be made with a saw mill, especially on large logs. In the first place, the saw mill must slab and square up. The veneer machine, of course, must round up its logs, for as the log is measured the small way anyway this rounding up is simply taking off the high spots. Then the veneer machine has no waste in the form of sawdust whatever, but it does have a core in the centre which may range from 6 to 12 inches in diameter, depending on the timber and the machine. This core is generally worked up into crating strips or something of the kind, provided it is sound material, and if not, it is burned for fuel to make steam. Usually the waste of good material through these cores is not much except in small maple logs and timber of that kind having a fine heart. At least, there is not enough waste here on the average to make up for the waste of sawdust in converting logs into lumber. Evidently, therefore, some of the waste complained of comes in the course of cutting and shaping the veneer for the market. If one is cutting clear stock for face veneer, of course, it is necessary to get out the defects, and it is probable that some of the veneer men are figuring on this kind of basis in making estimates of the output of veneer. This wouldn't be fair at all, because there is no saw mill man at all who figures his output simply from the quantity of first and second manufactured, for if he did sawmills would not get full scale out of their logs. The saw mill counts as its full product all the different grades of lumber manufactured, and if the veneer people do the same thing; that is, sort and grade their veneer, and trim it up nicely as the saw mill people do, to get out defects, and utilize every possible inch, this product of a rotary veneer machine on ordinary logs should be in excess of the product made by the saw mill. In other words, there should be less waste. It seems, therefore, that the thing that it is up to the veneer people to get busy on is this matter of how to handle the products to utilize all the stock made and not have from 20 to 30 per cent. of it going to waste. The lumber people are continually working out schemes and plans to utilize all their products, including narrow widths and short lengths, and probably if the veneer people would do the same thing they would find themselves getting more cut of their logs and incidentally making more profit out of their business. This is presupposing, of course, that the means adopted to utilize what is now going to waste are of a practical and not merely a theoretical and expensive nature, costing more to carry out than the product is worth.

USE OF HARDWOODS IN AUTOMOBILES.

The construction of automobiles is of interest to lumbermen—only with regard to the bodies and wheels, however, as the rest of the gear is of metal in practically every case. From the construction point of view the automobile is a combination of carriage and locomotive engine, whether the propelling power be gasoline, electricity or steam. At first the automobile was used only for pleasure, and the body and wheels of such vehicles follow the general characteristics of carriage construction, but the entry of the autotruck into commerce has necessitated the use of the heavier woods that belong to wagon building.

As the wagon and the carriage have already been treated in this series of articles it remains only to consider aspects of automobile body and wheel building that are more or less peculiar to this form of vehicle. Automobiles have not yet reached the variety in construction and employment of the horse-drawn vehicle, but, as is well-known, its manufacturers and friends look forward to a time when it will have wholly superseded the horse. In the carriage line it has been applied to most forms except the hearse, and it will probably be a long time before undertakers will adopt it, for the spectacle of a motor breaking down, or the chassis getting out of gear, would not conduce to maintaining the ceremonial gravity of proceedings; the "chug, chug," and the odor of gasoline would be other disagreeable features of the "auto-hearse;" and long-hallowed custom is always a serious obstacle for the progressive man to buck against, especially when religion stands back of the custom. Yet it is known that some automobile men are figuring upon this very thing, so that the "autohearse" may eventually become a reality.

The automobile has already been applied to the uses of the retail delivery wagon and the large delivery truck, and in the form of a three-wheeled motorcycle has brought into being a new type in the shape of the little delivery auto, which has proved very useful, but which in its common form contains little or no wood.

When one hears the word "automobile" the picture that comes into one's mind is a pleasure car, as it is in this field of vehicle employment that the horseless wagon has thus far attained its chief development, and even here the auto has by no means ceased to be regarded as a curiosity. In the carriage auto, as in its horse-drawn prototype, lightness is sought, in so far at least as it is consistent with strength. The bodies are usually made with ash framework and poplar panels, as in carriage construction, but pressed steel and aluminum panels are said to be growing in favor. Roofs for limousines and other roofed autos of the pleasure type are often made of wood in the three layers, the under side being mahogany and the two upper poplar. Mahogany, and sometimes birch, are used for window frames in limousines and for trimmings. Wooden wheel rims, when used in the steering gear, are generally of a single piece of maple bent to a perfect circle.

Most carriage autos have wooden wheels with metal hubs. The wood employed is almost always hickory, though ash is said to be sometimes substituted. Auto wheels must be solid, and therefore the spokes and rims make up in thickness what they lack in other dimensions. Oak, the wood universally utilized for spokes and generally for rims in heavy wagons, is never used, as hickory possesses an obvious advantage in standing the heavy jolts which the auto is constantly receiving. The wheels are often "dished," but the practice is not universal among automobile makers, for reasons which it is not necessary to enter into here. Automobile wheels are of the same size front and back, as the mode of steering is different from that which is universal in wagon and carriage building, and also because the method is thought to secure better distribution of load. Racing cars often have solid disks for wheels, which in such cases are of metal. The object of this is to avoid "windage" or the effect of wind upon the spokes, which is said to seriously retard the speed of the car. Wire wheels were formerly used for autos of all descriptions, but these have been practically abandoned.

Motor frames are sometimes of wood with iron armor, but the use of wood in any form is the exception.

The automobile industry as a market for hardwoods is a product of the last few years, though private vehicles driven by steam and other means are of much older origin. So far as we know they were first thought of by the monk and scholar Roger Bacon, who lived in the thirteenth century, and is not to be confounded with Sir Francis of the same surname, who was a contemporary of William Shakespeare. Bacon foresaw the time when we would be able to "propel carriages with incredible speed without the assistance of any animal."

Sleighs and sleds vary in construction and material according to their uses. Sleighs derive their construction from the carriage. Hickory is the gear material and the runners should be bent hickory. Bodies generally have ash framework and poplar panels, except that dashboards are frequently made of basswood, which is preferred by some high-grade makers because it submits more readily to the bending process than does poplar, and sleigh dashboards are generally handsomely bent in graceful curves. Red gum is also much used for bodies.

Farm and mountain bob and delivery sleds are made of heavier material. The runners are of oak, bent or sawed, just as in heavy wheeled vehicles the wheels are more likely to be of oak than anything else. Other gear parts are generally of rock elm and maple. The box may be a wagon box temporarily shifted from the wagon gear for the season, or a lighter box of the delivery type, and often, as in logging operations, no box whatever is needed.

Lumber enters more largely into the construction of the modern bicycle than the average man realizes, although steel and iron are the chief materials in it, as they represent a combination of great lightness and strength that wood does not possess. If the history of cycle-making had followed the lead given by the first maker bicycles would be all-wood vehicles to-day; for the pioneer bicycle, made early in the nineteenth century, was entirely of wood. It was an extremely crude affair, propelled by the rider pushing his feet against the ground.

All-wood bicycles have not been manufactured much the past few years, but a cycle called the "Hickory," with framework and wheels of that sturdy timber, was made not so very long ago by the Hickory Bicycle Company, a concern practically owned by the Pope Manufacturing Company, whose position in the cycle business is well known. Handle bars are still made of bent hickory, and of bent maple also, though steel is by far a more common material. Hickory is also sometimes used for the wheel-rims, but the favorite wood is maple, with elm as second choice. Ninety-five per cent. of the cycle wheelrims made are of wood. Until recently the proportion was even greater—ninety-nine per cent.—but there is now a tendency toward more extensive use of steel. The objection to hickory as a wood for wheel rims is that it warps more readily than maple or rock elm. Handles, or "grips," to employ the trade name, are usually of maple wood, with steel core and leather covering. Cork grips, once popular, are no longer used. Saddles in high-grade vehicles are of laminated wood covered with hair and leather.

On ladies' bicycles the guards are as often of wood as of metal. The metal guard has come into wide use during the past year or so, and about fifty per cent. of ladies' wheels now being turned out are supplied with these.

Bamboo tubing is said to have been made, but a well-known bicycle man, whose experience goes back over many years, says he never has seen it, and believes that if such a tubing was ever put upon the market it was some other wood finished in bamboo style for a "talking point."—"Hardwood Record."

CARE OF BOX LUMBER.

The receiving, sorting and piling of box lumber on the yards looks like a job anybody could do and one not calling for the exercise of any more judgment than is necessary to build straight lumber piles. Still, the receiving and disposing of lumber is getting to be quite a fine art in connect'on with box manufacturing, and the whole thing may eventually reach the point where the saw mill man in the woods will take note of the situation and begin to sort his own lumber with careful detail so as to realize more out of it. At present, however, the mill man has a habit of piling his low-grade lumber, without regard to width, length or exact thickness, into a general conglomeration for shipment to the box factory trade. He has done his careful selecting among the upper grades, and doesn't generally spend any great amount of time in the sorting of the lower grades. To the casual observer, too, it looks like this is all there is to do with it, and it is just about as good luck as not to take the most convenient lumber when it comes to getting out stock for boxes.

What the wise ones in the box factory trade are doing, however, is to sort this lumber as it is received with probably more care than is given by the mill man in sorting and classifying his upper grades. Naturally it is sorted for lengths and widths for the sake of convenience in piling and so that a man when he wants stock for a given size box can get the width desired without having to pull down a lot of lumber that doesn't apply. The sorting of widths, however, is only the beginning. Another thing, and the thing they watch more closely, is the matter of thickness. In the general run of box stock there may be found nearly everything from 3/4-inch to 6-4-inch. The box man may kick if there is too much thin stock but he never kicks if there is too much thick. He carefully sorts out all his thick boards because they enable him to resaw and get some stock a little thicker than would be practical with all the boards just 1-inch. He can resaw and make boards 3/8, generally from the regular run of inch stock. Quite frequently a box man is anxious for some half-inch boards, and then the extra thick boards found here and there in a carload of lumber come in mighty handy. So he sorts them out carefully as the lumber is unloaded and piles them apart for use in taking care of orders specifying a little thicker stock than is possible to get out of 1-inch stock. Also he takes the thin boards out. There he is likely to make a claim on against the manufacturer and strike for a reduction of the invoice. Of course at the same time he won't say anything about the thick ones and the advantages that accrue from them, which is natural. Although these thin boards do represent an actual loss to the box man, yet they do come in handy once in a while, when there is a call for 5/8-inch stock or something of that class. This is too thick to get by resawing, and it is a waste of material to work down inch stock into 5/8-inch. Where a man by sorting can get it, it saves him buying special stuff. If he can't there come times when 5-4 and 6-4 inch lumber is needed to fill orders. This kind cut to order costs more than the general run of culled out boards from the better grade of inch stock. Therefore, there is quite a saving to be effected in carefully sorting box lumber for thickness.

In sorting for widths, too, the box men have begun to draw the line much more closely than formerly, and not only sort for 6-inch, 8-inch, 10-inch and 12-inch widths, but also sort for the odd inches, and some of those who are getting the system habit down fine even sort for 1/2-inch and 1/4-inch, so as to reduce the waste items at the factory and have the exact widths on hand. It is found that the best way to save waste is to prevent it, and the place to start in preventing waste is in the sorting and piling of lumber as it is received at the factory. If it is carefully sorted and piled both as to thickness and width, taking note of the odd inches, and even fractions as well as the standard two-inch variations, it enables the box man to work much closer on his waste items and still not have to spend too much time at it in the factory. So it will be seen from this that the sorting of lumber is one of the most important duties in connection with the operation of a plant.

The importance of caring for, sorting and arranging the lumber so that each thickness and width will be readily obtainable, while it is probably the most important item, is not by any means the only one to remember in the care of box lumber. The better the foundations are made, the more carefully the piles are laid, the better condition the lumber will be kept in generally. Even lumber that is very badly twisted and warped when received may be straightened out somewhat by careful piling and improved both in appearance and in workable qualities. If lumber has been allowed to warp considerably it is sometimes found advisable to pile several layers solidly one board on top of another without strips. Then cross it over every six or eight layers with piling strips and repeat the operation, the idea being that this will assist in flattening out and straightening the boards in the course of time, and sometimes even after lumber is piled on the yard it is taken and repiled in this way for the sake of straightening it after it gets dried out; also it enables one to buy more lumber in less space.

Another point is to not only keep the lumber neatly piled all the time instead of scattered here and there, but to keep it clean, and if practical keep it under sheds. Some day when lumber gets valuable enough all factories will make a point of keeping their lumber stock under sheds. Some are doing it already, and the more of it is done the better it is for the lumber, and the easier it makes the work at the machines. Lumber standing out in the open accumulates dirt, cinders and grit. It gets beaten into the surface by rain, and it becomes difficult to get the planer to do nice work on it because the dirt dulls the knives rapidly. A lot of this can be spared by properly housing the lumber and even where this is not practical some of the poorest and roughest stock may be placed on the top of the piles to shelter the better stock to some extent. This may seem like going to a lot of trouble to take care of lumber, and lumber that in days gone by was of but little value, but the experience of those in the box business who have gone to some trouble in sorting and piling their box lumber furnish evidence that it is worth while and furnish an example that is a good one for many others to follow.—"Southern Lumberman."

Sutton village, Que., has granted a bonus to C. Manuel & Sons Company, of Richford, Vt., to aid them in establishing a veneering mill in Sutton village. The village by-law calls for a grant of $3,000 cash and exemption from taxation for ten years, free water, a land grant of five acres, and a siding from the present C.P.R. siding to their mill.

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.

Leask & Johnston, of Cranbrook, B.C., will build a sawmill.

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The Patrick Lumber Company, Nelson, B.C., has started operations.

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Geo. F. Smith will shortly install machinery for making barrels at Wilmot, N.S.

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Elwood's sawmill at Burtt's Corners, N.B., has been burned out at a loss of over $20,000.

* * * *

Leigh Bros. are about to erect an engine house at their sash and door factory in Victoria, B.C.

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O. Chalfour's sawmill at Quebec City was damaged by fire to the extent of $3,000, fully insured.

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The new Porto Rico sawmill on the C.P.R. flats, near Nelson, B.C., is being rapidly completed.

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The Eastern British Columbia River Lumber Company are rebuilding their sawmill at Fernie, B.C.

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W. R. Thompson's sawmill at Teeswater, Ont., has been burned down with a loss of $5,000; insured.

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The Yellow Head Pass Lumber Company has been incorporated to build a sawmill at Kimberley, B.C.

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The Fernie Lumber Company are rebuilding their sawmill plant, which was recently burned down.

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Bayliss & Low have taken over the J. G. McLaren sawmill at Ottawa, and will reopen with 50 men employed.

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Jas. Johnston's sawmill at Beachburg, Ont., has been burned, including 75,000 shingles. Loss, $1,000; no insurance.

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C. A. Lillesburg has just built a new sawmill at Kitsumkalum, near Prince Rupert, B.C., which is running satisfactorily.

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The Taylor-Pattison Mill Company, Limited, Victoria, B.C., will change its name to the Cameron Lumber Company, Limited.

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The John Hill Carriage Works at Bradford, Ont., have been burned. Loss about $8,000, partially covered by insurance.

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The Morris Piano Company's factory at Listowel, Ont., has been partially destroyed by fire. Loss, $75,000, covered by insurance.

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The employees of the shingle mills at St. John, N.B., who have been out on strike for some months past, have now mostly returned to work.

The Sparwood Lumber Company, Limited, whose mill at Sparwood, B.C., was recently burned by forest fires, will rebuild near the old site.

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Owing to the lowness of the Ottawa River, J. R. Booth and other lumbermen in the Ottawa-Hull district had to lay off a large number of men.

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The Schaake Machine Works, Vancouver, are installing machinery at the Langley Lumber Company's 30,000 capacity circular sawmill at Langley Prairie, B.C.

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The Elk Lumber Company, Limited, whose mill at Fernie, B.C., was burned recently by forest fires, are rebuilding there and building another mill at Hosmer.

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We understand that the MacGregor-Gourlay Company, Limited, have sold their north shops to F. J. Shimer & Sons, Milton, Penn., manufacturers of Shimer heads, etc., who will start a branch of their present business.

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Frank Hawkins has been appointed secretary of the newly organized Canadian Lumbermen's Association, Ottawa. He has had a varied business experience, including a good deal of that dealing with the lumber trade.

* * * *

J. A. Gregory's sawmill at Lepreaux, N.B., has been burned down with 500,000 feet of lumber and four C.P.R. freight cars. A fine new rotary mill escaped injury. Loss, $25,000. The mill will be rebuilt at once.

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The announcement is officially made by the Canadian Furniture Manufacturers, that preparations are being made at the works at Woodstock, Ont., for the reception of the general offices of the company, now located in Toronto. This move is the first step towards the concentration of the company's various factories in Woodstock, Ont.

* * * *

The Mageau Leblanc Lumber Company, Limited, Chapleau, Ont., have sold their sawmill to J. A. Fortin, former manager for the company, who has started to install planing machinery and will manufacture every kind of planing lumber. The new business will be carried on under the name of the Chapleau Electric Light and Power Company.

NEWLY INCORPORATED COMPANIES.

Duncan's Lumber Company, Limited, capital $25,000. To take over the sawmill business of R. W. Pirt, J. E. Campbell and J. A. Knox at Duncans, B.C., and to erect saw and shingle mills, etc.

P. Vincent Lumber Company, Limited, Montreal, capital $99,000. To manufacture lumber, pulpwood, etc., and acquire the business of O. Dufresne, Jr., and Frere, Montreal.

Cariboo Timber Company, Limited, Vancouver, capital $300,000. To erect sawmills, etc.

A. T. Kelliher Lumber Company, Limited, Deroche, B.C., capital $100,000, to carry on a sawmill business in British Columbia.

Star Lumber Company, Limited, Vancouver, B.C., capital $75,000. To manufacture and deal in lumber, woodenware, etc.

Vancouver Furniture Manufacturing Company, Limited, capital $25,000.

British American Lumber Company, Limited, Vancouver, B.C., capital $50,000. To operate saw, shingle and planing mills.

Central Lumber Company, Limited, Vancouver, B.C., capital $150,000. To make and deal in logs and wood of all kinds.

Port Neville Timber Company, Limited, Port Neville, capital, $150,000. To erect sawmills, etc.

McFadon Logging Company, Limited, Vancouver, B.C., capital $50,000. To acquire timber limits, erect sawmills, etc.

British Columbia Lumber Company, Limited, Victoria, B.C., capital $1,000,000. To manufacture all articles composed of wood.

Holt Timber Company, Limited, capital $1,000,000. E. B. Ryckman, Canada Life Building, Toronto, is interested.

OPENING FOR WOODWORKING MACHINERY.

A United States Consul in Brazil states that present conditions make this an especially propitious time for pushing the sale of a number of lines of goods. Probably the field offering the greatest inducements is that of industrial machinery. One line of machinery which deserves more attention than it is at present receiving is that of lumber and sawmill appliances and woodworking machinery of all kinds. The Brazil Railway Company, an American organization which has received important concessions of timber lands along the right of way on its lines in southern Brazil, is fast opening up the best timber lands in the Republic, and this must inevitably result in giving a tremendous impetus to the lumber industry in southern Brazil. Several development companies incorporated in the United States are looking up the situation with regard to the hardwood forests in Bahia and Minas Geraes, and railroads in this section are also being pushed gradually toward the timbered districts of those States. There can be no question but that there will be a considerable demand for woodworking machinery and sawmill equipment in the near future.

SOAKING LUMBER BEFORE SEASONING.

Various writers on the work of wood seasoning have called attention to the merits of lumber sawed from logs long submerged. They do this by speaking of the distinct advantages gained by soaking the logs or the sawed lumber in water as a preliminary step to the air seasoning.

It is pointed out that in Japan logs are kept in brackish ponds for several years before being worked up. To this treatment is ascribed the peculiar freedom from warping found in woodwork from Japan, and especially in the wood carvings which are common in that country.

The warping of woodwork is due to a change in dimension caused by the wood adjusting itself to the moisture condition of the surrounding air. In damp air wood swells but shrinks again as the air becomes drier. This property of wood can not be overcome entirely, but the search continues for methods of reducing it and retarding it so as to lessen its damage.

Soaking does decrease the tendency to warp but by no means overcomes it entirely. The effect of soaking as a remedy for warping, however, is less than can reasonably be expected from some methods of steaming.

As a commercial practice the soaking of logs or lumber to remedy warping of the finished product is not to be recommended except when it can be done during storage or transportation because of the time required to produce results that fall far short of what is usually claimed.

THE BUILDING OF A CITY.

If there ever was a case in the history of the world where sentiment built up a city, that city is San Francisco. There was no actual necessity for rebuilding that city on its old site. It could have been built away from where the evidences of ruin would have not appalled. But the heart of San Francisco could not be moved to any other location, and so, over the ruins, its ashes and the gaping earth has already grown up a magnificent city. Ruined walls and vacant lots are still in evidence but the preponderance of evidence is in favor of the new city. There are buildings now contemplated and others going up that only a few years ago would have made even a New Yorker take notice. The cost has been enormous and the pace at which they were built has been terrific. They who built them may have been mulcted in the building, but the buildings are there to stay.—"West Coast Lumberman."

PROTECTING THEIR TIMBER.

No better example of co-operation along private lines is to be found than in the work being done by the Washington State Fire Association, says the "West Coast Lumberman." This association has 2,700,000 acres of timber lands, owned by private individuals and corporations. These have been assessed one cent an acre for fire patrolling. During the dry season this year there have been seventy-five experienced men patrolling these timber lands. Each is an officer of the State of Washington, being legally appointed as a deputy. Nine thousand special notices and warnings have been posted. Several hundred small fires have been put out, of which about twenty-five were especially dangerous. Several thousand acres of slashings were burned over, while the damage to standing timber was practically nothing.

HOW HE GOT THE TREE CUT DOWN.

An honest old Pennsylvania farmer had a tree on his premises he wanted to cut down, but being weak in his back and having a dull axe, he hit upon the following plan:—

Knowing the passion among his neighbors for 'coon hunting, he made a 'coon's foot out of a potato and proceeded to imprint numerous tracks in the snow up to the tree. When all ready he informed his neighbors that the tree must be filled with 'coons, pointing to the external evidence made with his 'coon's foot.

The bait took, and in a short time half a dozen fellows with sharp axes were chopping at the base of the tree, each taking his regular turn. The party also brought dogs and shotguns, and were in ecstacies over the anticipated haul of fat 'coons. The tree finally fell, but nary a 'coon was seen to drop.

MANUAL TRAINING SCHOOLS.

J. W. Van Cleave, president of the National Association of Manufacturers, addressing a recent convention in Indianapolis, made some remarks of an interesting nature on education.

The United States, he says, has had manual training schools for more than a quarter of a century. Many of them, like the Winona Technical Institute, are excellent institutions. The part which these schools were intended to perform, they perform well. They graduate tens of thousands of skilled workers every year.

But, my friends, these schools meet only a small—a very small—part of the popular demand for industrial education. Virtually, all the manual training and technical schools are of the academic grade. Some of them are of the collegiate grade. Nearly all of them charge for tuition. Thus, they are out of the reach of the children of poor parents, who everywhere constitute the vast majority of the community. Nearly all of their graduates enter the technical professions. The ordinary mechanical trades receive very few of the pupils of the manual training schools of the present day.

What is needed is a scheme of industrial education which rejects caste and class lines of all sorts. It must be as broad as the entire land. It must be as free as the air and the sunlight.

It must take in every American boy, regardless of nativity, the poverty and obscurity of his parents. The poorer and the obscurer the parents, the greater the need for the training which will equip the children to lift themselves out of obsurity and poverty.

This training should take the boy in charge at his most impressionable age. It should beign at nine or ten, or at as early an age as he can take hold of the ordinary mechanical tools without physical danger to himself. This training should keep step with the boy through his entire course in the primary school.

For several reasons, I emphasize the need of the beginning of this training of the boy's hand and eye at the earliest practical moment. The boy can learn the use of tools quicker at from nine to ten or twelve years of age than he can when he gets older. These intermissions in the workshop will brighten the entire school day and lift his studies out of the rut and ruck of drudgery, and make them seem like play. Boys begin leaving school to become bread winners at ten or eleven years of age.

The dense ignorance of the average boy of the present day when he leaves school and applies for work is a constant surprise and regret to employers. Not only does he lack the skill of hand which even the most rudimentary of manual training gives him, and thus has to begin at the very bottom in the work which he gets, but he likewise lacks the mental stimulus and alertness which this training imparts. And thus his advancement is slow, and usually it is short as well as slow.

Very few persons realize that of the boys who are in schools at the age of eight, less than one out of twelve ever enters a high school. Yet the figures of the National Board of Education show that this is a fact. Notwithstanding the compulsory laws which are on the statute books in many localities all the schooling which the majority of the boys in the United States receive is that which they get before reaching the age of twelve. The necessity of earning his own bread, or of assisting in earning bread for himself and the other members of his family takes him out of school before reaching that age. As at present conducted schooling becomes repellant to many boys, and they are glad to leave it, even to go to work for a living.

This is not only a calamity for the boy, but it is a misfortune for the country.

We must lengthen this period of schooling.

The introduction of manual training in all our public schools will do this. By interspersing his ordinary studies with daily intermissions or vacations at the lathe, with the saw, the chisel or the plane, or with some other form of work, we will make school so interesting for the boy that he will be anxious to remain in it. We want to make the boy's parents, as well as the boy himself, feel that while in school he is learning the rudiments of a trade which will make his wages higher when he goes to work than they otherwise would be. Thus we will give his parents an incentive to keep him in school longer.

There is another advantage for this system of training which we must keep in mind. By beginning to use tools early, a boy quickly learns his own inclination and aptitude, and is able to make an intelligent selection of the sort of a mechanical calling for which he is best fitted. He is thus saved from the mistakes committed under the present conditions, when, at a later age, necessity compels him to make a choice of trade without any preliminary reconnoissance of the ground such as the primary school work in the elements of the tool handling will give him. These mistakes in the choice of a trade are probably far more numerous than most persons imagine. Usually they are discovered too late to be remedied. Often they disastrously affect the person in his whole life work.

Let us send "the whole boy" to school.

We will thus make a broader and better man of him, make the country prouder of him and make the country better because he has lived.

Moreover, by teaching the boy the new things which we propose to teach him he will also be learning more of the old things than he learns now. A boy who gives an hour a day to manual training will make greater progress in his ordinary school studies than will the boy who omits this instruction. This is the testimony of educators everywhere who have experience in this field.

One of the reasons why we must adopt some widely diffused method of creating skilled workers is that under the labor union policy of restriction and exclusion the old-time apprentice system has almost disappeared in the United States. And, within the next twenty or twenty-five years it promises to entirely disappear. A large proportion of the new mechanics whom we are getting now we are getting from Europe. As most of these are, at the outset, ignorant of our language, and as practically all of them are ignorant of our ways, we must teach them many things before we can fully utilize them in our industries.

—In "breasting" a saw to make it round, do not buck the piece you joint with right up to the saw as if you were going to cut a piece of wood. The piece, whatever it is, should be passed back and forth in front of the saw, so when it is done the edge of the teeth will be square and full. If you jamb a piece of emery hard against a saw to joint it, it uses up about ¼-inch before the teeth are filed down to a full point, and when this is done the saw will want jointing again before it will do good work. Most people think that a block of emery is just the stuff for this purpose, but unless you know how to use it, it is the poorest stuff in the world for this use. A good way to breast a table saw is to life the table so that a piece of emery will just hit the teeth, and pass it back and forth across the saw.

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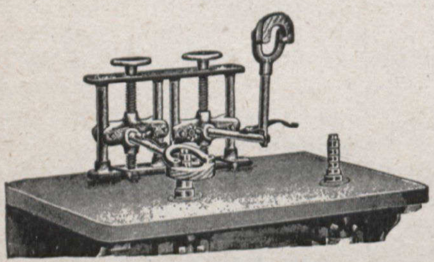

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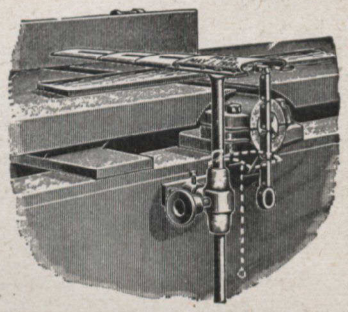

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Dotted line shows it at side of machine for rabbiting.

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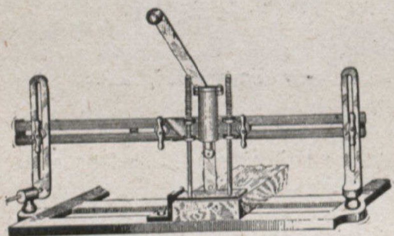

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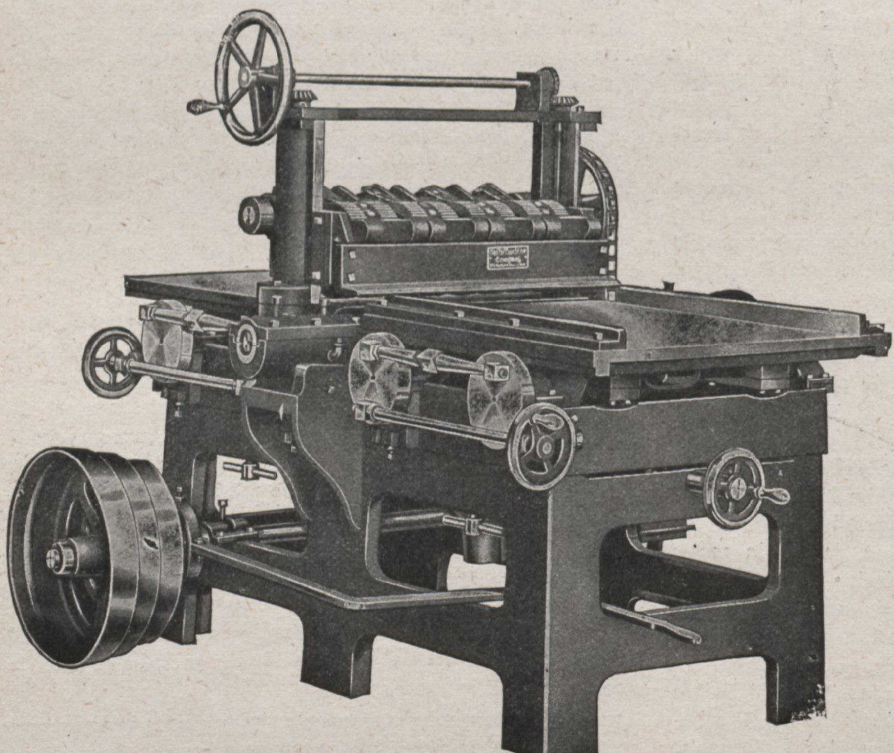

Feeds from 15 to 45 feet per minute. In feeding narrow stock through a 24-inch machine, for instance 4-inch stock, and feeding four pieces at the same time, the capacity at the end of the 10 hour day on the slowest feed would be 36,000 feet, and on the highest feed 108,000 feet.

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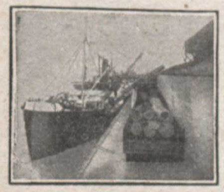

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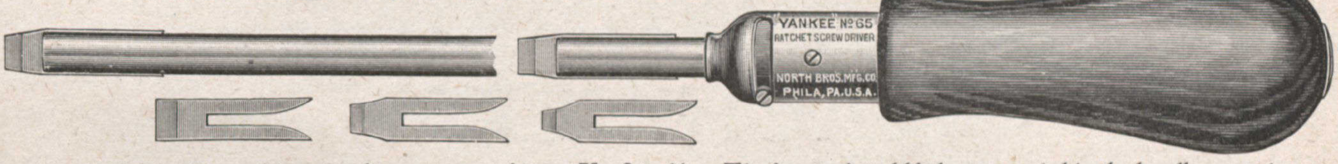

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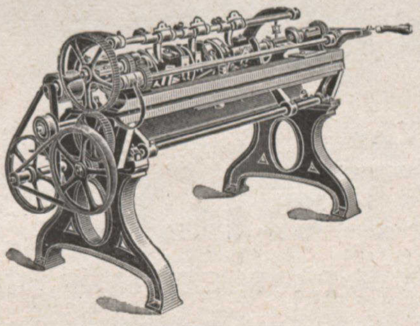

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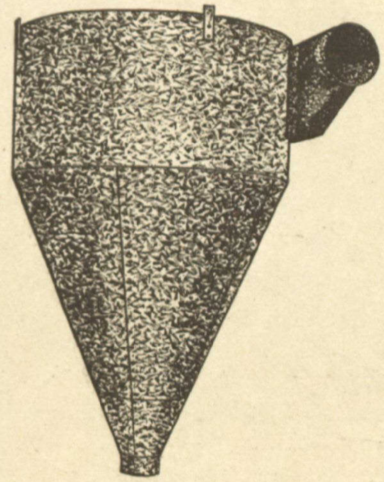

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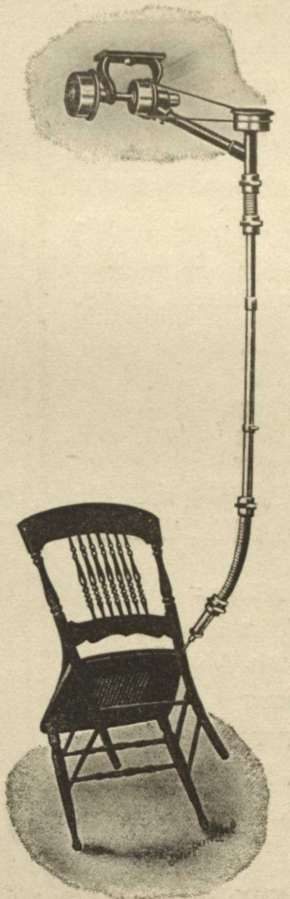

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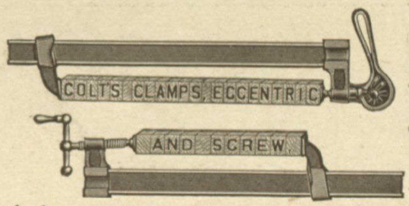

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