be considerably greater than if the timber is simply taken out of the woods and exported. We fail to see any dissimilarity between the situation in British Columbia and in Ontario, nor has Mr. Higgins given us any evidence to the contrary.

CARE IN MANUFACTURING LUMBER.

The tendency among lumbermen to sacrifice quality to quantity in the manufacture of lumber is, we are glad to say, not as common as it was a few years ago. Many who are inclined towards a large output have so designed and equipped their mills as to accomplish this without injury to the product; for there are no better mills in the world than some of the large white pine establishments to be found in Canada. Nevertheless, the evil of poorly manufactured lumber still exists to some extent, and particularly in the case of the moderate size and small mill. In order to make a large daily output, crowding of the saws is resorted to with the result that the lumber is roughly and unevenly sawn and cannot be classed as a good grade. The loss from this source, as well as from a lack of proper and efficient machinery for trimming, edging, etc., is much greater than is generally supposed by the manufacturer who turns out this class of lumber. Careless piling is also responsible for much unnecessary injury to lumber.

With our timber each year running more to low grade as the supply is cut away, it is very necessary that the quantity of low grade lumber should not be decreased through defective manufacture; on the contrary, it should be the aim of lumbermen to obtain the greatest possible quantity of high grade stock out of the log.

The large mill has doubtless an advantage over the small mill in this particular, as the larger revenue enables the owner to employ the most experienced help, such as sawyers, filers, etc., but with a little effort and care the product of the average small mill may be greatly improved.

One or two instances which have recently come to our notice of the loss resulting from badly manufactured lumber will show the folly of crowding a mill and of endeavoring to get along with inadequate equipment of an obsolete character. A carload of pine cuts and better was recently shipped to a dealer in Toronto. This lumber should have brought $35 per thousand. Owing to the fact that it was not trimmed, the dealer was obliged to accept $30 per thousand for the stock. An expenditure by the manufacturer of a small sum for a trimmer would have made the lumber much more valuable and saleable. A trimmer occupies but little room and is a valuable adjunct to the equipment of a mill.

Another carload of lumber recently arrived in Toronto which in many respects was of excellent quality, but contained a few boards that were unevenly sawn, being too thin at one end. Probable buyers inspected the stock, but refused to make what was considered a reasonable offer owing to the uneven boards which it contained. The quantity of uneven stock was not above 2 per cent., yet it was sufficient to condemn the entire carload. This may be taken as an illustration of the necessity of uniformity and of having every board properly manufactured. The buyer notices a board or two of imperfect manufacture and often refuses to examine the stock further.

The employment of cheap labor is responsible for much of the inferior lumber that is placed on the market. An incompetent sawyer or filer is unprofitable at any price, as is well illustrated by the experience of an Ontario mill owner a short time ago. The owner contracted to saw a considerable quantity of logs for a certain firm. A saw fitter was engaged at $5 per day, and during the first month a large quantity of high grade lumber was manufactured. When scrutinizing the expenses of the month, the owner decided to cut down the wage bill, and accordingly gave the position of fitter to an applicant who claimed to have little or no experience and who accepted the position at $1.50 per day. The result may easily be guessed. The party for whom the logs were being sawn refused to accept a large percentage of the lumber, which was charged against the owner of the mill. In addition to the damaged lumber, several saws were destroyed by improper hammering. It is needless to say that the owner recognized the situation and resolved to again engage an expert for the position of fitter. Some lumbermen do not fully appreciate the fact that band saws are more delicate and require greater care than circular saws; if they are not properly hammered they will not cut even lumber.

The quantity of lumber manufactured by small mills is considerable. If the product of these mills can be improved and the quantity of high grade lumber increased, it will have a material effect upon the market and at the same time bring greater returns to the manufacturer. The National Hardwood Lumber Association of the United States have taken a decided stand against lumber of inferior manufacture, the rules stating that all defectively sawn lumber shall be classed as culls.

QUESTIONS AND ANSWERS.

"W.A.S." writes: Will you kindly answer the following questions: (1) What is a fair number of shingles sawn and jointed by one man, using a Dunbar machine, in a day of 11 hours? (2) What thickness should a shingle be? (3) How much lumber is necessary to make 30,000 shingles?

ANSWER.—(1) The quantity of shingles which can be manufactured in a given time depends largely upon the character of the timber. On the Pacific Coast, where the lumber is sound throughout, 30,000 shingles is a fair average for 11 hours; in New Brunswick and Maine, where the centre of the log is often decayed, the average is about 15,000. (2) A shingle should be nearly one-half inch thick; in other words, a bunch composed of 24 shingles should be 10 inches across the end of the bunch. (3) Three thousand superficial feet of New Brunswick cedar will make 30,000 shingles, all grades. On the Pacific Coast the quantity of timber required to make the same number of shingles would, of course, be considerably less.

POWER AND ITS ECONOMICAL TRANSMISSION.

The important subject of "Power and its Economical Transmission" was discussed in an able manner by Mr. Henry Souther, consulting metallurgical engineer and state chemist, of Hartford, Conn., in a lecture delivered in the rotunda of the Board of Trade Building, Toronto, on January 16th, under the auspices of the Canadian Manufacturers' Association. Having the benefit of both practical and theoretical experience, Mr. Souther may be regarded as an authority on the subject. He treated briefly with the generation of power and then in more detail on sub-divisions. His remarks in part are given below:

Naturally the first thing to consider in connection with the subject before us is the source of power in an industrial establishment, and to determine the best source of power the only basis of comparison in these commercial days is that of cost.

The only power we can obtain for practically nothing is that from falling water. The cost of harnessing is considerable, but after that there is nothing to compare with water power for small cost. I expect to see the time—or at least I believe there will be a time, if I do not see it—when every waterfall will be utilized. This is becoming more and more possible with every addition to our knowledge of electricity. It is now not necessary as of old for a factory to actually overhang the stream from which the power is obtained; on the contrary, it is often better for it to be at a reasonable distance with only the generating machines at the canal or flume. Other things being equal, therefore, water power is best, for it is cheapest.

The only other commercial source of power is heat from coal or oil. The common form of reciprocating steam engine in its many forms of single and multiple expansion is at present almost universal, but it seems to me that a change from the reciprocating to the rotary is coming, our now popular type will become absolete, and the rotary type universally used.

This movement has made considerable headway in Europe and is beginning on this continent. The electric light company of my own city has put in the largest Parson's turbine (3,000 h. p.), which is running well and very economically as compared with the best reciprocating engines. Turbines of the De Laval type are creeping in very fast for small units of power, being better adapted to many small uses than any other machine. They are economical at all powers within their own maximum. The coming power, however, in my opinion, is that obtained from liquid fuel (oils) direct, perhaps from solid powdered fuel as well, or from either one gasified. We obtain power now in this way by so-called gas engines, more properly speaking combustion or explosive engines. As yet they are not always successful, but tremendous strides are being made in perfecting these engines and the number in actual use is now very large. All things considered, however, the best engine or other source of power for any given place or installation is not determined by its economy, its cost or the type, but rather by the combination of points that will contribute most to lessening the cost of production of a given article.

In the future we may look forward to the storing of power from the heat of the sun. This is now experimentally possible and is being accomplished in the sunny climate of California; but I do not think that any of you gentlemen would undertake to equip a new plant just at present and in this climate with its only source of power the sun. Many things more wonderful have been accomplished lately, but this scheme will wait until the commercial necessity for it arises, although it looks to me as if the present rise in the price of coal would hasten its coming.

Then, again, the man who professes to multiply power indefinitely by intricate systems of gearing or some other equally impossible scheme is not yet dead; I fear we must jolly him along, however, and let him down easy without counting him as a serious proposition. He is ingenious and interesting, but not profitable.

Having the power, how shall it be most economically distributed to the producing point? Means for doing this are multiplying fast through the development of electricity, gas engines and the use of compressed air.