NEWSLETTER
Forest Products
1934##024
MONTHLY NEWS BULLETIN NO. 24 FIRST PUBLISHED IN 1 JANUARY 1934

THE "WORKING" OF TIMBER

One of the difficulties in the use of wood is due to alternate shrinkage and swelling which take place owing to variations in the temperature and humidity of the air at different seasons of the year. The wide range of conditions of service under which seasoned wood may be used - conditions varying from outdoor exposed positions to centrally heated living rooms - must also be taken into consideration.

If a piece of wood is exposed to air having a constant temperature and humidity, its moisture content will tend to come to, and remain at, a final value at which there exists a state of equilibrium between the moisture in the wood and that in the air. This moisture content is termed the EQUILIBRIUM MOISTURE CONTENT.

The higher the temperature and lower the relative humidity, the lower the equilibrium moisture content will be. Any change in atmospheric conditions will be accompanied by a corresponding change in equilibrium moisture content. the time required to reach equilibrium depends on the size of the piece of wood, and whether it is freely exposed or coated with varnish or other preparation.

Thus the moisture content of a piece of wood will fluctuate, although it will seldom, if ever, reach minimum and maximum values corresponding to the extreme conditions of the surrounding air.

Any increase or decrease in the moisture content is accompanied by an increase or decrease in the dimensions of the wood. This change in size can be overcome only by keeping the wood in an unchanging atmosphere, a condition rarely obtainable. However, the variation can be made so small that it will not be a source of trouble in ordinary furniture, flooring, panelling, etc.

The least variation from the original size will occur if the moisture content of the wood during manufacture lies midway between the lowest and highest equilibrium moisture contents that the wood is likely to reach in service.

The results of experiments conducted abroad, together with scattered observations made from time-to-time in Australia are sufficient to indicate approximately the equilibrium moisture content of wood during the year in various parts of Australia, but there is an obvious need for more precise information in this regard.

An experiment to obtain information in this regard was commenced in February 1931. Sample boards were stacked both indoors and outdoors in the capital cities. These boards were weighed and measured at the beginning of each month during the last two years, with the addition that in Melbourne observations were made each week. All boards have now been returned to the laboratories of the Division of Forest Products, and the calculated dry weight of each has been checked.

This experiment has given interesting information on the variation in moisture content and dimension under different climatic conditions. Further the influence of species of timber, whether the board is quarter or backsawn, whether it is rough, dress or covered with various coatings, and the influence of thickness have all been recorded. At the present time the data are being

correlated and a report will be issued at an early date.

THE INTERNATIONAL NATURE OF RESEARCH

At the present time the Division of Forest Products has two future officers abroad investigating the various phases of timber research. These research students are at present studying at the Forest Products Laboratory, Madison, USA, and later will proceed in the Forest Products Research Laboratory, Princes Risborough, England. Altogether five other members of the staff of the Division of Forest Products have received training at foreign laboratories. Recently the Division has been able to reciprocate somewhat, but in this case the visitors have been from Java.

Mr A.T.J. Bianchi, Officer-in-Charge of the Technology Section of the Forest Research Institute, Buitenzorg, Java, spent over five weeks studying Australian methods of air seasoning and kiln drying. A section of seasoning is being formed at the Forest Research Institute and there it is proposed to install laboratory kilns similar to those in use in the laboratories of the Division.

Advantage was taken of the visit of Mr Bianchi to exchange ideas in forest products research generally. One outstanding feature of interest was the method used in the identification of tropical woods. A very clever technique has been built up using a low power hand lens and many anatomical features which one would expect to be invisible can, with a little training, be readily discerned.

Mr Bianchi was accompanied by Mr Andriesse, an engineer of the K.P.M., who spent a week in Melbourne, and who was particularly interested in the design of commercial kilns. Mr Andriesse will supervise the erection of semi-commercial kin units at the sawmill operated by the K.P.M.

The intention underlying the visit to Australia of these two officers is the development of the timber resources of the Dutch East Indies, the Forest Research Institute being interested in the determination of proper methods of seasoning and utilisation, and the K.P.M. in the shipment of the converted timber. It is hoped that this will provide a means of decreasing the unemployment resulting from the depression.

So it is that the discoveries of science receive international attention and by the pooling of scientific knowledge, civilisation as a whole progresses.

TECHNICAL CLASSES IN MODERN TIMBER KNOWLEDGE

In view of the large number of requests which have been received by the Division of Forest Products for the identification of unknown samples of timber, it was considered that a series of lectures on methods and practice of timber identification would be of interest. Accordingly during the past month the officers of the Division conducted a class to which engineers were invited.

This class consisted of three lectures. At the first the general principles of wood anatomy and wood identification were explained with the assistance of lantern slides and hand samples. For the remaining two lectures of the series the class was split into two groups, and the instruction was largely by demonstration and practice. In these practical classes, sets of hand samples were examined by means of hand lens. The first set was so selected as to give representative samples containing the common anatomical features used in wood identification. The second set was representative of timbers commonly used in Victoria and the members of the class with the aid of an identification key were able to recognise the individual species.

The outstanding feature of the class was the enthusiastic reception of the idea. It was originally anticipated that the total attendance would not exceed fifteen or twenty, but over seventy engineers and others took the course.

In view of this interest it is proposed early in the new year to hold further classes in Wood Preservation and Timber Mechanics. Details of these courses will be published later.

`DECAY IN FLOORS

The Division of Forest Products has been receiving an increasing number of enquiries

relative to flooring decay in Melbourne and suburbs. Although one would expect decay to be more prevalent in Melbourne than in the cities further north, there is yet evidence to show that this problem is also common in most of the other States.

The rot usually occurs in patches, and frequently there is, at first sight, nothing to indicate why one part of the floor should be attacked and not another. Hence the usual theory when timber gives trouble is adopted - the wood used in the flooring is to be blamed. This is erroneous: apart from a few cases where the failure can be traced to a leaking pipe, ice chest water, or some similar cause, the decay is always due to faulty ventilation of foundations.

There is a widespread belief that if a few air bricks are installed scattered throughout the foundations of a building, proper ventilation below the floor has been provided. This is, of course, far from being the case. Just as much care should be taken in the design of this ventilation, as is taken for any structural feature of the building. It is essential that every air space below the floor should receive a through draft from properly placed openings, and that there should be no dead pockets. This requires provision of suitable openings in interior foundation walls and careful consideration of the effect of chimney footings, concrete floors to bathrooms, verandahs, etc.

Also the type of air brick used must receive attention. Some of the terra cotta types are of very poor design. One common type was about 15 small round holes, representing a total area of only 6% of the face area of the air brick, and this type should be avoided for under floor ventilation unless a very large number is used.

In some cases, although care has been expended in the house design to give adequate ventilation, the effect is nullified because householders have grown shrubs and flowers adjacent to the ventilating openings and have thus prevented free air movement.

Because of the importance of this question of decay in building foundations and floors, the Division of Forest Products has issued a **Trade Circular (No. 18)** dealing with the subject. This is entitled *"The Prevention of Decay in Building Foundations"*, and describes the agencies which cause rot, and `how the attack may be prevented or, if present, what measures should be taken. Copies of the circular can be obtained from the Division.

BREVITIES

Mr J.E. Cummins, Senior Preservation Officer of the Division of Forest Products has returned from Western Australia where he inspected the experimental fence post lines erected with treated and untreated posts. In this investigation various Western Australian timbers were treated with different preservatives and erected in three different, but representative, localities. the fence posts have now been in position for four years and already the value of the treatment methods has become apparent. A large number of the untreated posts have deteriorated seriously and in some cases have practically disappeared, whereas the treated timber is still giving excellent service. the full details of this experiment, which is of interest not only in Western Australia, but throughout the Commonwealth is set out in **CSIR Pamphlet No. 24** "*The Preservative Treatment of Fence Posts*", but it is felt that the results to date justify the publication of a progress report on the experiment and this will be issued at an early date. The project is a cooperative one between the Forests Department of Western Australia and the Division of Forest Products.

Visitors to the laboratories of the Division of Forest Products during December include Senator Hardy of Hardys' Limited, Wagga Wagga, NSW. Senator Hardy spent five days with the officers of the Division at the laboratories and visiting kiln and sawmilling plants in Victoria.

Mr F. Gregson, Forest Utilisation Officer of the Forests Department of Western Australia is on a visit of

several months duration to the Division of Forest Products. He is particularly interested in the latest developments in dry kiln construction and operation and has visited a number of Victorian plants. During December he paid a visit to Tasmania in connection with the starting up of two new kilns of the latest internal-fan cross-shaft type designed by the Division. Circulation tests were carried out and the initial charges put through the kilns. Both the plants, one of which is at St Helens in the east coast, and the other at Launceston, behaved in a very satisfactory manner.

NEWSLETTER

Forest Products

1934##025

MONTHLY NEWS BULLETIN NO. 25 FIRST PUBLISHED IN 1 FEBRUARY 1934

THE STERILISATION OF TIMBERS BY MEANS OF HEAT

A common problem facing a timber merchant, miller or consumer is what to do with timber showing evidences of wood borers or wood-destroying fungi. Often the first reaction in such a situation is to decide that the timber is useless and should be destroyed. Such extreme measures, however, are not always necessary because it is often impossible to salvage a large percentage of the material. For the utilisation of such timber, of course, it is necessary that every precaution should be taken to prevent further development and spread of the infection. Subjecting the timber to high temperatures under saturated conditions is an effective method of dealing with the organisms. While discussing, however, this sterilisation process it is essential to refer also to the various forms of fungi and wood borers which are commonly encountered in Australian timbers.

There are two main types of fungi which affect timber, namely, (1) the wood staining forms, and (ii) the wood destroying forms. The first type lives on the contents of the cells of the wood and, as the name implies, causes saining or discolouration of the wood. Such staining is at times particularly noticeable in boards of *Pinus radiata* and Hoop Pine. These staining forms do not, however, seriously affect the strength or related properties of the timber although they do affect its appearance. The second, or the wood destroying form, live on both the cell contents and the cells themselves, thus causing serious losses in strength and often complete breakdown of the wood. Both forms are contagious and infected timber is likely to be a source of trouble owing to the probable spread of the fungi. For their conditions of existence a moisture content of timber above 20% is necessary. They are readily killed by heat sterilisation methods; a temperature of 160°F for two hours under saturated conditions will completely kill fungi in one inch timber.

For lower temperatures a longer period of heating is necessary - four hours at 140°F; eight hours at 120°F - but reducing the temperature below 120°F is unwise unless the time of treatment is extended over several days. Such treatments kill the fungi, but do not render the timber immune from further attacks. Thus, care should be taken to prevent subsequent exposure to conditions under which the timber may pick up moisture.

The borers affecting Australian timbers may be divided into two main groups, namely (1) the powder post and the furniture borers, and (ii) the pin hole and related borers. The powder post borers (Lyctus borers) commonly occur in the sapwood of Australian timbers, while the furniture borers affect both sapwood and truewood of old seasoned timbers. They can be effectively killed in all stages of their existence, i.e. beetles, pupae, grubs and eggs by heat treatment. For killing powder post borers the temperatures used need not be so high as for killing fungi, and exposure of one inch stock to a temperature of 130°F for 1½ hours at 100% relative humidity is entirely effective. For increased thickness of stock the time of exposure to the temperature should be increased - to two hours for 2 inch stock, and to 4½ hours for 3 inch stock. Timber infested with the powder post borers is only rendered sterile by such treatment and is not made immune from further attack. The beetles may deposit their egg in timber either partly

seasoned or completely seasoned, and as a result, suitable precautions should be taken in handling stock liable to infestation. In this connection the Division of Forest Products is at present carrying out a comprehensive investigation on powder post borers with the idea of developing cheap and satisfactory methods of treatment so as to render sapwood immune from the attack of these borers. The conditions for treatment against furniture borers have not been worked out as these are not commonly timber yard pests, but are usually in softwoods in old buildings and in old furniture and fittings. However, the treatments suggested for powder post borers should be equally effective.

The pin hole borers and the associated large borers, such as the auger and longhorn borers, attack only living or freshly felled timber. They **do not** reinfest seasoned timber. Logs may be infested with these borers in the bush and after conversion the timber may still contain live borers. In the case of the pin hole borers very little further damage is done to the unseasoned stock. The eggs which have been laid in cavities and holes made by the borers ultimately develop into beetles which generally follow the old tunnels and emerge from the timber which, if partly dry, is not reinfested. Larger borers, such as the longhorn and the auger borers, infest the timber in the bush. The eggs develop into young grubs which under certain conditions take some years to develop into mature beetles. As a result, sawn air-seasoned timber which has been included in an article of furniture may at some time show a large hole which is the emergence hole of the beetle. This beetle does not reinfest seasoned or partly seasoned material.

The Canadian Forest Products Laboratory have recently published results discussing the effect of heat treatment and air seasoning on pin hole borers (infesting hemlock). They found that all borers in green 3" hemlock could be effectively killed by exposure to a temperature of 150°F and a relative humidity of 80%, or to temperatures of 120°F were not satisfactory. The air seasoning work is as yet incomplete, but the evidence indicated that, if the air seasoning is sufficiently long, all living pin hole borers will either emerge or die and no reinfestation of the seasoned timber will occur. These results, although obtained with Canadian hemlock, can be applied to those Australian timbers which are subject to attack by pin hole borers.

Ignorance of the relative unimportance of pin hole borers and confusion of these with powder post and furniture borers has been responsible for many unnecessary rejections of timber. It will be obvious that the presence of borer holes in such products as flooring and lining is not deleterious in any way to the utility of the product, providing they do not indicate the presence of the powder post or furniture borers. Actually the different types of borer holes are very easy to distinguish and there is no excuse at all for an architect, builder or timber inspector to reject Australian hardwood because of the presence of holes made by the pin hole borer. Unfortunately, such unwarranted rejections still frequently occur, and the Division has, therefore, decided to add to its series of **Trade Circulars** on borers by issuing one dealing with pin hole borers. The two borer circulars already issued are **No. 6, Lyctus or the Powder Post Beetle**, and **No. 11, Anobium or the Furniture Borer**, and these are obtainable on application to the Division.

CREOSOTE FOR WOOD PRESERVATION Standard Specifications

The Standards Association of Australia has just issued a set of draft specifications and tests (No. K55) for creosote intended for wood preservation. Copies are available to anyone interested on application to the Association or to the Council for Scientific and Industrial Research.

Quite a feature of Australian engineering practice of recent years has been the attention given to the preservation of the large wooden members, such as railway sleepers, telegraph poles, bridge members, fence posts, etc. necessarily placed in contact with the ground. Research work on the development of the best methods of preservation to adopt with the different varieties of timbers available in Australia has engaged the attention of the Division of Forest Products of the Council for Scientific and Industrial Research for some years past, and as a result much information regarding the efficacy of various methods, and particularly those involving the use of creosote, has been obtained.

It has been found that the composition of the creosote affects its preservative action to a marked extent and it was largely to ensure the production of a high grade preservative product that officers of the Division collaborated with a Standards Association Committee in the drafting of a suitable specification. Incidentally, it is of interest to note that the use of creosote is increasing rapidly, public departments alone having ordered some 205,000 gallons during the last year.

THE FOREST PRODUCTS LABORATORY, MADISON, WISCONSIN, USA PART 1

At the present time two research students appointed by the Trustees of the Science and Industry Endowment Fund, are studying various phases of forest products research in America and England, preparatory to joining the staff of the Division of Forest Products. The following description of the USA Forest Products laboratory by S.F. Rust, B.Sc., one of these research students, should be of general interest to the timber industry of Australia, as this laboratory is considered the mother of forest products research. This description is being circulated through the medium of this Monthly News Bulletin in two parts.

"The Forest Products Laboratory was established in 1910 in the United States Forest Service at Madison, Wis., in co-operation with the University of Wisconsin. It was the result of the desire to coordinate, for reasons of increased efficiency, the various sections of Forest Products Research then in existence. For several years it was unique in that it was the only institution in the world conducted with the object of turning the searchlight of research upon wood, and its uses, and making the information thus obtained available to the public. Its aim is maximum efficiency in the use of existing and projected forest stands, and the adaptation of same to the changing needs of the nation. This object is accomplished by developing the most economical means of converting standing trees into finished products; by making the growth of timber more profitable by increasing the possibilities in the utilization of both used and unused species; by the development of new and more efficient processes to give new uses for old materials, and new materials for old uses. In a word the aim is to render practical assistance to the manufacturers and users of wood and wood products, and at the same time to promote forest conservation and the practice of forestry.

"Every American industry or class of consumer using or growing wood or any other forest product may thus be a beneficiary of the work done at the laboratory. Every such industry, class of consumer and timber producer is a potential cooperator in the laboratory's work. The value of the laboratory to any such unit depends to a large extent upon the use made of it. It presents an opportunity for every manufacturer, user and timber grower to supplement the information obtained by experience and hard knocks, with technical data obtained through scientific research. Over a period of two decades the laboratory has proved its worth by its contributions to our knowledge of the fundamental characteristics and uses of wood, and by the constant stream of requests for assistance in the solution of individual problems, which pour into the various Sections. The volume of work tackled necessitated continuous expansion, until in 1932 merit received its just reward when the whole of the laboratory's operations was transferred to a newly constructed building at one end of the University of Wisconsin campus. This is a magnificent six storey concrete and steel structure, designed on modernistic lines, the plane surfaces being relieved by an unusual arrangement of cypress fins giving the effect of deep reveals. This year a further substantial grant for the purchase of equipment has been made, thus augmenting and accelerating the work of the laboratory by the aid of modern developments in science and engineering.

"The laboratory is in charge of a Director, Assistant Director, and a staff comprising the heads of the different research and administrative sections. There are eight main divisions of the laboratory's work - Silvicultural Relations; Timber Mechanics; Timber Physics; Wood Preservation; Pulp and Paper; Derived Products and Industrial Investigations, together with Pathology which is maintained in cooperation with the Bureau of Plant Industry. In addition, there is a section of Laboratory Operation which handles the administrative work involved in accounting, engineering, photography, computing, records,

supplies and maintenance of the laboratory generally. A division of the Director's office reviews and coordinates the results secured, prepares material for publication and in other ways arranges for its most effective dissemination and utilization. Total permanent staff comprises about one hundred and seventy-five people, varying from men of broad general experience with wood, and knowledge of its characteristics, to specialists in various wood uses who devote their whole time to the study of special problems. Such men are recruited from the professions of Engineering, Chemistry, Forestry and Pathology. A sharp distinction is drawn between administrative and investigative assignments, enabling research men to devote the whole of their faculties to the problem in hand.

"Research is increasingly effective in proportion as it is carefully planned and executed, and dissection of the laboratory work programme reveals that this idea is the keynote of the system. Familiarity with the needs of timber growers, wood consumers, and wood using industries serves as a guide to direct the investigations made at the laboratory. At the beginning of each year a programme covering the work of the laboratory for the year is considered and approved. Individual initiative and responsibility are given the widest possible opportunity, but at the same time the work of different men is so coordinated by an interchange of ideas among the different sections, that duplication is avoided and cumulative results are obtained. A carefully worked out system for keeping a check on the status, progress and correlation of investigative activities and for guiding inter-related projects through the laboratory has been adopted."

Part 2 of this article describes the work of the various sections and refers to some of the latest developments in forest products research.

PUBLICATIONS OF THE DIVISION OF FOREST PRODUCTS

1. There is a frequent demand for technical information on specific Australian timbers, and it is usually found that existing information is scattered through a wide range of publications which in many cases are now out of print or contain data no longer applicable. To provide a comprehensive collection of the latest information concerning individual timbers the Division of Forest Products is preparing a series of Technical Papers. The first of these, *"Properties of Australian Timbers, Part I"*, dealing with eight timbers of the genus *Eucalyptus* (Ash group) has now been issued. These timbers are of low density and pale colour which have at times been called ash timbers because of a superficial resemblance to ashes of the Northern Hemisphere. The main timbers discussed are *E. regnans* (mountain ash), *E. gigantea* (red ash or woollybutt), *E. obliqua* (messmate or brown top). The data concerning all these timbers has been collected from various publications and from unpublished reports of the different sections of the Division of Forest Products. Much of it also is the result of personal visits by officers of the Division to the principal milling centres in all the States and to a very large number of the main wood using industries. The data presented include information on the habit and distribution of the tree, botanical and common names, supplies, general characteristics of wood, seasoning properties, durability and adaptability to preservative treatment chemical composition of the wood, structure of the wood, uses, grading and strength properties. Photomicrographs showing the anatomical features of the various timbers have been included, together with a key for the separation of the species. Those interested may obtain copies of this publication (C.S.I.R. Pamphlet No. 47) on application to the Division.

2. The latest Trade Circular prepared by the officers of the Division of Forest Products belongs to the series on the gluing of wood and deals with casein glues, their preparation and application. These glues have a very important sphere of utility because of their water resistant properties and the fact that they are cold water glues. They are not as well known as they should be in Australia and even in some industries such as the plywood industry where they are extensively used, good results have not always been obtained through ignorance

of the fundamental principles underlying their preparation and use. This Trade Circular, No. 19, is at present in the hands of the printer and will be issued at an early date.

3. Collapse is a very important feature in the seasoning of many Australian timbers. Although it can be readily removed by a simple and inexpensive process called "reconditioning", such treatment is not used to the extent it should be. This is probably due in some cases to lack of knowledge of how to recondition, or lack of appreciation of the savings possible by such a procedure. It has, therefore, been decided to issue a Trade Circular on *"Collapse and Reconditioning"*, and this is in the course of preparation.

BREVITIES

An additional laboratory kiln is being added to the equipment of the Division of Forest Products. The three existing kilns are constantly in use and have, at present, three years' work ahead of them without the additional work which can be expected to come in during that period. The new kiln besides relieving congestion in kiln schedule work, will also be used for the study of theoretical problems of kiln circulation, temperature and humidity.

Extremely rapid air seasoning was obtained during some experiments on the seasoning of young mountain ash. After eight weeks' drying during December and January, 1" material dried from a moisture content of 170% to approximately 12%, while 1½" material fell to 15% during the same period. Although the stack was a small one, it is an indication that very rapid air seasoning can be obtained with this class of stock under suitable conditions.

A few years ago a large percentage of timber users had a prejudice against kiln dried timber. This was due to the inefficiency of early kiln-drying methods. Now that modern kiln seasoning practice has been generally adopted, it is unusual to find anyone still clinging to the old prejudices against kiln dried material. In fact the pendulum has now swung in the other direction. Kiln dried stock enjoys deservedly such a high reputation that it commands a premium over air dried material. In Melbourne kiln dried floorings, both select and merchantable grades, bring several shillings more per hundred lineal feet, while for joinery and similar stock kiln dried timber alone will usually be accepted at premium of as much as 10/-d. and 15/-d. a hundred super feet.

CSIRO AUSTRALIA

NEWSLETTER

1934##026

MONTHLY NEWS BULLETIN NO. 26 **FIRST PUBLISHED IN 1 MARCH 1934**

PRE-NOTE

This News Bulletin is issued to newspapers and periodicals for the reprinting of various articles and news items. Last month one newspaper, in giving a resume of one of the articles, made it appear that the news bulletins were sent directly to individuals. The result was that the Division of Forest Products received numerous inquiries form people desirous of obtaining copies. This indicated that the information given in the News Bulletin is of wide appeal. However, all enquirers were referred to the news and periodical press for this information, since at the present time it would be impractical to circulate these News Bulletins as widely as Trade Circulars and other publications of the Division.

CAUSES OF BRITTLENESS IN WOOD

For many purposes, one of the most serious defects that may occur in timber is brittleness. By brittleness is meant the tendency to break suddenly with little deflection and practically no warning. For example, glass and cast iron are both very brittle materials whereas celluloid and mild steel are the reverse and are said to be tough. Brittle materials, although they may be comparatively strong when subjected to a steady load are incapable of resisting shocks or blows. Thus, celluloid is often substituted for glass in places where it is liable to be subjected to knocks and cast iron is never used in important parts of structures which are subjected to impact.

For the same reasons brittle timber should not be used in articles or in structures which are subjected to shock loads, for example, in sporting goods, tool handles, railway brides, etc. It is well known that certain species of timber are much more brittle than others. Softwoods, i.e. woods without pores, are in general less tough than hardwoods, i.e. woods with pores. Variations within species are often so great, however, that some of the wood from normally tough species is more brittle than the wood from species which are normally low in toughness. Thus, species selection is often less important than the selection of individual pieces.

In order to make a judicious selection of tough material, it is necessary to know the various causes of brittleness, of which the following are the most usual in timber:-

(i) Sloping grain
(ii) Decay or nor
(iii) Low density
(iv) Rate of growth
(v) Sapwood in comparison with truewood
(vi) Compression wood
(vii) Compression failures
(viii) Position in tree
(ix) Heart
(x) High temperature treatments.

Sloping Grain. This term covers cross grain, diagonal grain and spiral grain and all of these have been shown to be a definite cause of brittleness and one of the most common. A slope of 1 in 20 reduces the impact strength about 15%, while a slope of 1 in 5 causes a reduction of about 66%. Trade Circular No. 13 issued by the Division of Forest Products deals

with the causes and effects of sloping grain in timber.

Decay (rot). This is caused by the action of wood destroying fungi and the toughness of decayed wood is very considerably reduced in comparison with sound wood of the same species. Even in the incipient stages, when the infection is not visible to the naked eye, the wood may be quite brittle. In the more advanced stages the wood, besides being seriously weakened otherwise, is incapable of withstanding even slight shocks.

Low Density. In general low density wood is more brittle than that of high density. It is found, therefore, that a piece which is much lower in density than the average for the species is usually brittle. On the other hand, wood of average density from a normally light species is usually tougher than the abnormally light wood of a heavier species, although the density of the latter may be greater than that of the former.

Rate of Growth. This may have an indirect influence on the toughness of the wood, for example, in softwoods, in general, the higher the rate of growth the lower the density and therefore the lower the toughness. On the other hand, in many hardwoods within limits fast grown wood is denser and tougher than slow grown. This does not apply, however, to the fast grown wood found near the centre of most trees. This fast grown central wood is low in density and, therefore, more brittle than the average.

Sapwood. No systematic difference has been discovered in the brittleness of sapwood in comparison to truewood. If of the same density and rate of growth, the toughness is about the same. On the other hand, under some conditions, growth factors may be such that the sapwood is of different density to the truewood and in such circumstances may have different properties to the truewood. Extensive experiments in America have shown that, **other things being equal**, there is no difference in the toughness of the sapwood and the truewood of hickory. Thus, with proper methods of selection, red hickory is just as good as white hickory. No corresponding tests have been carried out with Australian timbers but it is reasonable to suppose that the same considerations apply.

Compression failures. The toughness of wood can be seriously reduced by the presence of compression failures (transverse shocks or felling shakes), which appear in the form of lines running across the grain of the wood. These failures are caused by mechanical stressing due either to severe wind storms or to felling. Tests have shown that in some, at least, of the eucalypts the toughness of the wood on each of the visible compression failure has not been affected. In these species it is, therefore, safe to cut out the compression failures and use the remainder of the piece.

Position in tree. A considerable amount of work has been and is being carried out by the Division of Forest Products in connection with the influence of position in the tree on the toughness. It is, as yet, too early to make any definite statement, but it appears that it is not advisable to use wood from too near the base of the tree when shock resistance is an important factor.

Heart. With regard to the effect of distance from the pith, however, much more definite information is available. In a large number of the eucalypts the wood from near the centre of the tree is usually very brittle, and this part of the tree has been termed the "heart". Heart is now being investigated thoroughly by the Division of Forest Products and from the progress to date it appears that its occurrence in the tree varies considerably in different trees, being much more extensive in order trees than in young trees. The change from heart to truewood usually occurs within an inch or two and is often quite sudden. This is shown by the sudden change from brittle to tough wood. The fundamental cause of heart is still unknown.

Heart may be readily detected by splitting off a small splinter ¼" square and breaking it in the fingers. If the break is sudden and a carrotty fracture obtained, the wood is almost certainly heart. If, on the other hand, the break is not sudden and a splintering fracture is obtained, and wood is truewood. Another method of detection that has been applied is to raise the grain with the point of a knife. If the sliver runs along and is difficult to break the wood is almost certainly tough, but if it breaks suddenly with a carrotty appearance the presence of heart is indicated. This test cannot be applied to the quarter sawn faces of timber with interlocking grain, and it is only

practicable in the case of harder timbers when green wood is used.

High temperature treatments. Long exposure of timber to high temperatures will cause brittleness particularly if the moisture content is high. For exacting purposes, therefore, it is recommended that low temperature schedules should be used in kiln drying.

KILN SCHEDULES FOR AUSTRALIAN TIMBERS

The steadily increasing use of kilns for drying Australian timbers has created a demand for information regarding suitable kiln schedules for different species. This demand was partly met towards the middle of last year when the Division of Forest Products published a Technical Paper dealing with kiln schedules and giving notes on the drying characteristics of some sixteen Australian timbers. Since the publication of this paper, further work has been carried out, both with the same species and also with five additional species, for which tentative schedules have been determined. These schedules will not be published at the present time, but any kiln operator requiring information may obtain it on application to the Division. The species covered in the more recent work are:-

Marrietia peralata (red tulip oak)
Eucalyptus dalrympleana (mountain oak, NSW)
Schizomeria ovata (crab apple)
Cardwellia sublimis (silky oak)
Eucalyptus sp. (blue top stringybark from Tasmania).

In addition, It is usually possible, from general information, to suggest a preliminary schedule for any species not included in the list, if this is urgently desired. In important cases, also, the Division will make pilot runs in its experimental kilns if a schedule for a species is required immediately.

AUSTRALIAN TIMBERS ABROAD

That Australian timbers are becoming better known abroad is evidenced by the fact that requests for more information concerning them are frequently received by the Division of Forest Products. In recent months, in response to such requests, the Division has furnished information regarding Australian timbers and Australian timber practice to France, Java, Borneo, Kenya, New Zealand and Brazil. In addition to these special requests, the Division maintains a regular exchange of information with thirty countries including the main countries of Europe.

STANDARD APPLE CASE FOR EXPORT

Last year and the previous year, some very interesting laboratory experiments were carried out on the effect of the shape of apple cases on the bruising of the fruit. These tests indicated that an oversize dump case with a 9" width of end, and properly standardised as to moisture content and thickness of timber gave the best protection against bruising. A full account of this work has been published in CSIR Pamphlet No. 45 (DFP Technical Paper No. 10) and copies can be obtained on application to the Division.

These results are now to be checked up by an actual shipment to England, for during the coming month a parcel of 540 cases is to be sent to London. The trial has been made possible by the co-operation of Mr H.G. Colombie, of Melbourne, who has made all shipping arrangements, of Messrs J.W. Bailey and R. Webb of Narre Warren, whose fruit will be pack, and of Messrs C.H. Tutton and F.J. Yelland, who are providing cases.

Half the consignment will be packed in Canadian cases and the other half in improved dump cases. Forty of the cases will be examined in England by the Cambridge Low Temperature Research Station. The remainder will be inspected and sold.

It is hoped that this small shipment will provide information on which larger shipments can be based. The shipment is designed to confirm or disprove the results of laboratory work, which must be tested under commercial conditions before they can be used as a basis of commercial practices.

THE SHRINKAGE OF TIMBER

All timbers do not shrink the same amount, and a timber user often wonders why one piece of timber shrinks more than another. When very accurate measurements are made, it is surprising to find how variable the reduction in dimension can be. Thus, if two pieces are cut side by side from the same board and dried in different ways, their final sizes may be quite different, although they were reduced to the same moisture content. Again treating the green timber in varying ways can affect the amount it will ultimately shrink.

In the USA, of recent years, timber has been treated with certain solutions and gases, so that the amount of shrinkage has been considerably reduced. Except in a very few cases, however, such treatments have not been found practicable.

The Division of Forest Products has commenced a series of experiments on the fundamental shrinkage properties of Australian timbers and these should ultimately yield some very interesting results.

PUBLICATIONS OF THE DIVISION OF FOREST PRODUCTS

1. Technical Paper No. 12 of the Division of Forest Products will shortly be available for distribution. This paper (which forms one of the series of bulletins issued by the Council for Scientific and Industrial Research) deals with various methods for the identification of forty-one different pale coloured woods of the genus *Eucalyptus*. A large number of these timbers prove very difficult to identify chiefly because of the wide variation in structure and, to a certain extent, in properties found within a species. For this reason, therefore, rather full descriptive notes of each timber have been included in this publication, together with suggested keys for their identification. The identification keys have been prepared in two ways. In the first, those features which are apparent to the naked eye, or by means of a hand lens have been used to place the timbers in various groups. In the second, an attempt has been made to separate the important timbers on the basis of both macroscopic and microscopic features. To assist in identification, numerous photomicrographs showing the structure of each species have been included.

2. Three new Trade Circulars are in the course of preparation. The first of these deals with Timber Drying Rooms for furniture manufacturers and others, the second with the Shrinkage of Timber, and the third with "Timber Bending".

BREVITIES

Officers of the Division of Forest Products are at present preparing a publication on the timbers used for electric power and telephone transmission poles. It is planned to cover in this publication all points of interest to pole users, including the latest information on preservative treatments, durability, the properties of the timbers, the sources of supplies, methods for identification, etc. In order to make this work as complete as possible, the Division has forwarded questionnaires covering all points to the various pole users throughout the Commonwealth.

About six months ago the Division of Forest Products received a consignment of karri for tests on the mechanical properties of small clear specimens. The material was cut from five selected trees and is being tested according to international test methods. The first consignment has now been supplemented with a quantity of material taken from young karri trees ranging up to 24" in diameter. Strength tests on green specimens are now nearing completion and the data obtained is at present being analysed. As soon as this is complete, a report on the strength of small green specimens of karri will be issued.

The second part of the article describing the activities of the USA Forest Products laboratory has been held over until the next issue of this News Bulletin.

NEWSLETTER

1934##027

MONTHLY NEWS LETTER NO. 27* **FIRST PUBLISHED IN 2 APRIL 1934**

*PRENOTE

The tittle of this publication has been changed from "Monthly News Bulletin" to "Monthly News Letter", in order to obviate confusion with the series of Bulletins dealing with various technical subjects issued from time-to-time by the Council for Scientific and Industrial Research. In future, therefore, references will be made to the "Monthly News Letter", instead of to the "News Bulletin".

THE FOREST PRODUCTS LABORATORY, MADISON, WISCONSIN, USA PART 2

In a previous issue the first instalment of an article dealing with the work of the United States Forest Products Laboratory was printed. In the present issue the second and final instalment has been included.

"The normal programme is too extensive to permit of any detailed examination, but a brief resumé of the mainlines of research will serve to indicate the scope and variety of the problems in hand.

"One phase of the work of the Section of Silvicultural Relations is concerned with the effect of various site conditions - climatic, edaphic and artificial - (such as spacing) - on the physical properties of wood. Another study is that of the production of turpentine and rosin from the southern pines. Considerable benefit through the prolongation of the useful life of the tree without any decrease in the production of oleoresin has been realized. Wood identification and the establishment of a collection of authentic wood specimens is also an important function of this section. Largely originating in controversies incident to the marketing of forest products of all kinds, about three thousand wood samples come to the section for an authoritative examination every year.

"Over 60 per cent of the lumber produced in the United States is used in building construction. In this highly competitive field accurate strength data on wood and its structural combinations is essential. Hence the Timber Mechanics Section has carried out tests that have made it possible to publish comprehensive information on the strength, weight and shrinkage of one hundred and sixty-four native woods. In addition considerable work has been, and is being done, on timbers in structural sizes, and special equipment and personnel have been devoted to the working out of engineering principles involved in the construction of wooden and corrugated fibre board containers, aircraft members, and recently, frame buildings. By a series of full scale tests on typical wall panels, on a million pound testing machine, means of sheathing and bracing to increase the rigidity of house walls by as much as 400 per cent above that currently obtained, have been developed. Recent work has been largely on the use of metal connectors in wood construction.

"The Section of Timber Physics is engaged primarily on research into the physical properties of wood - density, shrinkage, transfusion of moisture, hygroscopicity,

specific heat, heat conductivity, and the permeability of wood to liquids and gases - as well as the related problems of kiln and air drying. An accurate knowledge of such properties is essential to practically every industry using wood. Studies to determine the usefulness and limitations of the various types of commercial kilns are made and improvements in design may be suggested. Comprehensive experiments to determine the proper drying schedules for all important timber species, as well as schedules for special purpose lumber are constantly being carried out. Attention has been given to the development and the extension of the use of electric moisture content meters. Such an instrument recently invented has proved itself simple, portable, economical in construction and operation, and accurate to 1 per cent. Its effective range, 7-24 per cent, corresponds closely to the range of wood moisture content that is most critical in use. The use of this instrument has enabled studies to be made of the moisture content range in various parts of dwellings in five distinct climatic regions of the USA, thus yielding information on the optimum moisture content for the installation of wood.

"One of the most productive fields in which forest products research has been engaged is the modifying of wood properties through the use of chemical preservatives such as creosote and zinc chloride, paints and coatings, fire retardants, and glues. This is the province of the Wood Preservation Section. A concrete example of the economic benefit derived from the extension of the practice of Wood Preservation is afforded by the reduction in the replacement of railway sleepers from 250 to 180 per mile of track per year by the use of treated sleepers. Experiments are constantly being made to develop new preservatives which will be either cheaper or more effective than present preservatives, or which have properties fitting them for wider use or special purposes. Work of this nature is naturally closely correlated with investigations of preservative processes. These include the relative efficiency of commercially established processes and of new or proposed ones, as well as the fundamental principles involved in the various conditions of temperature, and pressure, and other factors entering into the treating process. A third class of wood preservation studies deals with the suitability of various species to treatment, including the relative resistance to impregnation and decay, and the best methods of preparing them for treatment.

"In the sphere of fire retardants a standard test for the inflammability of wood has been developed and is now widely used. Various chemicals and chemical treatments have been used, and impregnated material tested in this fire tube apparatus.

"The principles involved in proper interrelation of glue viscosity, temperature, assembly time, and pressure have been worked out so that joints as strong as the wood itself, or even stronger, can regularly be obtained by scientific glue room practice with all but the most refractory woods. New casein glues together with a cold press blood albumin glue have also been developed. Recently a chemical treatment has been devised that has protected blood glued plywood joints for five years from any appreciable loss in strength through decay in a moisture saturated atmosphere.

"Painting studies have dealt with primarily with the role played by the kind of wood used. The superiority of aluminium primers over ordinary priming paints have been convincingly demonstrated in numerous paint exposure tests. Other research includes studies of the methods of paint application in order to give longer service, also how to eliminate early paint failure due to moisture collecting in the outer walls of houses. At the present time efforts are being made to develop a modified linseed oil that will prevent paint becoming brittle when it ages which is the defect of present paints that limits their durability on different woods.

"The major objective of the Pulp and Paper Section is to improve standard pulping methods and develop new methods which will permit the use of substitute species such as southern pines, western firs and hemlock. Notable success has been attained in this direction especially in regard to the southern pines. An entirely new process combining the desirable attributes of both chemical and mechanical pulping has been devised, to produce high yields of cheap print paper from both hardwoods and softwoods. This process involves the use of a rod mill which has long been a standard pulverizing device in the mining industry. This apparatus is now being widely employed in paper mills as a beater,

also as a disintegrating engine for the repulping of old papers. Extensive studies pertaining to the utilization of wood waste, the recovery and commercial use of waste liquors, and the suitability of pulp for the manufacture of molded articles and artificial silk are also being carried out.

"The Section of Derived Products is engaged mainly in fundamental studies of the chemistry of cellulose and lignin, together with research into the chemistry of wood plastics. Considerable progress has been made in various directions but mainly in the more efficient distillation of wood and refining of the products; in the study of extractives; and in studies of the toxicity of various chemicals to decay organisms.

"The Section of Industrial Investigations is concerned with the economics of small sawmill and logging operations; with the use of ready cut (small dimension) stock by industries; with the refinement of grading practices and with the utilization of neglected species. Investigations in the field of selective logging have been made to determine, for any given set of conditions the marginal size tree below which it is uneconomical to cut. Attempts are also being made to obtain closer utilization by the integration of industries.

"The work of the Pathology Section can be divided into two parts - Diagnosis and evaluation of fungus defects in wood products, and fundamental research which includes: taxonomic studies of organisms causing fungus defects in wood products, investigations of the physiology of the organisms such as their moisture and temperature relations, their effect on the chemical and physiological properties of wood, and their reaction to fungicides.

"In addition, courses on various subjects, for example, kiln drying, gluing, boxing and crating, are given at the laboratory at intervals. These courses are of particular value to superintendents, lumber and production men and foremen in wood using plants.

"Investigations are undertaken both independently and on a co-operative basis, but all investigations must be of a research character that will give information or results of value in obtaining the general objects aimed at by the laboratory.

"Results and information are made available to the public as rapidly as possible. This is done by personal contact, and through reports written during the progress of the investigation and upon its completion, so that all information of value is published either as bulletins or circulars by the Government, in technical notes, by correspondence, or as special articles in trade journals and technical and scientific papers."

PINUS RADIATA FOR PAPER MAKING

Some months ago a note was published in this News Letter (see Pre-note) referring to the use of *Pinus radiata* (insignia pine) as a paper making material. At that time doubt was expressed as to the suitability of the timber for the manufacture of good quality sulphite pulp and it was made clear that the Division of Forest Products had no knowledge of any satisfactory work which showed the contrary. It was also stated that there was need for research to remove the technical difficulties that had been encountered.

Since the issue of that number of the News Letter, a report by Dr C.E. Curran of the United States Forest Products Laboratory, has been received and the evidence disclosed in this report, together with the results of Dr Herty's most recent trials at the Georgia (USA) (Experiment Station, have caused the Division to modify its views. This recent work shows that resinous pines can be pulped satisfactorily and that many of the technical difficulties have been overcome. It remains to be shown, however, that the improved processes can be carried out at a cost which will enable the resulting paper to compete in price with that made from such timbers as spruce and hemlock.

Dr Herty's semi-commercial tests led him to state that the cost of pulping southern pitch pines was below that of pulping spruce. Dr Curran's report, while not definite on this important point, gives several indications that the cost would be higher than with spruce. For example, the cost of grinding the mechanical pulp is higher and there is need for bleaching at least to some extent, while in ordinary newsprint made from spruce this expensive process is not necessary.

The position now is that the question of cost needs to be properly investigated for it is manifestly impossible to establish an industry at the cost of hundreds of thousands of pounds on the basis of laboratory scale tests which do not give reasonably accurate costs. In Dr Herty's work he estimates the cost of his pulp wood at US$4.00 a cord. This is a very low cost and would not return much to the forest. It is more than doubtful that pulp wood could be delivered from a plantation to a mill site at such a price in Australia.

The recent developments vindicate the constantly reiterated warning of the Division of Forest Products, that mere statements as to the future of *Pinus radiata* for the manufacture of pulp were unsatisfactory and that further research was essential in order to demonstrate that practical difficulties could be overcome.

Statements have appeared in the Press, leading readers to believe that the Division's attitude was that *Pinus radiata* could not be pulped. This is not correct. It was made clear that satisfactory methods for the manufacture of sulphite pulp from this timber and not been found, bit it was also stated that further research might lead to more satisfactory results. The Division now urges that still further research is necessary in order to obtain definite figures as to cost and, if necessary, in order to reduce costs to a satisfactory level. This must precede the establishment of any newsprint industry based on the pulping of resinous pines.

EXPERIMENTAL TESTS WITH POLES

In November 1932, a number of experimental poles were installed at Belgrave and Benalla, Victoria, in connection with the series of tests carried out by the Division of Forest Products. Just recently additional poles which have been seasoned for about twelve months have been added to the others in the test plots. In this experiment only one species of timber, namely, *E. obliqua* (messmate), has been used.

Eight different methods of preservative treatment are being investigated using in some cases both green and air dried poles. Untreated poles have also been included for comparative purposes. The various preservative treatments employed are:-

(i) creosote under pressure - full length of pole

(ii) creosote open tank treatment of butt only

(iii) creosote brush treatment together with puddling of the surrounding soil with creosote

(iv) crude oil and arsenic solution brush treatment with puddling of the soil

(v) the use of collars of white arsenic

(vi) collars of a mixture of sodium fluoride and white arsenic

(vii) charring by means of an oxy-acetylene flame followed by spraying with creosote and soil puddling

(viii) the use of a bandage methods of pole preservation development in Germany.

The poles used in these experiments were either 10 or 20 feet long, the length depending on the method of treatment.

In February of this year a preliminary inspection of the poles was carried out and it was found that at Belgrave large numbers of the untreated poles were already attacked by decay, the sapwood in some of the unsapped poles being completely destroyed. At Benalla, termites had also caused damage to the untreated poles. At both places some of the collar treated poles were slightly attacked by decay or termites. The remaining treated poles were in excellent condition. Further inspections will be made annually and a report will be published as soon as sufficient reliable data are obtained.

STEEL VERSUS WOODEN RAILWAY CARRIAGES?

Since the recent disastrous French railway accident in which great loss of life was caused by a collision between an all steal train and a train composed of "wooden" carriages, there has been a considerable agitation all over the world for the abolition of "wooden" carriages. An editorial published in a recent number of *"The Engineer"*, one of the leading English engineering journals, dealing with the question of steel and wooden carriages is, therefore, of interest. Before giving a précis of this editorial it is as well to mention that a modern "wooden" carriage has a steel underframe with

a wooden body, while in the all steel carriage both the undercarriage and body are of steel.

The editorial points out that there are two serious objections to the use of "wooden" carriages. One of these, the fire risk, is caused by the escape of gas after a collision or derailment, but is very considerably reduced these days by the general adoption of electric lighting. The more important objection to "wooden" carriages, however, is the danger from telescoping. In this regard the history of railway accidents in England is of interest (there are very few all steel carriages in use in England). In the Hawes Junction accident in 1910, telescoping was very serious. The Dinwoodie accident in 1928, however, was splendid testimony to the efficacy of the steps taken after the Hawes Junction to prevent telescoping. In this accident the "Royal Highlander", drawn by two engines and consisting of 12 "wooden" carriages ran into a freight train at 50 miles per hour. The two engines of the express were derailed and the leading coach mounted the debris. The independent official who investigated the accident said that the effects of the collision on the coaches of the express was as a whole remarkably small. All the coaches had steel underframes, and all, except the last, were of modern heavy construction; all with the same exception were fitted with Spencer's double action shock absorbing buffers.

There was no doubt that the type of buffer referred to played an important part in preventing telescoping and in minimising the effects of the accident on passengers and damages to the rolling stock. For instance, all doors of the third coach were subsequently opened quite easily; not a window was broken to the rear of the second coach excepting the one pane which was cracked in the fifth.

Coming to the Howling Basin collision in 1933, when an express running at 50 miles per hour collided with some wagons, we found that, although the engine and all the coaches were derailed, there was no overturning or telescoping. The six coaches of the express were all of modern construction with well braced underframes and wooden bodies. Considering the speed at which the collision occurred the damage was small. It was confined mainly to the front of the engine, to the bogies and running gear of the coaches; there was only one broken window in the whole train. In concluding his report the investigating officer said that the collision was remarkable for the small number of injuries involved. This must, he thought, be attributed to the excellence of the design and construction of the modern rolling stock of which the express train was composed.

A few other points need to be mentioned. Since 1928 telescoping has not been mentioned in the annual reports on British railway accidents. Also, as illustrative of another aspect of the question, it may be remarked that after a collision last year between an electrically operated passenger train and a goods train the wreckage of the all steel motor coach had to be cut apart with oxyacetylene torches in order to release the motorman and the guard of the goods train. It must not be overlooked that the impact between an all steel train and a "wooden" train, as in the recent deplorable French accident, is very different from one between two all steel trains.

The above extracts from the editorial referred to show that there is another side to the agitation that has occurred in the lay press in both England and Australia for the abolition of "wooden" rolling stock. There is no doubt that **with modern methods of construction** the dangers from telescoping and fire are very small. In the event of an accident the unfortunate passengers can be readily freed from "wooden" carriages, whereas with all steel construction the work of freeing passengers is very much more difficult and, in fact, often impossible without special equipment.

ELECTRICAL MOISTURE METERS

The principle underlying the use of Electrical Moisture Meters in testing the moisture content of timber is the variation of the electrical resistance of wood with its moisture content. However, the exact values vary to some extent with different species of timber and to obtain the best results the right "correction figure" should be applied in each case. This work of determining "correction figures" has been proceeding in the laboratories of the Division of Forest Products during the last three years. To date, correction figures for over sixty different species of timber have been determined and these have

been published in the Division's Trade Circular No. 9 - "Electrical Moisture Meters" - Second Edition. The last three timbers for which figures have been obtained are English ash (*Fraxinus excelsior*), red mahogany (*Eucalyptus resinifera*) and King William Pine (*Athrotaxis selaginoides*).

Besides extending the work to cover additional species, check tests are continually being carried out on new consignments of timbers previously tested. In almost all cases it has been found that there is no appreciable difference in the correction figures and it is believed that the figure is, for all practical purposes, constant for any one species of timber irrespective of locality.

TIMBER PHYSICS

A section of Timber Physics has now been initiated in the Division. Mr W.L. Greenhilll has been given charge of this Section which will shortly begin work.

The Section is taking over from other sections work connected with the density, shrinkage and collapse of timber, and methods of determining moisture contents and stress conditions. Additional work is planned to determine fibre saturation points and the relation between atmospheric conditions and moisture content for Australian timbers.

NEWSLETTER

Forest Products

1934##028

MONTHLY NEWS LETTER NO. 28 FIRST PUBLISHED IN 1 MAY 1934

THE PREDICTED TIMBER FAMINE - IS IT JUSTIFIED?

Numerous proposals for commercial forestry schemes base their estimates of future profits on the idea that the world is faced with the danger of a timber famine within the next decade or two. It is consequently important to consider whether this danger is or is not a real one.

Foresters who have had to look on, more or less helplessly, while they see the forests ruthlessly exploited for present profit and with little or no consideration for future supplies, have issued warning after warning of a future shortage. Justified though their attitude may have been, a study of timber utilisation today indicates the need for a revision of this prediction.

It is not with any idea of opposing the warning cry of the forester, but definitely to remove a super optimism in the minds of the investing public in regard to famine prices of timber that this note is written. There has undoubtedly been exploitation of the timber reserves of the world at a rate much greater than the forests are reproducing themselves, but certain developments have of recent years had the effect of considerably modifying this. In the first place, the world's timber consumption per head of population has been steadily decreasing for a number of years. Any approach of a shortage will considerably assist in a further decrease because rising prices will result in an even greater use of timber substitutes than at present. This will always tend to check the prices increase.

The use of steel window frames and doors, office fittings, poles, railway sleepers, railway carriages and numerous other articles previously made of timber is only one of the many causes of decreased consumption. Numerous types of fibre and plaster building boards have come on to the market and their manufacture and use are progressing at a tremendous rate. Still more recent has been the growth of the plastics industry and an increasing number of articles are now being pressed from moulding powders. the growth of this industry has been phenomenal and it is only in its infancy.

This factor of timber substitutes is one that was not foreseen when panic predictions were made. Another factor of importance in combating a timber shortage is the constantly increasing list of timbers at one time disregarded commercially, but now being used in large quantities. New timbers are constantly coming into the market for the manufacture of wooden articles and of paper pulp. Recent work has shown the possibility of pulping the pitch pines of the Southern States of America. If this proves a commercial success it will add enormously to the reserves of pulp wood.

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A further factor which will modify the demands of the future is the steadily decreasing population rate. Within a generation this will play a considerable part in lowering demand. The steadily increasing efficiency of timber operatives in the bush, the mill and the factory constitutes still another conservation factor. Research is continually showing new ways of increasing the output from the log and preventing or reducing waste in conversion. The huge waste destructors at one time considered an essential part of every timber mill in the United States of America are rapidly disappearing as fresh uses are found for the waste. In some large mills it is difficult today to find enough waste to keep the sawdust burning. There is a growing recognition of these factors and foresters in some countries are beginning to realise the position.

There is every need for the issue of warnings against the over rapid destruction of forest areas and foresters will continue to urge their point of view; but, because this is so, there is no justification for a belief that money invested in forestry schemes will yield high rates of interest because of famine prices in the near or even in the distant future.

THE PREPARATION OF WOOD PRIOR TO PRESERVATIVE TREATMENT

Information has previously been given in these Monthly News Letters regarding the various types of oil and water soluble wood preservatives, and their relative merits. To obtain satisfactory results, when using any of these preservatives, it is essential that special care and attention be given to the timber before treatment. The timber should be free from bark, seasoned (except to the case of certain special treatments) and be initially free from decay. Preservatives will not always penetrate through bark, and thus, if the bark is left on at the time of treatment, the preservative cannot be expected to protect satisfactorily the wood immediately below the bark. In service the bark may fall off or be knocked off, thus exposing an area of untreated wood which will then be open to attack by decay. Once attack commences, the decay will penetrate the wood and may destroy the central portion of a treated wooden member. The preservative must, therefore, be applied equally and consistently all round the bark-free wood.

In green timber the individual cells are filled or partly filled with water and this prevents the penetration of preservatives, particularly of those with an oil base. The treatment of green timber by brushing, or spraying, is, therefore, unsatisfactory. Moreover, there is the possibility of cracks opening in the timber as drying occurs, thus exposing surfaces of untreated timber. For preference the timber should be air seasoned for approximately one year, but the time of seasoning will naturally vary with the size and nature of the timber, the locality in which it is being seasoned, and the conditions of piling, etc., adopted. For surface treatments such as brushing or spraying, sufficient seasoning to dry properly the outside half-inch of wood will probably give satisfactory results, but for other methods of treatment the degree of seasoning has a definite effect on the depth of penetration and adsorption of the preservative, more especially with treatable woods.

Further, timber, to be subjected to preservative treatment, should be first carefully examined to insure that it is free from decay. Except where the treatment involves a long heating period, the decay (especially if it has penetrated the wood to any extent) may not be killed by the treatment. Such decay will go on developing below the external treated area until only a hollow shell is left.

PRESERVATIVE TREATMENT OF QUEENSLAND TIMBERS FOR USE AS SLEEPERS

On behalf of the Queensland Forest Service, the Division of Forest Products has just completed the treatment of a number of half round sleepers of blackbutt (*E. pilularis*) and rose gum (*E. saligna*). The sleepers, previously air seasoned, were treated in the experimental treating plant of the Division. In the treatment a vacuum was first applied in order to remove a large part of the air contained in the cells of wood; hot creosote was then forced into the cylinder under a pressure of 150-200 lbs per sq. inch. This pressure treatment was continued for two

hours. In both species the sapwood was completely and heavily impregnated with creosote, while a penetration of about 1/5"-1/10" was obtained with the truewood. The average absorption of preservative was 9.3 lbs per sleeper in the case of rose gum and 5.1 lbs per sleeper for blackbutt. This adsorption is equivalent to 4.1 and 2.4 lbs per cubic foot of wool respectively.

These treated sleepers will be forwarded to Queensland, where they, together with untreated controls, will be installed in the track in order to observe their life under service conditions.

WOOD TAINT IN BUTTER

As a result of the work carried out by the Division of Forest Products to overcome the taint in butter caused by hoop pine the Department of Commerce has issued a regulation preventing the export of butter in hoop pine boxes, unless these boxes have been sprayed by the casein-formalin treatment recommended by the Division.

This regulation is to come into force on the first of May, but reasonable time will be allowed in which to make the necessary arrangements for supplies of treated boxes.

In this connection it is interesting to note that recent work in the Dairy Research Laboratories of New Zealand has fully confirmed the efficacy of the treatment in preventing wood taint.

There is certain to be a great deal of adverse comment from the industry at first. This always occurs when a new regulation is put into force. There is, however, no doubt that in a little while, when the results of the spraying are evident, there will be a general approval of the process.

PREVENTING LEAKAGE FROM BEER BARRELS

Coopers are often confronted with a problem of stopping leaking beer barrels. Some barrels allow a slow, but steady leakage of gases, and beer shipped in them is found to be "flat" when delivered. The cause of this trouble is frequently traced to the head and to the undercut portion of the stave below and above the head. At these places sufficient end grain of the timber is exposed to permit escape of gas and some liquid if the pores of the wood are open.

The United States Forest Products Laboratory has recently developed a simple means of stoping such leakage even when porous woods are used. Using ordinary brewers' pitch, the resinous preparation used for internal sealing of all beer barrels, it was found that a leaky barrel could be made as tight as a sound one, by means of a short pressure treatment with the hot liquid pitch standing a few inches deep in first one end of the barrel and then the other. Aside from this procedure, which can be effected in step with the customary spraying operation, the only other change in practice necessary is to caulk or pitch the croze or groove of the barrel where the hand is drawn in. Barrels treated in this manner have withstood hydro-pneumatic tests in the laboratory and have made five round trips from brewery to consumer without development of leakage.

PUBLICATIONS OF THE DIVISION OF FOREST PRODUCTS

(1) **Trade Circular No. 20** - "Collapse and the Reconditioning of Collapsed Timber".

This Trade Circular is now ready for distribution. It deals fully with the details of the reconditioning treatment of collapsed timber and with the considerable advantages than can, in many cases, be obtained by its adoption. Although this treatment of collapsed timber on a commercial scale is now well established and fairly widely adopted in Victoria and Tasmania, there are still a number of timbermen, especially in the other States, who are not familiar with it. This Trade Circular has, therefore, been prepared. It sets out in a simple form the details of treatment and embraces one or two recommendations which are made as the result of recent investigations and which have not previously been published.

(2) **Trade Circular No. 21** - "Drying Rooms for Furniture Stock" - (In press, but should be ready for distribution by the end of May).

This Circular is intended to give some simple directions which will be of help to manufacturers who are considering the installation of drying rooms for furniture stock. The furniture manufacturer should always make provision for bringing his stock to the correct moisture content for his particular requirements. To insure this prior to fabrication as well as to remove excess moisture added during manufacture, for example, during gluing, it is essential to install drying rooms.

(3) **Trade Circular No. 22** - "Timber Bending" - (In press)

Very little information is available regarding the bending of Australian timbers and very little experimental work has been carried out with our timbers. The need for more knowledge and the necessity for experimental work is well recognised, and the Division of Forest Products is at present making enquiries regarding special equipment for this purpose. It is hoped that this will shortly be installed and the work initiated. In the meantime, however, this circular has been prepared to set out some of the fund principles involved in the bending of timbers. The proper understanding of these principles should result in improved bending practice and the reduction of losses now regarded as inevitable.

(4) **Trade Circular No. 23** - "The Shrinkage of wood" - (In press)

It is of vital importance that timbermen in general should understand the relation which shrinkage bears to their problems in utilising wood. To help them to this understanding, Trade Circular No. 23 has been prepared. In it the influence of shrinkage on the milling and drying of green timber is discussed together with the reasons why various forms of degrade would not occur if uneven shrinkage during drying could be eliminated.

All the above trade circulars as well as other publications of the Division may be obtained without cost by applying to the Division.

TIMBER SEASONING CLASSES IN TASMANIA

During the recent visit to Tasmania of Messrs. I.H. Boas and S.A. Clarke, Chief and Deputy Chief of the Division of Forest Products, a definite stir of interest in kiln seasoning was noted. As a result it is anticipated that several new batteries of kilns will be installed in that State in the near future.

The main object of the visit was to conduct two short courses of lectures in Timber Seasoning and related problems. One of those courses was held in Launceston and the other in Smithton. The courses, each of which was of one week's duration, were designed specially for those interested in kiln operation and were well attended.

CSIRO AUSTRALIA

NEWSLETTER
Forest Products
1934##029
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FACTS ABOUT TIMBER SEASONING

1. Kilns and their Rate of Drying

In a timber seasoning kiln, provided the circulation is satisfactory and the temperature and humidity are under proper control, the rate of drying of a charge is dependent upon the rate at which the moisture can be transmitted from the centre of each piece of timber to the surface. That is to say, the timber itself is the ultimate deciding factor in the possible rate of drying. Further, given a kiln in which the circulation, temperature and humidity can be satisfactorily controlled, the rate of transfusion of moisture from the centre to the surface of each piece of timber is dependent entirely on the use of the correct drying schedule for the particular material being dried.

While it is doubtful if absolutely perfect control of circulation, humidity and temperature is feasible, there are several designs of timber seasoning kilns which approach the ideal in this respect. So far as the rate of drying is concerned, there is nothing to choose between thee kilns, and intending installers of kilns should be aware of such statements as "our kilns will dry 25% or 50% faster than any other". In nine cases out of ten those making such claims are simply attempting to bolster up inferior kilns. In choosing between the several designs of kilns which give satisfactory control of conditions, the question is narrowed down to one of initial cost and cost and simplicity of operation.

The cross-shaft internal fan type of kiln advocated by the Division of Forest Products has been chosen after careful study of its performance from this point of view. It is a kiln which gives satisfactory control of conditions, is cheap to install and simple and economical to operate.

The Division is, at present, devoting its attention to the materials and methods of kiln construction so that construction costs can be kept to a minimum, and maximum life obtained. Wherever possible, personal inspections of existing kiln installations are being carried out in order to look for points of depreciation. The co-operation of various operators is also being obtained to collect similar information for kilns which are not readily accessible to the Division.

PINHOLES IN TIMBER

There is a common fear in the minds of architects and timber users generally that the presence in timber of holes caused by the pin-hole borer indicates that further destruction of the timber will take place. Actually, of course, this is not so, for the pinhole borer lives only in the living or freshly felled tree, and does not attack seasoned or partly seasoned timber. Moreover, the tunnels it makes can be readily distinguished form those of the destructive borers such as the Lyctus and furniture borers. This is because the holes are discoloured and do not contain powder but sometimes only a stringy frass, whereas the borings of the destructive borers are filled with a fine powder and the surface holes show no discolouration.

Perhaps the timber industry is, to a certain extent, itself to blame for the confusion about borers because the term pinhole has been used indiscriminately in some localities to apply to all forms of borer attack. The names of the different types of borer attack have been

standardised in Australia by the Standards Association and the definitions and descriptions are clearly set cut in the appendix to the draft terms and definitions used in timber grading. These have been published as Trade Circular No. 15 of the Division of Forest Products.

More extensive information on borer identification and eradication can be obtained from Trade Circular No. 5 dealing with the Lyctus, or Powder Post Beetle and Trade Circular No. 11 on the Anobium or the Furniture Borer.

At the present time, another Trade Circular dealing exclusively with the Pin-hole Borer is in the course of preparation and will be issued at an early date. All of these Trade Circulars may be obtained, free of charge, on application to this Division.

TIMBER GRADING STUDIES

At the end of 1932, and early in 1933, a comprehensive grading investigation was carried out in Western Australia as a co-operative project between the Western Australian Forests Department and the Division of Forest Products. In this investigation existing timber specifications were checked to find whether they gave a true description of the class of timber being supplied and accepted. This involved the examination, piece by piece, of large quantities of timber and the listing and classification of the nature and extent of all defects.

Where specifications were unsatisfactory, new trial specifications were drawn up, submitted to test and modified until satisfactory. Such tests involved the careful inspection of some 35,000 pieces of timber. This investigation was confined to the two Western Australian timbers, jarrah and karri, but it has resulted in the collection of information which permits the laying down of grading rules on a sound basis.

The preparation of grading rules for all Australian timbers has been occupying the attention of Committees of the Standards Association throughout the Commonwealth, but in this work there has been a severe handicap due to lack of fundamental data on the extent and occurrence of defects.

These difficulties are not confined to Australia. Recently the Advisory Committee on Timbers of the Imperial Institute drew attention to the necessity for proper grading studies throughout the Empire so that grades for timbers entering Great Britain could be drawn up on a proper basis.

The Division of Forest Products is, therefore, extending its grading work to cover all the more important species of Eastern Australia. Initially, the work will be confined to Victoria, but later will extend to the other States. Preliminary investigations into the quality of timber on the Melbourne market have been in progress for some time and mill studies at bush mills have already commenced.

The co-operation of all branches of the timber industry is requested in this work of a nation-wide character and individual firms are asked to give every assistance to the personnel of the grading study crew. The value of the investigations in Western Australia was greatly enhanced by the excellent co-operation afforded by the timber merchants was greatly enhanced by the excellent co-operation afforded by the timber merchants and sawmillers.

THE IDENTIFICATION OF AUSTRALIAN TIMBERS

It is well known that the majority of the hardwoods of everyday use in Australia belong to the genus *Eucalyptus* and, because of their everyday use, it is important that the physical and mechanical properties of the various species be placed on record. In the course of its work the Division of Forest Products has already studied the wood structure of some eighty different eucalypts of importance and, as a result, has developed methods for their identification. Additional work on the mechanical properties, the seasoning, and the adaptability to preservative treatment of these timbers is proceeding. However, the Division of Forest Products has not lost sight of the fact that there are a large number of commercial timbers in Australia other than eucalypts.

As a preliminary step in the collection of information concerning these other timbers, extensive investigations are being carried out on the wood structure of approximately 100 of

the more important non-eucalypt timbers. The investigations have been proceeding in stages, the timbers being examined by families. That is to say, all the commercial timbers belonging to one particular botanical family are examined at the one time in order to study points of similarity and dissimilarity. Just as certain traits or characteristics are common in human families, so it is found that certain definite features are common to the individual timbers of the same botanical family. For example, large wood rays giving a distinctive ray figure on quarter cut surfaces are common to the various silky oaks, the banksias or honeysuckles, beefwood and needlewood, all of which belong to the same botanical family, the Proteaceae. The she-oaks or bull oaks also show distinctive ray figures and possess large wood rays, but they belong to a different botanical family which fact can be detected on other features. It is also found that a number of different woods closely related botanically all possess definite odours which may or may not be fragrant.

Not only is it of value to know how and where the Australian timbers of the same family resemble each other, but it is of importance to know how they resemble or differ from their overseas cousins, i.e. from timbers not growing in Australia, although in the same botanical family.

As a result of all this work on the structure and physical properties of the commercial non-eucalypts of Australia, it is hoped shortly to publish a key to the identification of these timbers based on macroscopic features. As an aid to those wishing to use such a key, it is proposed to include photographs of the cross section of each species at ten magnifications. This magnification is similar to that obtainable with an ordinary hand lens. These photographs are being prepared by an improved technique following the suggestion of Mr A.T.J. Bianchi of the Forest Research Institute, Buitenzorg, Java, who recently spent some time with the Division of Forest Products studying modern seasoning developments.

WOODEN MEAT SKEWERS

We are so used to seeing timber in our daily life that often we do not realise that quite insignificant uses can represent an appreciable consumption of timber. For example, Australia probably uses about 20,000,000 wooden skewers per annum and each one of these has to be of the right timber, the right diameter and length, and carefully pointed to an exacting specification. At one time, all skewers were imported, but now they are made locally and in addition there is a small export trade. A common complaint about Australian hardwoods is that they are too heavy, but the butcher buying skewers never complains. He buys his skewers by the thousand as timber, and he sells them by the pound as meat.

BACK-SAWN AND QUARTER-SAWN TIMBER

In spite of the fact that the terms back-sawn and quarter-sawn have been defined by the Timber Committee of the Standards Association of Australia, there is still some confusion in isolated places as to the exact meanings of these two terms.

In a tree most of the wood elements or cells run in a vertical direction, but there is a secondary series (the rays - for example, in oak) which radiate horizontally from the pith or structural centre to the bark. If timber is cut with the wide face generally in the direction of these rays, it is said to be quarter-sawn. When the end of such a piece is examined the growth rings will be found running mostly at right angles to the wide face, although timber with the growth rings from this to an angle of 45° to the wide face is usually accepted under the general term quarter-sawn.

If a cut is made off the side of a log the surface so exposed is said to be back-sawn. In back-sawn timber, therefore, the rays are generally at right angles to the wide face, while the width of the board follows more or less the direction of the growth rings.

BREVITIES

Termites, or white ants, as they are popularly called, are among the most destructive insects in Australia. Because they are always with us, we do not quite realise the cost of their depredations, but this must run into some hundreds of thousands of pounds per annum. To reduce this loss, co-operative investigations between the Division of Economic

Entomology and the Division of Forest Products are in progress, and Dr Holdaway, of the staff of the former Division, recently visited Melbourne to discuss the various phases of the work. One phase of the investigations has involved a careful study of the likes and dislikes of these insects, so that, now, little colonies can be kept in jars in the laboratory and their behaviour under certain conditions studied.

The weak points in a wooden box are usually the nailed joints so that nail design is a factor of importance. It is common practice to coat nails with resinous substances in order to increase their holding power. Such nails are called cement-coated nails and tests overseas have shown that they have a considerably higher holding power than the ordinary nails. In tests carried out by the Division of Forest Products, however, with Australian nails, there was little, if any, significant difference between the behaviour of the two types. To find the cause of this apparent anomaly some nails have been obtained from Canada so that comparative tests can be carried out.

Mr I.H. Boas, Chief of the Division of Forest Products, has recently returned from a visit to New South Wales and Queensland. Mr Boas, who is also Chairman of the Timber Sectional Committee of the Standards Association of Australia, investigated timber grading matters in these States, in addition to general problems associated with the work of the Division.

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THE VARIABILITY OF TIMBER

Timber differs from synthetic structural materials such as steel, in that it is the product of living organisms and hence shows the variability common to all organic products. If a piece of timber is required for some definite purpose, it is not sufficient to obtain simply any piece of wood and expect it to meet the requirements. Rather is it necessary to decide whether a hard timber or a soft timber, a strong timber or a shock resistant timber, a coarse textured timber or one with a fine texture and turning to a smooth surface is required. Having decided upon the properties desired, it is usual then to specify a species of timber which is known generally to meet the requirements.

In other words, the timber user knows that there are distinct differences between the various species of timber, but it is not always realised that there is also appreciable variation within the same species. Failure to appreciate this factor has been responsible for much trouble and disappointment.

The first point to be considered is the variation within the one tree. One great difference is that between the sapwood and the truewood, and this is generally recognised. For example, the truewood is known to be much more durable than the sapwood, and it often differs widely in colour, but the sapwood is easier to season and impregnate with preservatives. A fact which is not generally realised is that, other things being equal, sapwood is as strong as truewood. Millers of eucalypts are fully aware of the difference between the heart of the tree and the timber nearer the sapwood. The central portion of the tree represents the part laid down in the early years of the life of the tree, and this material is considerably lower in density and differs in other properties from the bulk of the wood in the tree.

Again, there are variations from the bottom to the top of the bole of the tree. It is well known, for example, that in many species the shrinkage in timber from top logs is greater than in that from butt logs and due cutting allowances are made. Also the shock resistance is known to vary throughout the height of the tree - in some species the toughest timber being obtained from the butt logs, while in others such material is obtained higher in the tree.

Perhaps the variation from tree to tree within a species is better known. For example, it is common knowledge that trees growing on unsuitable sites yield inferior timber and that from district to district and even within the same district there is considerable variation in the quality of timber produced.

It will now be apparent that where timber is required for an exacting use, it is not sufficient simply to specify species of timber: careful selection of the quality required must be made. Also it is impossible to determine the properties of any species of timber from the examination of one or two pieces. Thus, in carrying out research work, the Division of Forest Products pays particular attention to the selection of material for the various tests, so that these should be representative of the species concerned.

THE STRENGTH OF KARRI

At the present time, the Division of Forest Products, in co-operation with the Western

Australian Forests Department, is carrying out an extensive series of tests on the mechanical properties of karri (*E. diversicolor*). One of the principal objects of this investigation is to study the variation in the properties of the wood, both from different parts of the same tree, and from different trees. A knowledge of the manner in which the properties vary is of great importance in the proper selection of timber for special purposes where high mechanical properties are required, such as in tool handles and sporting goods. In this study tests are being carried out with the clear wood in accordance with the standard methods adopted in English speaking countries. The results will thus be directly comparable with those of the principal overseas species with which karri comes into competition.

For these tests, and in order to cover the variation both within the species and within the tree, specimens were taken from a total of 26 trees. The material was cut in such a way as to investigate the variations in properties with height and distance from the sapwood. From five of the trees sufficient material was obtained to carry out the following tests:-

Static bending, compression parallel to and perpendicular to the grain, cleavage, shear, hardness and toughness. Toughness tests only were carried out on the specimens from the remaining trees.

Half of the specimens obtained have been tested in the green condition: the remaining specimens have been stacked for drying and will be tested when air-dry. The mechanical tests on the green timber have now been completed (over 2300 tests). The average results have been calculated, but will not be published until the tests on the air-dry material have been completed. In the meantime, anyone interested may obtain information concerning the results on application to the Division of Forest Products. The complete analysis of the results is still proceeding, but already some interesting information has been obtained. One interesting point is that the average results agree closely with average found for this species by Sir George Julius in 1906.

In comparison with overseas species, karri is a very hard, strong and stiff timber of moderate impact strength. It is better than douglas fir (oregon) and English oak in practically all properties, and for structural purposes, its strength and stiffness enable the use of sizes smaller than are necessary with douglas fir and oak.

GLUING PRACTICE

In Trade Circular No. 14, the Division of Forest Products drew attention to the prevalence of bad gluing practice in many parts of Australia, and the circular was prepared in order to assist in overcoming such bad practice. It is astonishing how difficult it is to persuade some manufacturers that care in gluing is essential for good results.

In a recent issue of the "*Furniture Manufacturer*", there appears an article on "Glue - Its Use and Abuse". This article shows that even in the United States, where so much work has been done on glue and so much written about it, the same old bad practices of boiling glue and keeping it too long still occurs. If this is the case in the United States, there need be no apology for once more calling attention to Trade Circular No. 14 and suggesting that all glue users write for a copy and study it closely (copies are obtainable on application to the Division).

The writer of the article in the "*Furniture Manufacturer*" states - "There are some who have an idea that all that is required in a glueman is a human being, who can use his muscle - that the good glue they have provided will make up for lack of grey matter in the head. Those who have this idea should ponder deeply, because the money invested in a glueroom and the wages paid to glueman should pay real dividends and eliminate a lot of trouble all through the factory."

COLLAPSE IN TIMBER

Most people are now familiar with the timber fault known as collapse, which is quite a prominent feature in many of the lighter eucalypts. The reconditioning process for the removal of collapse and its benefits in increased yield and improved quality are also well known. It is not generally realised, however, that many of the denser timbers are also susceptible to collapse. In these, it is usually manifest, not so much as irregular shrinkage as excessive shrinkage. An example

in point is red gum (*Eucalyptus rostrata*). Back cut flooring boards of this species are known to shrink to rather a large extent in width during drying, while there is often warping and kinking of the boards. Reconditioning of red gum is undoubtedly a profitable procedure for the green size required to produce a flooring board free from skip is considerably reduced and the quality of the timber both as regards machining and straightness is also improved.

Probably many other Australian timbers could with advantage be reconditioned and this and other aspects of collapse are at present being studied by the Division of Forest Products.

TEXT BOOKS ON TIMBER

One of the difficulties confronting the student of timber problems whether elementary or advanced is the absence of good text books on timber. For example, many of the English books on building construction have several chapters devoted to timber matters, but the information contained in these is often out-of-date and in many cases includes a large number of ancient fallacies.

The Division of Forest Products has tried to meet the position by issuing a series of trade circulars, of which 23 have already been printed and distributed. These are free, and are in large demand. There can be no doubt that they are filling a definite need in the community. Sometimes, however, officers of the Division find evidence that recipients of Trade Circulars are not making use of them and are not even troubling to file them for future reference. The supply of each of these Trade Circulars is definitely limited, and already a number of the earlier numbers are out of print and will not be re-issued.

Recently, the Division has been requested by Manual Training Instructors in several States to make Trade Circulars available to trainees and so provide for them a ready means of reference. It has also been suggested that the Division should prepare text books suitable for students, and covering various phases of timber utilisation. Such books, of course, could not be issued free, but would have to be sold. The Division has this suggestion under consideration and will probably adopt it. One point to be considered will be whether to continue the free issue of Trade Circulars as before, or whether to confine the information distributed to the text book series. The decision will rest to a large extent on the respect which is given to the free issue of Trade Circulars.

THE FIRE RISK IN TIMBER KILNS

A good example of how the association of ideas can be erroneous is provided in the common conception that timber seasoning **kiln** are a serious fire risk. This conception has been due to the use of the word "kiln", for such things as brick kilns and pottery kilns which actually have burning material inside them. Perhaps remembrance of the early types of timber seasoning kilns which, in many cases, were nothing more than smoke rooms, is also a factor.

The modern timber seasoning kiln is not a serious fire risk, whether built of brick, concrete or timber. There is no fire inside the kiln, and the source of heat is steam, which is confined within steam pipes. The kiln temperatures are only moderate, as high temperatures seriously affect the timber. Further the humidity inside a kiln is comparatively high and in many cases will barely support combustion. Providing, therefore, certain elementary precautions are taken such as isolating hot steam pipes from contact with timber, the danger of fire in a timber seasoning kiln is no greater and is probably even less than in a timber storage shed. In addition, as the kiln itself can be made practically air tight, a fire control precaution can readily be provided in the form of a steam pipe for flooding the kiln with steam. Such steam would rapidly extinguish any fire introduced into the kiln charge from outside sources.

CONTROLLING THE POWDER-POST BORER

Lyctus, or the powder-post borer, attacks the sapwood of many pored timbers and is responsible for great economic loss. Thus, in eucalypts such as mountain ash (*E. regnans*) spotted gum (*E. maculata*), etc. the sapwood must at present be excluded in milling. Again, some of our important light and easily worked brush timbers such as crab-apple, have a wide sapwood, which is susceptible to attack. For practically all purposes, where durability is not a factor, e.g. cabinet work, sapwood is equally as good as truewood and, in some cases, is preferable. If, therefore, some method of controlling the powder post borer which is so destructive of sapwood can be found, considerable advantage to the Australian timber industry must result.

Recent investigations in England, therefore, into certain phases of Lyctus attack are of considerable interest to Australia, for there seems to be a possibility of developing methods of control. The basic point discovered is the relationship between Lyctus attack and the presence of starch in the sapwood of the timber. Preliminary experiments by the Division of Forest Products on parallel lines seem to show that this relationship also holds in Australia. At the present time, an investigation into the presence of starch in the sapwood of Australian timbers subject to attack is contemplated. It is already known that the occurrence of starch is erratic in its incidence and the lines of investigation will be designed to show whether at any part of the year starch is absent or whether starch, if present, can be removed by encouraging the natural processes of the tree.

Tests on the painting and impregnation of sapwood with various chemicals are in progress, so that ultimately the Lyctus problem will resolve itself into the selection of the most appropriate method of control in any particular case.

BREVITIES

Why Oil Cricket Bats?

The Division of Forest Products has been puzzled for some time as to the reason why cricket bats are always oiled. When asked, cricket enthusiasts gave a variety of reasons, the chief of which were: (a) to resist the weather, and (b) because cricket bats have always been oiled. The latter reason does not advance our knowledge, while the former is definitely incorrect. The amount of time during which a cricket bat is exposed to damaging weather conditions is so small that this could not affect its useful life. Probably the idea has grown up because failure of the face of the bat from ball impact often resembles weathering of timber exposed for long periods. It seems likely that by filling the cells, the process of oiling lends support to the fibres of the face of the bat and increases the ability of the cells to resist the enormous rupturing forces at the amount of impact. The Division of Forest Products has treated numerous small pieces of cricket bat willow with oil and when this has hardened toughness tests will be carried out.

During July, Mr C.S. Elliot, Senior Seasoning Officer of the Division of Forest Products, will be visiting Brisbane to investigate seasoning problems and to assist any members of the timber industry who have difficulties connected with the drying of timber. Mr Elliot will spend approximately four weeks in Brisbane, and those desirous of getting in touch with him may do so through either the Director of Forestry or Mr P.O. Nixon, the Secretary of the Brisbane Timber Merchants Association.

A well attended meeting of the Royal Victorian Institute of Architects was held on June 28th at the laboratories of the Division of Forest Products.

After an address by Mr I.H. Boas, Chief of the Division, the architects made a tour of the laboratories and saw in operation the experimental seasoning kilns, electrical moisture meters, timber testing machines, and a box testing drum. Exhibits on timber structures, wood borers and flooring profiles were also examined.

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LAMINATED STOCK

In Australia, where the seasoning of the thicker sizes of timber often presents serious difficulties, it is surprising that more use is not made of laminated stock. Perhaps this is, to some extent, due to the lack of knowledge of how to fabricate laminated material, or to lack of appreciation of its many advantages. In plywood the grain of adjacent laminations runs at right angles, but a very useful class of material can be made from comparatively thick plies with the grain all running in the same direction, and this is known as laminated stock. It is not unusual to find the principle of lamination adopted for such articles as tennis racquet frames, where the thinner plies facilitate bending and allow the use of several different kinds of timber in the one member.

A very common use which is almost entirely neglected in Australia is the preparation of large squares and flitches. For example, 3" and 4" squares which are often difficult to secure thoroughly seasoned and of the same species as the rest of the article, can easily and cheaply be fabricated out of 1" stock. Moreover, in the centre of laminations of such units a useful outlet can be found for reject material, providing the edges are clear.

There may be a misconception that such glued products are inferior to solid material, but if the gluing practice is good this is certainly not the case. Properly made glued joints are usually as strong as, and in many cases, stronger than the timber itself, while the fact that laminated stock of this type is used for the most exacting purposes, such as aeroplane propellers, should be ample indication that fears are groundless.

Among the outlets for laminated stocks are last blocks, blocks for turnery, seasoned poss and pillars, ceiling beams and furniture stock - particularly legs. However, a word of warning is necessary. In laminating material with timbers of widely different properties, and where high stresses are likely to be encountered during use, a light flexible timber is sometimes combined with a heavy stiff timber with the idea of obtaining a product high in stiffness and strength, but light in weight. Such a mixture of species should only be decided upon after a careful investigation of the mechanical properties of the timbers concerned, because when a product of this type is stressed, the load is nearly all thrown on to the stiff timber. Usually it will be found that more satisfactory results can be obtained by selecting a single timber of moderate weight and moderate strength and stiffness.

QUEENSLAND FORESTRY INVESTIGATIONS OFFICER VISITS MELBOURNE LABORATORIES OF DIVISION OF FOREST PRODUCTS

The laboratories of the Division of Forest Products have now become a recognised training ground in the various branches of timber research. The Division is always willing to train members of commercial firms in kiln operation and already a dozen or more officers have received such instructions, in addition to many others who have taken advantage of the correspondence seasoning courses. From time-to-time, however, the Division has visitors who are more interested in the latest development of timber research and experimental technique. Among these have been Mr A.T.J. Bianchi of the Forest Research Institute, Java, and Mr F. Gregson, Forest Utilisation Officer, Western Australia.

At the present time, Mr C.J.J. Watson of the Investigations Branch of the Queensland Forest Service is on an extended visit. A comprehensive programme of work covering particularly the wood anatomy, timber mechanics, preservation and seasoning sections has been drawn up. Most of Mr Watson's time to date has been spent in the section of Wood Structure, where his co-operation has been of value to the Division, not only because he is the recognised authority on the macroscopic identification of Queensland timbers, but also for his knowledge of the properties and uses of the exceptionally wide variety of timbers from this State. During the past month, also, Mr Watson superintended some tests on Queensland timbers for wood wool. the species tested included silver quandong, hoop pine, blakcbutt and silver ash, and some promising results were obtained. A further interesting feature was that the tests were carried out with a machine of Australian manufacture.

PRESERVATIVE TREATMENT OF FENCE POTS

Some years ago, an investigation was commenced in Western Australia into the preservative treatment of fence posts. This investigation was a co-operative project between the Forests Department of Western Australia and the Division of Forest Products. A large number of posts of different species of timber was treated by various preservative processes and these, together with untreated controls, were installed in localities where they would be subjected to the effects of decay, termites (white ants), or both. Inspections have been made 3 or 3½ years after installation, and these have disclosed that, while in all localities the untreated controls have deteriorated very seriously, the posts treated by certain of the processes used are in excellent condition. While the period is too short to give anything but an indication of the ultimate efficacy of the treatments, it can be noted that the creosote plus crude oil and the zinc chloride plus arsenic treatments are giving satisfactory results at all test sites. The sodium fluoride plus arsenic treatments is giving good results in the dry localities. Full details of the methods of treatment are given in Pamphlet No. 24 of the Council for Scientific and Industrial Research, entitled "*The Preservative Treatment of Fence Posts*".

WHY POLISH NAILS

Wire nails are formed by passing steel wire through a machine which, in one operation, cuts the wire to length, forms the had, and points the nail. After leaving the machine the nails are rather rough and have sharp edges and fins. These would be liable to injure the hands of the user and the nails are usually polished after leaving the nail making machine.

Polishing generally consists of tumbling the nails in a rotating drum where the rubbing of the nails on one another removes any sharp edges and at the same time imparts a polish to the shanks of the nails. Overseas, nails are usually more highly polished than in Australia and consequently they have a much better appearance than those made locally. Recent tests by the Division of Forest Products have shown, however, that, from the point of view of holding power, high polishing is bad, because it definitely reduces the holding power of the nail. American nails had only about 80% of the holding power of the Australian nails. it thus appears that the polishing process should be continued only far enough to remove any sharp edges.

KILN DRYING IN AUSTRALIA

Apparently there are a few die-hards who still believe that kiln-drying is a new fangled idea and that rapid seasoning in a kiln has a deleterious effect upon the timber. Actually, of course, it is possible by means of properly operated kilns to reduce timber to a thoroughly seasoned condition at any time of the year, whereas this is very difficult and, in many cases, impossible by air seasoning.

Timber users generally appreciate now the virtues of kiln-dried timber and demand it for the most exacting purposes. Producers of seasoned timber realise that kiln-drying is for them a profitable investment because of the enhanced prices often obtained, and because they are able to fill orders which they would otherwise have to reject for lack of seasoned material. It is not surprising, therefore, to find that there are now in Australia about 250 timber seasoning kilns, veneer driers, and

similar rapid seasoning units. This number is steadily increasing so that there can be no doubt that kiln drying has the public confidence.

At the present time the Division of Forest Products has in hand a large number of inquiries for new kiln installations. To those handling timber, the Division gives advice on the best type of kiln to install; it recommends suitable yard layouts; and, if necessary, provides free of charge plans and specifications of kiln buildings and details of equipment. A caution to those erecting kilns is, however, necessary. From time-to-time the Division encounters instances of attempts to improve on its plans by modifications or additions. It should be recognised that the plans have been prepared as a result of careful investigation over a number of years of the best features of kiln design both in Australia and abroad. Ill-considered attempts at improvement usually result in the kiln-owner wasting money by trying out some feature, which has already proved a failure. Plans and specifications should be scrupulously followed even to the minutest detail If the kiln installer has ideas which he wishes to incorporate or modifications which he wishes to make on the score of economy and local conditions, he is strongly advised to submit these to the Division of Forest Products who will be glad to report whether they are likely to be worthy of inclusion.

BREVITIES

1. Last year, at the request of the Western Australian Forests Department, some preliminary tests were carried out on the toughness (shock resistance) of brown mallet (*E. astringens*). The results were very promising, the samples tested giving toughness values amongst the highest for Australian timbers. As it is impossible to draw definite conclusions from such a small number of tests, the W.A. Forests Department shipped to the Division 15 logs of this timber for more comprehensive static strength and toughness tests. The logs have been received, cut up into standard test specimens, and testing of the green material has already been commenced.

2. There can be no doubt that one of the reasons which has permitted another type of case to come into competition with the Australian dump case is the shipment of apples in green hardwood cases. Many growers have the erroneous impression that it is advantageous to use hardwood in the green case; some contending that the cases do not dry out and shrink in cold storage, while others contend that shrinkage does occur, but claim that it is advantageous in maintaining a tight pack. That green cases are unsatisfactory has been amply borne out by experience and further evidence was found in an experimental shipment from Tasmania last season. In connection with investigations into another aspect of apple production, fruit was packed in green hardwood cases by an experienced packer whose high standard of packing could be relied upon. Although the fruit was not packed too tightly the cases, when opened in London, showed that severe bruising of the apple had occurred through excessive tightness in the case. It was obvious that the cause of the bruising was shrinkage of the case. Shrinkages of the order of ¼-½" in the width of dump cases are often inevitable when green timber is used and shrinkages up to and over ½" have actually been measured. It is obvious, therefore, that the slight expense involved in seasoning hardwood cases for export apples is more than justified.

3. Timber has resigned supreme for so long in many of its spheres that there is a tendency to assume that it has a monopoly of these markets. It must be realised, however, that timber can only retain its supremacy if it maintains a high standard of efficiency and takes advantage of every scientific development. A good example of this is to be found in the cooperage industry in the United States. Before prohibition wooden beer barrels held a monopoly, but after repeal the coopers found themselves faced with very severe competition from steel and special alloy barrels. The use of these substitutes was assisted by the shortage of oak stave stock and a tendency by some producers to use improperly seasoned material. However, the adoption of kiln drying to make available the requisite supplies in a properly seasoned state has enabled the

manufacturers to produce once more a product of guaranteed superiority.

4. The casein-formalin treatment of hoop pine butter boxes to prevent wood taint is now a recognised process. All experience to date indicates that when properly carried out this coating prevents degrading of the butter. Recently, however, the Division of Forest Products had brought under its notice a treated box which was in a most unsatisfactory condition. The hoop pine used was of very low quality and was from "stinker" stock, while the coating had been applied in a very inefficient manner. The patent rights of the casein-formalin treatment are held by the Council for Scientific and Industrial Research, and while these are made available free to those desirous of spraying boxes, there is an express condition that the spraying shall be carried out in a proper manner. the Division would be glad to be informed of any instances of unsatisfactory treatment so that appropriate action can be taken.

NEWSLETTER

Forest Products

1934##032

MONTHLY NEWS LETTER NO. 32 FIRST PUBLISHED IN 1 SEPTEMBER 1934

STANDARD COMMON NAMES FOR AUSTRALIAN TIMBER

The reputation of a timber is closely associated with its trade name. For example, turpentine is noted for its resistance to marine organisms, but if other timbers which had not this durability were sold under the same trade name the fact has not been so generally realised as it should be because of the extraordinary confusion of trade names. thus, there are blue gums in every State of the Commonwealth and this name covers five distinct species with timbers of widely varying properties.

Again, we have the confusion of a multiplicity of trade names for the same timber, for example, *Flindersia australis*, is called both crows ash and teak, *Gmelina leichhardtii*, white beech and grey teak. Sometimes this confusion of names has a ludicrous turn when, for example, such a timber as *Eucalyptus regnans*, is called mountain ash in one State and swamp gum in another.

Unfortunately, this confusion of names is extending. Recently, the Division of Forest Products received for identification a sample of so-called southern coachwood. The name 'coachwood' is associated with a definite timber *Ceratopetalum apetelum*, which has built a deserved reputation as a result of valuable service in a wide range of the better uses. The sample of southern coachwood, although superficially resembling coachwood, proved to be a totally different species belonging to the paper barks or ti-trees, not even remotely related botanically to the true coachwood. This was a transparent attempt to take advantage of the present confusion of trade names to secure for an untried timber the reputation of a much valued species.

The need for the standardisation of the common names for Australian timbers is long overdue and must receive attention in the near future.

WHERE TIMBER HOUSES SCORE

Of interest to Australian timber interests is the report of a recent lecture on "Timber Buildings" given before a meeting of the British Wood Preserving Association in London and abstracted in the Timber Trade Journal, 17th March, 1934.

In Russia, Scandinavia and the North American continent, said the lecturer, 80% of the living houses were built of timber. After giving details of Canadian and American methods of construction the lecturer dealt fully with the principal objection levelled against timber houses - the fire risk.

Recent statistics have disproved entirely the common belief that the fire risk in a timber house is greater than in one built of brick, concrete, or other incombustible material. These statistics showed that it was practically impossible for a timber house to ignite from an external cause and that the cause of fire in any type of building was almost invariably an internal one; that is to say, the fire started in the contents, such as clothing, fuel, rubbish, etc. In order to make a house fireproof it was necessary to have the contents fire-proof. This, of course, was impossible.

Some years ago, the United States National Board of Fire Underwriters made a survey of

buildings in various American States. The survey covered approximately 1¼ million buildings, 75% 100 timber houses, and 2.43 for each 100 brick and stone buildings. What is more interesting still is the fact that of all fires, 98.7% were confined to the building in which they originated, even though three-quarters of all the buildings examined were timber buildings.

Dealing particularly with the timber building in Great Britain, the lecturer spoke of the advantage of a well-built timber house. It was considerably more comfortable than a brick house owing to the far better insulation afforded by the walls both in summer and in winter. The speed of building was another point which frequently became of considerable value.

AIR FLOW IN TIMBER SEASONING KILNS

A report has recently been received from the Vancouver Division of the Forest Products of Canada dealing with an investigation on the effect of the rate of air movement in a kiln. The particular experiments described were concerned with the effect of the rate of air circulation on: (a) the rate of drying, (b) the steam and power consumption, and (c) the degrade during drying. The tests were carried out in an internal fan kiln of commercial size fitted with a variable speed motor. Kiln runs were made with 1" Douglas fir stock at three different temperatures and at three different speeds of the fan motor. The results indicated that in kilns with mechanical circulation, the use of high rates of air circulation does not materially increase the speed of drying, all other factors being constant. Furthermore, there is a marked increase in steam and power consumption with increase in rate of circulation. No definite results were obtained with regard to the effect on degrade.

These experiments are of special interest in view of the fact that investigations of problems associated with the design of kilns from the point of view of air circulation are being carried out at the present time in a recently designed experimental kiln at the laboratories of the Division of Forest Products, East Melbourne. The aim of the work is to determine the correct proportions for kilns, the most economical rates of air circulation for drying the various Australian timbers; the most efficient size of spacing strip to use in stacking the timber, and in general to place the whole problem of kiln design on a sound basis.

FIELD TESTS WITH TREATED POLES

The Division of Forest Products is carrying out an extensive series of field experiments with poles to determine the efficacy of various preservative treatments. At the present time, there are two test sites in Victoria, at Belgrave and Benalla, and at these testing sites numerous untreated and treated poles are under surveillance. Various preservative treatments have been used in order to determine the relative values of treatment in extending the service life of the pole. The timbers chosen for treatment are not durable species in comparison with ironbarks or certain of the boxes, but will be of importance when suitable preservative treatments, which will extend their service life, are developed.

It is now proposed that a similar series of experiments be carried out in New South Wales. Co-operating with the Division of Forest Products are the New South Wales Forestry Commission, the N.S.W. Railways, the N.S.W. Department of Public Works, the Sydney City Council and the Postmaster General's Department. In these experiments it is planned to use blackbutt, spotted gum and flooded gum, timbers which are not at present generally used for poles because of their low durability, but which should prove eminently suitable provided they respond to the preservative treatments.

Mr J.E. Cummins, Senior Preservation Officer of the Division of Forest Products, will visit Sydney early in September to arrange the details for carrying out these tests.

OUTLETS FOR SHORT-LENGTH SAWN TIMBER

Considerable quantities of square edged timber must be sacrificed during sawmilling operations because no market is known to be available for small dimension stock (short length timber). The salvaging of the small dimensions would result in the conversion of a waste into a utility and offers benefits both to

sawmilling and fabricating plants by permitting closer utilisation of a forest on the one hand and by minimising re-manufacture on the other. These notes briefly indicate the problem in the hope that they will stimulate users and producers in the consideration of the possibilities of co-operation in this phase of timber utilisation.

Considering the number of wooden articles or parts of fabricated goods which are under 2 ft in length, it is surprising that it is so difficult to market directly from the sawmill any products less than 6 ft in length. Definite developments have been witnessed in recent years in the disposing of small squares for turnery; for broom, mop rake and tool handles; and for short length boards to manufacture of furniture and built-up panels. These have been distinctly encouraging to the sawmilling industry, but the amount of material so marketed does not yet approach the proportion that it is possible to obtain.

A partial list of outlets for small dimension stock includes:- bobbins, book cases, cabinets, cases, campers' equipment, caskets, chair stock, coffins, furniture, handles, ice-chests, kennels, ladder-rungs, lattice, laths, novelties, ornaments, parquetry flooring, pattern making, page, pickets, rollers for maps and blinds, screen doors, survey pegs, tanks, tools toys, tubs, turnery washboards, window sashes and frames. For each of these uses, there are special features relating to grade and dimensions which must be observed, but these can be met if the requirements are thoroughly understood and efforts directed towards proper selection and milling.

Little information is yet available as to the extent of the markets in Australia for sawn timber of small sizes. However, in the timber grading studies now being carried out by the Division of Forest Products, the grades of material that can be produced are being determined in all the important forest districts. Later, the work will be extended to study consumers' requirements regarding both quality and ultimate size of cuttings. By correlation the data collected at both producing and consuming centres, it is contended that recommendations can be made for the improved utilisation of our natural timber resources.

BREVITIES

1. Wood Borers

With the approach of spring, householders throughout Australia should be on the look out for evidence of borers. During the winter, the grubs (or larvae) have been consistently working in infested timber which may be in the flooring, furniture, or any other wood around the house. If any woodwork was previously infested with borers, now is the time to treat it, even though it has been treated before. A treatment now, and then another in a month's time, may kill all the borers and prevent the spread of infestation. If the small round flight holes of the mature beetles are observed in the wood, then the necessity for treatment is more urgent.

Treating solutions which are suitable are:-

(a) **Creosote** - used preferably for such woodwork as flooring, joists, rafters, posts, etc., since it stains the wood and also affects stains and polishes.

(b) **Creosote and kerosene** - one part of creosote to eight parts of kerosene.

(c) **Paradichlorobenzene** - dissolved in kerosene (5% solution) - this is very poisonous to borers and does not stain the wood.

(d) **Kerosene and turpentine in equal parts** - both these act slowly and a number of treatments may be necessary.

All these solutions should be painted on the wood, or better still, forced into the borer holes by means of a hypodermic syringe or a fountain pen filler.

2. Mr C.J.J. Watson of the Investigations Branch of the Queensland Forest Service has been busily engaged on a wide range of activities at the Division of Forest Products. During the past month, a considerable amount of time in the Preservation Section carrying out an interesting series of investigations on the

attack of the powder post borers on Australian timbers and methods for its control and preservation. Of considerable interest to Queensland also were the pole tests which were inspected at Belgrave. In these tests, poles of non-durable species have been treated by a number of different methods and the relative efficacy of those is already becoming manifest. A trouble of no small magnitude is the darkening of white paint in Queensland due to the development of moulds on the painted surfaces. Test panels painted to give a wide range of conditions are being prepared to test out possible methods of control and when preparation has been completed the samples will be exposed to infection in Brisbane. Probably the outstanding problems in the timber industry in Queensland at the present time are those connected with seasoning and Mr Watson has carried out experimental work on the kiln seasoning of certain Queensland timbers. As Victoria is the most advanced of all the States in kiln drying practice, inspections have been made of modern seasoning plants of three different types at Moe, Alexandra, and at the Ford Motor Body Works, Geelong.

3. In the study of the strength properties of Australian timbers the Timber Mechanics Section of the Division of Forest Products has tested over 11,000 different samples during the past two years. Testing is now proceeding at such a rapid rate that it has become necessary to enlarge the computing staff so that results may be analysed and reports issued with a minimum of delay.

4. Timber Seasoning Class

In previous years the Division of Forest Products has conducted several very successful classes in timber seasoning. It is now proposed to hold a further class on this subject, to commence on Monday, September 24th. The course is free of charge to all who are interested in the air drying or kiln drying of timber. It will consist of lectures and practical demonstrations at the laboratory of the Division of Forest Products, and will also embrace visits to commercial plants for the purpose of demonstrating different types of kilns and air drying practice.

The course will start at 9.30 a.m. on Monday, September 24th, and will last the whole of that week. Anyone interested and desirous of attending the course should get in touch with the Division, as soon as possible, and not later than Monday, September 17th.

CSIRO
AUSTRALIA

NEWSLETTER
Forest Products
1934##033
MONTHLY NEWS LETTER NO. 33 FIRST PUBLISHED IN 1 OCTOBER 1934

WHITE PAPER FROM PINES

In previous notes in this News Letter, the problem of making white papers from resinous pines has been dealt with. Readers will have ntoed a rapid change in the position during the last year. In the first note, attention was called to the fact that in spite of claims in regard to the conversion of *P. radiata* (Insignis) into white paper, this has never been proved to be possible. It was stressed that, though this had not been done, this did not prove that it could not be effected, and the need was for further research.

In a later note, the claims of Dr Herty and his associates in Georgia, U.S.A., to have solved the problem were discussed. These workers had overcome the technical difficulties, and their costs of production appeared to be satisfactory. The quality of newspaper produced was also said to be satisfactory, and newspapers were satisfied with the paper made on a semi-commercial scale. There were, however, two main drawbacks. One that was Herty had only succeeded with pines which were young enough not to have developed any heartwood, and the second was that the pines became quickly blue stained by sap-staining fungi, and had to be used within a few weeks of cutting to avoid excessive bleaching costs. The importance of the fact that heartwood could not be used led the Division of Forest Products to look into the question of the age at which the heartwood developed in *P. radiata* from Australia and New Zealand, and for several months work has been progressing on these lines, and a preliminary report is now being prepared for publication. The significance of the heartwood problem was that it limited the age at which piens could be used, and, therefore, necessitated the comparatively early conversion of the pine to paper if it was to be used at all for this purpose. Latest developments have followed quickly, for now Dr Herty claims that he has overcome both the difficulties, and can now use his process on heartwood and on badly blue stained pine. If these claims are substantiated, the whole problem has now been reduced to one of cost of production. In previous papers, Herty shows satisfactory costs, but these are based on a very low wood cost. In such a case, the paper industry may be made to pay, but it does not provide a profitable market for the timber from plantations. Within a few years, then, by the application of scientific research, technical difficulties have been removed, and the huge pine forests of the Southern States now appear to be available to supply American pulp requirements. It is reported that a large company is proceeding shortly to exploit the process.

There is still, however, the big problem for forestry companies of getting a price for their timber that will pay. Herty calculates on a price of 14/-d. a cord for the timber on the mill site. This price would barely pay cost of extraction and transport, except under very favourable conditions. The problem, as far as pine plantations is concerned, has, therefore, moved on considerably, but is still far from solved from the point of view of profits to bondholders.

TIMBER GRADING STUDIES

The need for basing grading rules for timber upon actual observations on large paracels of timbers instead of on the opinons of those engaged in the trade has been made evident over and over again in the course of the work

of the Timber Sectional Committees of the Standarads Association. In every case where inspection of parcels of timber has replaced round table discussions, it has been found necessary to greatly modify the suggested grading rules. Recently suggested grades for Empire timbers imported into England were drawn up by a special committee, and submitted to the Dominions for approval or criticisms. It was found that the rules were most unsatisfactory for Australian timbers, but it had to be admitted that the information on which sound rules could be based was not in existence. The only comprehensive grading study carried out in Australia was that by Turnbull of the Division of Forest Products and Gregson of the Western Australian Forests Department, on jarrah and karri, and published as Pamphlet No. 41 by C.S.I.R. The need for these studies was emphasised in the letter from the Secretary of State for the Colonies to the Prime Minister, in which he quoted the Director of the Imperial Institute. The Executive of C.S.I.R. thereupon asked for a special grant of £1,000 per annum for three years for the necessary studies and the Government has agreed to this amount for the current year.

As a result, the staff of the Division of Forest Products has been strengthened to undertake the work. Mr F.E. Hutchinson, formerly on the staff of the Forestry School of the New Zealand University, has been appointed, and will reach Melbourne to take up his duties early in December. Mr B. Whitington has been appointed as computor and an assistant computor has been provided. A modern automatic electric calculating machine has been installed for the work. Mr R.F. Turnbull is in charge of the work, and in addition to the above officers, will have the assistance of Mr A.J. Thomas, who was formerly Assistant Seasoning Officer of the Division. The work for this year will be confined to Victoria, and will be extended to other States later on.

GROWTH OF JAPANESE RAYON INDUSTRY

There has been a surprising growth in the manufacture of rayon in Japan within the last eight years. At the end of 1926, the combined output of all the operating companies was 10 tons a day. By the formation of new companies and extension of existing plants, this has grown until at the end of 1933 it has reached 208 tons a day, and extensions in progress will bring this to 250 tons.

It is commonly thought that the supply of wood for rayon production can be used to find a market for large quantities of timber and that this is one of the big markets for pines grown in Australian and New Zealand plantations. The tremendous output in Japan which is equivalent to about 80,000 tons a year, would, however, only need 1,000 acres a year of pine fi the yield of timber is 75 cords per acre. These figures show that to supply local demand only a few acres of pine forests are needed per annum, even if the small output would enable an industry to be established economically.

Rayon, then, cannot be looked to a serious contribution to the marketing possibilities of pines.

BREVITIES

Machine for Lining Barrels with Glue

A new method has been devised for coating turpentine barrels with glue to replace the old way of pouring the heated glue into the barrel and rolling it round till it was coated on all sides, and then pouring out the excess glue through the bung hole.

A machine has been constructed in which the barrel is placed over a spindle and a revolving spray coats a 55 gallon barrel in 15 seconds, which is only 10% of the time taken by the old method. The coat is also more even and the waste far less.

The hot glue is held in a 70 gallon vat and is forced through semi-circular ports in the nozzle which revolves at 30 r.p.m. The temperature is 220°F. When the barrel is removed, safety catches close automatically to prevent the workmen being injured by hot glue.

Empire Forestry Conference

Information has been received that an Empire Forestry Conference is to be held in September, 1935, in South Africa. Owing to the Depression, the conference, to haev been held in 1933, was postponed. Forest Products is to form a special feature of the discussions, and this is a matter for congratulation. At previous conferences almost all the time has been given to problems of sylviculture and allied subjects. There are many problems in utilisation which need discussion, and some basal problems which can only be satisfactorily dealt with at such a conference. For example, after 5 years' correspondence, it has not yet been possible to get complete agreement on the definitions of common terms used in the timber world. The lines on which Empire grading rules can be established also need discussion, and there is great need of planning work so as to avoid overlap and consequent waste of time and money.

Timber Seasoning Class

NEWSLETTER

1934##034

MONTHLY NEWS LETTER NO. 34 FIRST PUBLISHED IN 1 NOVEMBER 1934

PRESERVATIVE TREATMENT OF *PINUS RADIATA* SLEEPERS

Extensive plantations of softwood have been established in a number of States of the Commonwealth, and now that some of the earlier plantings are reaching maturity, the problem associated with marketing are receiving a considerable amount of attention.

In South Australia, at least, one of the markets to be investigated is that of railway and tramway sleepers, because this State has only a limited supply of native timbers suitable for this purpose. However, the permanent way engineer is not prepared to introduce into his track large quantities of a new type of sleeper unless he is assured of their suitability and durability. The only reliable method of determining this is by service tests, and as these take a long time to yield the required information, it is necessary that the tests should not be left until markets are urgently required for the grown timber.

Accordingly, tests at present being carried out as a co-operative project between the South Australian Woods and Forests Department, the South Australian Railways Department, the Adelaide Municipal Tramways Trust and the Division of Forest Products. The Victorian Railways are closely following the test and are co-operating in transport arrangements.

About 400 broad and narrow gauge *Pinus radiata* sleepers have been cut and seasoned, and these have been forwarded to the laboratories of the Division at East Melbourne. Here they are to be treated with water soluble, creosote, and creosote and oil preservatives, after which they will be shipped back to South Australia, and installed in carefully selected test sites on broad and narrow gauge lines, in localities subject to fungus and white ant attack, and in tramway lines. The tramway tests will be supplemented with tests of red gum sleepers subjected to a dipping treatment.

The defects present in every sleeper will be carefully noted and each sleeper will be marked with an official number of means of numeral headed nails. Thus, the influence of defects on service life will be indicated, so that future specifications for these sleepers can be rationally prepared.

The preservative treatment will be carried out in the experimental treating plant of the Division of Forest Products. This plant consists of a pressure cylinder, which has been extended to take full length sleepers. The cylinder after charging with sleepers is filled with hot preservative, and this is forced into the timber under pressure. Afterwards excess preservative is removed from the sleepers, so that deep penetration can be secured without too great a consumption of the impregnating materials.

After the sleepers have been installed in the track, careful inspections will be carried out at regular intervals.

COLLAPSE IN SILKY OAK

It is generally considered that silky oak is a timber which is tolerant of severe temperature conditions in kiln drying, but a consignment recently dried in a commercial kiln indicates

that this is not always so, and that care should always be exercised.

The charge in question was kiln dried from a so-called 'shipping dry' state, under a schedule commencing at a temperature of 150°F. When removed from the kiln, the timber was found to be badly affected by collapse which was present as excessive and irregular shrinkage and as distortions in the lengths of the boards. In addition, collapse of the surface layers had caused case hardening, locking up wet spots in the cores of 2" thick stock, so that many pieces were far from dry when the charge was withdrawn from the kiln.

Experiments have shown, however, that the timber can be restored to normal condition by a reconditioning treatment.

Since collapse is much more severe at higher temperatures, low temperature schedules should be used with silky oak if there is any tendency at all to collapse. If a high temperature schedule is used, the timber should be watched closely for collapse, and, if any indication of this is present, kiln temperatures should immediately be reduced and the kiln operated on a lower temperature schedule.

MINOR TIMBER USES

There are a number of minor timber uses which are not commonly known, and which, although often requiring individually only small pieces, yet in the aggregate absorb large amounts of timber. Wooden links and connecting pieces in machinery, wooden bearings in many household appliances, e.g. wringers, wooden pressing forms for silk stockings, bobbins, shuttles, etc. are a few of the more common examples. In the majority of cases the requirements are exacting and only timbers which have the requisite properties for the desired purpose are used. Since the appliances or pieces of machinery have often been based on similar ones in use overseas, it is found that the timber employed is generally European or American. Such timbers as birch, beech and maple are common. It is very probable that there are many Australian timbers suitable for these purposes, only it is necessary to find the exact timber for each particular use.

The Division of Forest Products is constantly giving advice in cases of this nature. The procedure followed is standard. In the first place, the identity of the imported timber is definitely determined, and its fundamental cell structure examined under the microscope. From this examination, it is possible to select Australian timbers, likely to be suitable, on the basis of structural similarities. The Division keeps in stock a variety of timbers which can be used for trial purposes and the co-operation of the State Forest Services is obtained in securing timber outside this range or for further supplies.

RECENT PUBLICATIONS OF THE DIVISION OF FOREST PRODUCTS

Trade Circular No. 26

In this trade circular, some of the terms used in the mechanical testing of timber have been defined and discussed. The timberman must have some knowledge of the properties of timber and of the influence of such properties on its uses. Unfortunately, it has been found that many erroneous ideas are extant concerning some of the terms, scientific and otherwise, used in describing or discussing timber. In this trade circular, therefore, some of the more common terms used in discussing the mechanical properties of timber, such as, toughness, brittleness, hardness, working stresses and factor of safety, stress and strain, have been explained. At the same time, some of the less common terms, such as, tensile stress, modulus of rupture, modulus of elasticity, shearing stress, etc., have been fully discussed in order to acquaint the timberman with their exact meaning. The knowledge of these terms or at least the knowledge that definitions and explanations of the terms are readily available will be of value later when considering problems of the grading of structural timbers and timbers for purposes with special strength requirements.

This trade circular may be obtained free on application.

TIMBER SEASONING CLASSES

Following the recent successful seasoning class held in Melbourne at the laboratories of the Division of Forest Products, it has been decided to hold a similar class in Sydney commencing Monday, 19th November, and being continued on the Tuesday, Wednesday and Friday of that week. Through the courtesy of the Curator, the class will be held at the Technological Museum, Harris Street.

The course will cover general instruction on the seasoning of timber, and will include lectures on the growth of a tree and structure of wood as it affects seasoning; the moisture in wood and its measurement and removal; the drying conditions necessary to season timber; air seasoning; types of kilns; their instruments and control; layout, handling, collapse, veneer drying; electrical moisture meters; and related subjects.

While the course will be of particular value to those interested, or likely to be interested in kiln drying, it will also be of considerable use to yard and shop foremen and others whose duty it is to dry timber and to arrange for the supply of seasoned material.

Preliminary arrangements are in hand to conduct a similar class in Brisbane during the week commencing November 26th.

TIMBER TESTS

Some of the wattles have good local reputations for shock resistance and so have been used in handles of various kinds. One, in particular, *Acacia penninervis* of New South Wales, has been given the name of mountain hickory because it was considered to be a possible substitute for imported hickory. The New South Wales Forestry Commission has supplied to the Division of Forest Products five logs of this species, and these have been converted according to standard methods into pieces suitable for strength tests. Half of the pieces so obtained are being tested green, and the remainder seasoned prior to testing in the dry state. From the results obtained, a reliable comparison can be made of the mechanical and physical properties of this timber with those of hickory.

BREVITIES

The use of blinker electrical moisture meters is still increasing steadily. In addition to those in use in Australia, two instruments were recently manufactured for the Dutch East Indies. In New Zealand, also, interest in this type of electrical moisture meter is increasing and at the request of the N.E. State Forest Service the Division of Forest Products has just completed the determination of correction figures for seven common timbers of New Zealand. As a number of these timbers are in use in Australia, they are listed below so that users of blinkers in the Commonwealth desiring correction figures for these can obtain them on application to the Division. The timbers are: rimu, white pin, kauri, silver beech, tawa, totara, matai.

According to the latest advice received, the influence of the Division of Forest Products has extended to Czechoslovakia where a pair of cross-shaft internal fan kilns has been built according to designs issued by the Division.

The interest in this type of kiln arose as a direct result of one of the Division's Trade Circulars which, while published primarily for the Australian timber trade, have a limited distribution overseas. It is understood that the kilns are to be used for the drying of motor body stock.

The Chief of the Division has recently returned from a visit to Western Australia, where he discussed numerous matters of specific WA interest with the Conservator of Forests, Mr S.L. Kessell. One of these matters was in connection with the proposals to standardise the Canadian case for apple export. Western Australia has always sent her applies in the distinctive red Jarrah or Karri case, and the Division strongly recommends the retention of this as opposed to its entire or partial replacement by the hemlock case.

A visit to the forest areas to see the jarrah and mallet regeneration proved particularly instructive, and the work being carried out there, largely by relief workers, will undoubtedly prove very remunerative to the State. The mallet areas, in particular, will certainly bring a regular income from what is essentially waste land and is an outstanding example of how forestry can be used, not only

to absorb labour, but to bring into use land otherwise of no value.

FOREST PRODUCTS INVESTIGATIONS

There appears to be a certain amount of misapprehension as to the functions of the Division of Forest Products. The Division is a Commonwealth organisation, and its duties are confined to forest products problems. It is not concerned with purely forestry matters, and is not connected with State Forestry Departments. It works, however, in the closest co-operation with these on forest products problems, and some idea of the closeness of this co-operation can be secured by consideration of a visit paid to the Division by Mr C.J.J. Watson of the Investigations Branch of the Queensland Forestry Sub-Department. Mr Watson spent three months with the division and during this time made a close study of problems associated with the utilisation of Queensland timbers. But as the basis of utilisation is a sound knowledge of the properties and treatment of timbers, the major portion of his time was spent proceeding from one section to another throughout the Division studying the latest information on forest products research. Thus, in the Section of Wood Structure, wood anatomy and its importance in identification and utilisation were considered. In the Timber Mechanics Section strength tests were carried out, on a universal testing machine and on a shock resistance tester, the design of boxes, using the box testing drum, was studied, and problems associated with the strength of Queensland timbers and the collection and supply of material for tests were discussed. In the Seasoning and Timber Physics Section, kiln drying tests on Queensland timbers were carried out in the experimental kilns, veneers were tested for moisture content by electrical methods, and visits were paid to a large number of commercial kiln installations where the latest developments in kiln design and handling methods were noted. Pressure and hot and cold bath treatments were carried out in the Preservation Section, investigations on Lyctus, Powder Post borer, were carefully followed, and inspections were made of pole test sites in decay and termite infested areas. Panels for the testing of white paints to prevent contamination by black moulds - a common trouble in Queensland - were prepared and these will later be installed in a test site near Brisbane. Chemical tests for the separation of species of timber often almost identical in appearance and structure were carried out in the Wood Chemistry Section. In co-operation with the Utilisation Officer, investigations were made of marketing problems in Melbourne, and problems associated with the introduction of northern timbers on the southern markets were studied. Mr Watson also joined the field staff of the grading investigation and carried out a grading study at one of the Victorian bush mills. He also attended meetings of the Victorian Sub-committee on Timber of the Standards Association of Australia, which had under consideration the Queensland draft proposals for grading plywood. He will, therefore, be in a position to explain first hand the reasons why committee members in Melbourne desire certain modifications to the plywood grading rules proposed.

With officers of the Melbourne Harbour Trust, an inspection was made of timber piling in a number of different localities, and the extent and type of attack on the timber by marine organisms was noted.

The visit of Mr Watson will, therefore, be a most valuable one, not only in furthering his knowledge of southern conditions and the work being carried out in Victoria, but also in assisting to maintain the closest co-operation possible between the Queensland Forestry Sub-Department and the Division of Forest Products, so that anyone with a problem in forest products can be assured of the full assistance of both organisations without unnecessary duplication.

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ALCOHOL AND SUGARS FROM WOOD

Wood substance consists of an intimate mixture or combination of two complex substances, namely cellulose and lignin. When the wood substance is heated with dilute acids the cellulose is converted to a greater or less extent into sugars, some of which may be fermented by yeast to give alcohol and carbon dioxide.

The facts have formed the basis of numerous processes for the manufacture of power alcohol and for the conversion of wood waste into a cattle food. In spite of much research lasting many years, the yields of fermentable sugars, and consequently of alcohol, were always much lower than would be expected from the accepted chemical composition of cellulose. The reason for this was that, under such conditions as were practicable, the reaction on the cellulose was slow and, at the high temperatures used, there was sufficient time for the destruction of the sugars first formed by the acid. In other words the acids not only converted the cellulose not sugars, but continued their attack on sugars and so lowered the yield.

In the early processes the usual procedure consisted of heating sawdust with dilute sulphuric acid in digesters which had an acid proof lining. Thus a dilute acid-sugar solution was obtained; the acid was neutralised with lime and the solution fermented. The cost of the alcohol so produced was too high for the process to compete with the ordinary methods of producing alcohol. Enormous quantities of the cheapest raw material in the form of sawdust or mill waste are, however, available and so there have been persistent efforts to make the process a commercial one.

During the war when cost was a secondary consideration the process was carried out successfully in several factories. At the end of the war period, however, these factories were closed down as they were not economical.

Further research has shown that by the use of more concentrated acid (spirits of salts), a far more complete conversion was obtained. The higher yields of sugar and alcohol seemed to offer great prospects of success, but in practice the strong acids acting at high temperatures proved so destructive to the plant that costs still remained too high. Various improvements were made in the materials used in the plant, but these did not appear to solve the problem as no commercial advance was made.

Within recent years a German chemist, Dr Bergius, who is so well known for his discovery of the process of hydrogenation of coal to form oils, so improved the old dilute sulphuric acid process that a factory is now at work. The results are apparently sufficiently promising to justify the erection of a larger plant.

In the modifications devised by Dr Bergius, the dilute acid is made to flow in succession through a series of vats packed with sawdust and other small wood waste. The acid is under slight pressure and enters the system of vats at the one where conversion of the sawdust is practically complete, passing in turn through others containing less and less of the converted material, until finally it reaches a vat containing fresh sawdust. In this way it is found that there is a large yield of sugars which can either be fermented to give alcohol, or can be left in the mash which is neutralised and then sold as cattle food. While the prospects of this latest scheme seem far better

than those of older processes the costs of production given are still such that power alcohol so produced is dearer than petrol as a source of fuel. the Bergius process is, however, definite move forward, and it appears as if the problem of producing power alcohol from sawdust is nearing solution. If the remaining difficulties are overcome, it will lead to developments of enormous importance and wood waste may yet become of great value.

A factor frequently forgotten is that a waste material acquires a value the moment a use is found for it. The final process must therefore be very sound economically if it is to stand.

IS THERE ANY RELATIONSHIP BETWEEN DURABILITY AND DENSITY IN WOOD?

This question has never been satisfactorily answered by experimental methods, and yet apparently there is some general relationship. If the numerous commercial eucalypts common to eastern Australian are considered, a moment's reflection will show that those most durable in the ground are also among the most dense. The heavy woods such as the ironbarks, grey box, grey gum, yellow box, red box, are all used for purposes where natural resistance to the attack of termites and decay is most necessary. These timbers all have an air dry weight of from 65-70 lbs/cu.ft. On the other hand less dense species, such as mountain ash, messmate, peppermint and others, are not used to any extent in this way. The air dry weight of these timbers varies between 40 and 55 lbs/cu.ft. Other eucalypts which are intermediate in weight between the two extremes mentioned are also intermediate in their natural resistance to termites and decay. Thus tallowwood, red gum and white mahogany are durable timbers although not in the same class as the ironbarks.

There are of course exceptions to this general observation and it has been found, for example, that in Western a dense eucalypt timber, salmon gum, is not very durable in the ground. Other exceptions may be quoted, but it does appear that within the eucalypts at least there may be some relationship.

Naturally, there are numerous factors which must be taken into account when considering durability. A timber such as cypress pine is considered a very durable species, but it is light in weight. In this case, however, it has been shown that the durability or natural resistance of the wood is related to the presence of certain toxic materials which are present in the wood.

The United States Forest Products Laboratory has worked for a number of years on the reason for the durability of certain American timbers, notably redwood and cedar, and their work has shown that here again these comparatively light woods owe their durability to the presence of toxic chemicals in the cells of the wood.

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It is fairly safe, however, to say that within a species the denser material can be expected to last longer, and to serve better than the less dense material. Thus it is of importance first of all to know the range of density of a species, and secondly, to know the exact density of the sample being used for the particular purpose. A portion of the work of the Division of Forest Products is the compilation of information on the density of Australian timbers and information on the various species may be obtained on application.

It is of interest to note that in a recent issue of the American Journal for Forestry there is an article dealing to some extent with this question of density and durability. Early in 1917 one worker in the USA concluded from certain experiments that in the case of longleaf and loblolly pines the density materially influences the resistance to decay of the truewood, the more dense wood being the more durable. This conclusion is not criticised, but it seems as if the proving of the point one way or the other is not a very simple problem. Undoubtedly there is still much room for research on this and other problems connected with the relation of physical properties of wood to its durability.

WOOD TECHNOLOGIST HELPS TO DEVELOP CLUES LEADING TO LINDBERGH KIDNAPPERS

The following extract has been taken from a News Bulletin of the United States Forest Products Laboratory, dated 24/9/34:-

> "Newspapers throughout the country today will carry a story of the Lindbergh case which will read in part as follows:
>
> "Early in the case, Col. H. Norman Schwarzkopf, Superintendent of the New Jersey State Police, requested the assistance of the Forest Products Laboratory in developing any possible clue from the wood in the ladder used in the kidnapping of the Lindbergh baby. The Laboratory at once assigned Mr Koehler, its leading wood technologist, to work on the case in cooperation with the New Jersey State Police.
>
> "Mr Koehler's intensive technical examination of the wood in the ladder disclosed not only the species of wood, but also certain very distinctive and peculiar markings of the wood. With his conclusions as to the causes of these markings as a basis, and working in close cooperation with Col. Schwarzkof's organisation, over one thousand lumber mills from New Jersey to Alabama were intensively examined by him at the Forest Products Laboratory.
>
> "From this study, Mr Koehler and representatives of the New Jersey State Police traced to destination and intensively examined many lumber shipments of the species and dimensions used in the ladder until lumber with the identical distinctive markings occurring in the ladder was found at the retail yard of the National Lumber and Millwork Company in the Bronx. This is the company where it is now reported that Bruno Hauptmann was sporadically employed shortly before and after the kidnapping."

This is an excellent example of how technical knowledge can be of assistance to the general public - in this case represented by the New Jersey State Police. In all the Forest Products Laboratories throughout the world, including our own in Melbourne, hardly a day goes by without samples being submitted for identification by interested parties. This part of the work is very time-consuming and calls for an expert knowledge of the timbers not only of the particular country where the laboratory is situated, but of all parts of the world. It is therefore of interest to see that one wood technologist at least has received some public recognition for what must have been an arduous and difficult job.

PRESERVATIVE TREATMENT OF *PINUS RADIATA* SLEEPERS (continued)

In the previous issue of this News Letter a resumé of the proposed plan of work for the preservative treatment of 400 of these sleepers was given. The actual work has been going during the past month, and during that time 110 sleepers have been treated in the experimental treating plant of the Division of Forest Products. As the treating cylinder is only a small one used mainly for experimental purposes, the work involved is very considerable and the staff of the Preservation Section of the Division is kept very busy. However, this is justified by the great importance of finding increased uses for this timber.

If the treated sleepers of *Pinus radiata* prove successful the future of pine plantations in Australia will be brighter. Future markets for the volumes of pine grown in some States at least do not at present look too satisfactory, and every effort needs to be made to find other outlets than those at present existing.

In order that the field tests treated sleepers will give the maximum of information great care has to be taken in the selection of proper sites for the installation of both the treated sleepers and the controls. Sites will be selected so as to give information on the resistance of the treated sleepers to the attack of both termites and decay.

Mr J.E. Cummins, Senior Preservation Officer of the Division, has recently visited South Australia, and in cooperation with officers of the South Australian Railways Department has made preliminary arrangements for the installation of the sleepers in suitable test localities.

RECENT PUBLICATIONS OF THE DIVISION OF FOREST PRODUCTS

In the recent issue (November) of the Journal of the council for Scientific and Industrial Research appears an article dealing with "Brittle Heart in Australian Timbers". The question of brittle heart is of great importance in the utilisation of Australian timbers, since it is often very difficult to distinguish an appearance alone, and may find its way into the commercial product. In many cases, especially in tool handles and sporting goods, the presence of brittle wood or wood of low impact strength is a very serious defect.

The article in question deals fully with the nature and properties of this brittle heart and discusses its distribution within the tree and the probable causes of the phenomenon. Diagrammatically it is shown how much lower is the toughness or impact strength of the brittle heart in comparison with that of the truewood. The most interesting feature of the practical man is the description of various methods of detection, several of which may be rapidly applied in the field. One of these consists of splitting off a small piece, say $^{3}/_{16}$th" or ¼" square, breaking it in the fingers, and observing the type of fracture, - whether fibrous or brittle. After a little experience heart can be detected with considerable accuracy by this means.

The Division is obtaining a large number of reprints of this article and copies of it may be obtained on application.

Another article in the same issue of the Journal deals with a recently developed attachment by means of which electrical moisture meters may be used for testing veneers. With this special attachment the veneers are clamped between plate electrodes which are illustrated. The paper also reports the results of experiments carried out by this means and gives the calibration of a standard meter when used with this attachment for testing veneers of varying thicknesses. The work indicated that, provided the necessary precautions are taken, the special attachment can be used to give results for veneer sheets to the same degree of accuracy as obtained with the hammer electrodes on thicker timber.

A limited number of reprints of this article will be available for distribution and those interested should apply to the Division.

AMERICAN TESTS OF TIMBER FOR BUTTER BOXES AND TUBS

A recent issue (October, 1934) of "Barrel and Box and Packages" reports on work carried out by the US Forest Products Laboratory in the general investigation of certain hardwoods. A special utilisation test was completed in which a number of hardwoods were used as container material for high grade creamery butter, - the odour and flavour imparting qualities of the woods being determined.

On the basic question of the odour and taste factor no comprehensive data on American woods as a whole are available, although tests of a few woods are on record from as far back as 1919. The present series of tests was marked by a new and effective procedure covering the largest regional group of woods yet investigated from the dairying standpoint.

The work was carried out in cooperation with the University of Wisconsin Department of Dairy Industry, and the actual scoring of the butter done by one who is a recognised authority.

The test method was, briefly, to "sandwich" slices of butter ¾" thick between ¼" samples of wood, 2½" square, and to keep the sandwiches at commercial storage temperatures in separate sealed glass jars, scoring the butter for taste and odour after 2, 7 and 14 day periods of storage. The samples of each wood tested were used at different moisture contents, namely 6, 12 and 20%. Each set of samples was matched with duplicate samples coated with paraffin, representing the common commercial treatment of box and tub material. The butter samples were wrapped in vegetable parchment and the butter tested and scored taken from just inside the wrapper.

The "sandwich" method was considered an entirely satisfactory way of answering the taste

and odour question, besides being rapid and inexpensive.

The report further states that of the southern hardwoods tested, taken from the Gulf and South Atlantic Coast regions, the order of preference from the standpoint of odour and taste for butter packing was as follows:- ash, soft maple, hackberry, sycamore, beech, yellow poplar, elm, black gum, basswood, cottonwood, red gum and magnolia.

A warning, however, follows: All the foregoing is not to be taken as a ready made laboratory endorsement of a particular species for a wholesale invasion of the butter packing field. Other practical considerations besides odour and taste must be taken into account, and these tests are but a beginning in any study of butter-packaging woods.

BREVITIES

Mr F.E. Hutchinson, B.Sc.For. (Montana), B.F.Sc. (N.Z.) arrived in Melbourne from New Zealand during the last week of November, to take up his duties with the Division of Forest Products of the Council for Scientific and Industrial Research. Mr Hutchinson was until recently Lecturer in Forest Utilisation at the Canterbury School of Forestry, Christchurch, New Zealand. His work with the Division of Forest Products will be connected with the timber grading studies which the Division has now in hand.

Mr R.A. Johnson of the Sydney Harbour Trust will shortly spend some time in the laboratories of the Division of Forest Products. Mr Johnson is especially interested in the work of the Division relating to the preservation of marine piling.

Mr S.A. Clarke, Deputy Chief of the Division of Forest Products, has recently conducted a seasoning class in Sydney where over 30 members attended for instruction in the various branches of timber seasoning. That there is a rapidly growing interest in kilns and kiln seasoning. That there is a rapidly growing interest in kilns and kiln seasoning in New South Wales is evidenced by the fact that the Division is receiving more and more enquiries from those interested, asking for advice. Several plants have kilns in course of erection, and there is also an increasing number utilising properly designed finishing rooms.

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