NEWSLETTER
Forest Products
1937##060
MONTHLY NEWS LETTER NO. 60 FIRST PUBLISHED IN JANUARY 1937

THE NEW FOREST PRODUCTS LABORATORY

During the past few months, the Division of Forest Products has been gradually transferring its staff and equipment from the temporary quarters that it had occupied in East Melbourne for some seven years. Now, all sections with their equipment have been moved and installed in their new quarters, the one exception being the woodworking machinery which awaits the completion of the sawmill.

All administrative and laboratory work is now being handled at the new quarters and correspondents and visitors to the laboratory are advised to note carefully the new address - 69-77 Yarra Bank Road, South Melbourne, S.C.4. The location is particularly handy to the city, being within a stone's throw of the southern end of the Spencer Street Bridge.

The main frontage, facing the River Yarra, is entirely taken up by the three-storey administrative block, which at ground level houses various pieces of equipment and the thousands of authenticated wood samples used in all laboratory work. The first floor contains the rooms of the Chief and Deputy-Chief, the library, the general offices, and the rooms of research officers, while the second floor contains the laboratories of the Sections of Wood Structure, Timber Physics, Chemistry and Wood Preservation.

Immediately to the rear of the main building is a single-storied wooden structure which in a compact unit forms the offices and laboratories of the Section of Timber Mechanics. Here are installed the small universal testing machine, the box testing drum, and the steam bending equipment, which have been transferred from the old laboratories. However, the pride of place in this building is given to the new 600,000 lb. Southwark-Emery Testing Machine. Because of the great height of the columns of this machine, the centre portion of the roof of this laboratory has been carried up in a tower like structure. A new 20,000 lb. machine is at present being installed. With this equipment the Timber Mechanics Laboratory can hold its own with similar laboratories abroad.

Buildings which previously existed on the east and west sides of the site have been renovated. That on the east side contains the boiler room, the kiln room with its laboratory seasoning kilns and reconditioning boxes, and the preservation plant for the treatment of wood under pressure. Additional equipment for the mixing, spreading and pressing of glue has recently been installed. On the west side are located the engineering, carpentry and woodworking shops. On the southern end of the block will be erected the sawmill which, in addition to housing the existing plant, will contain a new power feed circular bench and a straight line cross cut. At some later date, this will be extended to provide for a breaking down saw.

THE ELECTRICAL SEASONING OF TIMBER

Attempts to season timber by passing an electrical current through it have met with very limited success and despite a number of attempts to commercialise such a process, the idea has been discarded as unsatisfactory.

Quite recently an entirely new principle in electrical application to drying has been experimented with at the Institute of Scientific

Research on Timber at Leningrad. The method consists in placing the timber in the position of a dielectric in an electric field produced by high frequency alternating currents similar to those used for diathermic treatment in hospitals. Frequencies of the order of 50 to 100 million are reported to have given most success but complete details of the apparatus used are not yet available.

While the method is not likely to be of value commercially except perhaps for highly specialised purposes, it is at least very interesting and any further developments are being watched for.

THE CONSTRUCTION OF SEASONING KILNS

One of the many activities of the Division of Forest Products is to supply to those desiring to install timber seasoning kilns complete plans and specifications of units suitable for their requirements. The details of design of these kilns are determined from the results of careful investigations and it is absolutely essential that, if completely satisfactory results are to be obtained, the plans of the kilns be closely adhered to during construction. It is not uncommon to find kiln installations where modifications have been made to the designs supplied by the Division, perhaps thereby effecting a saving of a few pounds, but at the same time seriously jeopardising the efficiency of the plant.

The most unhappy aspect of such short sighted policy from the Division's standpoint is that it is still credited with the design of the kilns, although this may be far from true, and if failure results the responsibility is laid out at its door.

An outstanding instance of such an installation has recently come to the notice of the Division. Among other modifications made to the plans supplied was the locating of the belt drives to the fan shafts in a position exposed to the kiln atmosphere instead of outside the kiln. In this way the cost of a few bearings and a few feet of shafting has been saved but the loss due to rapid depreciation of belts will outweigh this saving in a very few weeks.

NEW TYPE OF WOODEN AIRSCREWS

A recent article appearing in the ”London Daily Telegraph" and referring to the claims of a new type of wooden propeller is of general interest. It refers to a new German process which hardens the wood and preserves it from changes and deterioration due to atmospheric conditions. This process is of great value when applied to such wooden articles as aeroplane propellers and all wooden propellers supplied to the Royal Air Force are now required to be finished by it. Imperial Airways and numerous aeroplane manufacturers also use propellers treated in this manner. The importance of the process is all the greater in view of the large size of many propellers now in demand. With increased diameter the weight of the metal propeller becomes a disadvantage and the metal is, moreover, subject to fatigue.

The new hardening process is a reinforcement of the leading edge of the blade by a narrow brass sheath sweated to a strip of specially manufactured phosphor bronze gauze. The propeller is then covered with sheet celluloid, which is forced into the wood under enormous pressure in a sealed chamber. The surface is thus made so hard that it is impossible to stamp identification particulars in the usual way. They have to be stamped on a brass plate inserted flush with the covering.

The propellers, although made of light wood, are immensely strong. They are unaffected by a heavy hail, which scarifies the edge of the ordinary wooden propeller, and they may be left exposed to the weather when a machine is standing in the open.

The blades are much lighter than metal ones. By employing them in variable pitch propellers a big reduction in weight is secured.

Associated with the blade-hardening process is a new method, from the same inventor, by which the blade root is made of hard wood treated by a new pressure and impregnating process, which gives it a tensile strength of 16 tons per square inch. This method solves the difficulty of making a satisfactory wooden lightweight detachable blade for variable-pitch propellers.

RECENT PUBLICATIONS OF THE DIVISION

Trade Circular No. 34:- Sawing Methods. 1 - Quarter-sawing. This circular refers briefly to the various sawing methods that may be used in the conversion of logs and describes in detail the quarter-sawing procedure. It is often of definite advantage to use quarter-sawn material since, for many purposes, the properties of such stock are markedly superior to those of backsawn stock; hence, there is practical value in employing a method of sawing which will increase the proportion of quarter-sawn stock. The circular discusses fully the various methods of quarter-sawing and the points emphasised are illustrated by numerous diagrams.

Trade Circular No. 35:- Faults in Wooden Floors. Although the beauty and utility of good wooden floors are beyond dispute, the all too common occurrence of faults due to carelessness or lack of knowledge in the manufacture and laying provides an opening for competitive flooring materials which are steadily increasing in number and usage. This Trade Circular classifies the most common faults found in wooden floors and then discusses these faults from the aspects of cause and methods of prevention. For those interested it provides an interesting and useful reference on the manufacture and laying of either strip or block flooring.

Trade Circular No. 37:- Kiln Instruments. The satisfactory operation of a timber seasoning kiln requires, on the one hand, means for the determination of kiln conditions, and on the other hand, means for controlling these conditions to suit the timbers being dried. For the measurement of the kiln temperature and humidity, thermometers of either the simplest form or the more elaborate designs may be used, while the control of the conditions may be achieved either by hand operation or by automatic control instruments, according to the fineness of control desired.

This Trade Circular describes the various types of thermometers and control instruments available, and gives notes on their use and on their placement in the kiln. It forms a most useful practical guide for kiln operators in general.

Note: Trade Circular No. 36, dealing with Termites, has been somewhat delayed in printing, but will be issued shortly together with trade Circular No. 37.

FORTHCOMING TECHNICAL PAPER ON KILN-DRYING

The Division of Forest Products has recently prepared for publication the second part of "A Guide to the Seasoning of Australian Timbers" in the form of a pamphlet designed for day-to-day reference by kiln-operators. Part I of this series was published in 1933 and in it, in addition to kiln-drying schedules for seventeen species of Australian timbers, and notes on the drying characteristics of these timbers, there were supplementary notes on the general principles of timber seasoning.

The forthcoming publication gives drying schedules for twenty-two additional species together with notes on the drying characteristics of these species. Also, it gives further information regarding the drying of four species originally discussed in the earlier publication. As a further aid to kiln-operators, two appendices have been included. One of these is a list of all Trade Circulars published to date dealing with timber seasoning problems, and the other is a table of species correction figures for use with electrical moisture meters. This table covers all species for which correction figures have been determined and is of considerably wider scope than the tables previously published in Trade Circular No. 9. This new publication will be available for distribution early in 1937.

NEW LABORATORY EQUIPMENT

A new 20,000 lb Universal Testing Machine has just been installed in the Timber Mechanics Laboratory of the Division. This machine is, in general, similar to the 600,000 lb. machine recently erected and was manufactured by the Baldwin Southwark Corporation, Philadelphia, USA. The machine is of the hydraulic type, oil being supplied by a variable discharge Hele-Shaw pump driven by a constant speed A.C. motor with push-button control. Specimens and assemblies up to 30 inches wide and 5 feet long can be tested in tension and compression, the load being

indicated on 3 sensitive gauges, the ranges of which are 0-1,000 lbs, 0-5,000, and 0-20,000 lbs. The arrangement of the dials enables changes of load as low as 1 lb to be detected. All controls, gauges, etc., are housed in a cabinet separate from the machine proper. This arrangement is very convenient and the machine is remarkably easy to operate.

This new machine will be first used in an extensive investigation into the efficiency of coach-screws, a matter which is at present being investigated by the Division at the request of the Standards Association of Australia and which necessitates the testing of over 2,000 coach screws.

Another addition to the equipment of the Division is a 3,000 lb plywood testing machine manufactured by Messrs W. & T. Avery Ltd of Birmingham, England. This machine is especially designed to test the strength of the gluing of plywood - a matter of obvious importance in the use of plywood. It can also be used for testing other glued joints.

The purchase of both these machines which are the most modern obtainable was made possible by the generous bequest of Mr W. Russell Grimwade, OBE, the Chairman of the State Committee of the Council.

BREVITY

Mr A.B. Jamieson, who was previously in the Chemistry Section of the Division of Forest Products, sent an interesting Christmas card to the Chief of the Division from Japan. Both the envelope and the card had been covered with a thinn layer of veneer. This is very much thinner than veneers normally used for furniture, etc., being only about one-four hundredth part of an inch thick. The timber is probably a true Ash (*Fraxinus* sp.). The result was particularly attractive, and was an excellent example of the artistic effects that can be obtained with timber. There is no reason why certain Australian species could not be used in a similar manner.

NEWSLETTER
Forest Products

1937##061

MONTHLY NEWS LETTER NO. 61 FIRST PUBLISHED IN 1 FEBRUARY 1937

WHY BLAME WOOD?

Whenever a serious fire occurs in a building largely constructed of wood, whenever a bad train accident happens and wooden carriages are splintered and catch fire, whenever a series of motor car accidents occur with loss of life, it is common practice to place part of the blame on the wooden construction members.

In December last, a terrible catastrophe occurred on the Chicago elevated railways and a newspaper headline read "Death Rides in Wooden Cars". One could multiply instances like this indefinitely and an accumulation of such incidents has led to a serious decline in the use of timber in trains, motor cars, etc. One of the large motor body companies in the United States, writing to the Editor of a Timber Journal, recently showed how such publicity had driven them to use all steel bodies, in spite of the fact that they believed that the composite wood and steel body is the best and safest. General Motors and other large motor-body companies in Australia have followed the lead thus set, though they had large sums of money invested in timber.

Is wood to blame for these catastrophes? Even a little time given to the consideration of all the circumstances will prove that it is not; but some scapegoat has to be found and the timber cannot defend itself. Moreover, the timber suppliers have been very slack in coming to the defence.

In this connection, a note in the editorial columns of "Wood Products" is of interest and contains the germ of the real reply to the question asked above. The note reads as follows:-

It's the Human Element that Counts

"What value so-called "fireproof" walls when human carelessness sets afire the furnishings of a house or the gasoline or kerosene in a stove? What protection great beams, whether steel or wood, when a man with the heavy responsibility of many human lives relaxes his vigilance for just a few fatal seconds and plunges a train into the stress of a crash it was not built to withstand? What satisfaction an all-steel auto body or even the stronger and better steel-and-wood body when the careless motorist takes just one chance too many and drapes his "safe" conveyance around an unyielding hydrant or post or wall - or another car - or crashes a careless pedestrian?

"Let not the admirable urge for safer equipment quiet the voice demanding safer operators. Nobody would consider the horse-drawn buggy of another day with its "frail all-wood body, like a matchbox" a safe conveyance on our highways today. But 36,000 persons were not killed each year in buggies in America.

"Why should they be, now?"

In the Chicago train accident, for example, we find that a 3 car high speed train with steel carriages travelling at 40 miles per hour crashed into the rear of a stationary train with wooden carriages 38 years old and really out-of-date. Is it the fault of wood that when some 15,000,000 foot pounds of energy suddenly hurled against it, the rear carriages crumpled and several people were killed. One cannot experiment to find out what might have happened had these cars been of steel, but it needs little imagination to believe that the results may have been worse since the steel

carriages would have buckled and probably fallen into the street below with even greater loss of life. Still, we are told that "Death Rides in Wooden Cars" and that story is believed by most people who read it.

What is wanted for public safety is not a search for a scapegoat in the form of an inert material that cannot answer charges of murder but some organisation or control of the human elements so as to prevent the accidents that result in death and loss of property.

THE CONDITIONING OF FURNITURE PANELS

Pay a visit to any furniture showroom. Glance casually around and let your eyes wander over an array of highly polished artistically designed suites; let your senses be soothed by the symphony of colors, the tonings and shadings accentuated by the expert matching of veneer; let them be delighted by the symmetry of curves and the clean appearance of unbroken surfaces. But then examine an individual suite in closer detail. The vision fades, as one realises that the surface sheen is marred by numerous wavy lines or perhaps broken by fine hair checks in the face veneer. The whole appearance of the suite has been spoilt by the presence of these defects!

What are the causes? How can such defects be eliminated? These are two queries the answers to which are known to the majority of manufacturers. But what steps are regularly taken to ensure that all possibility of the development of sunken joints, wavy surfaces, and splitting of the faces is eliminated? The core, the crossbanded core and the finished panel may all be dried to a certain extent, but in many instances not enough care is taken to allow the core or panel to condition thoroughly. After the gluing of the core, or the crossbands to the core, sufficient time must be allowed to enable the moisture content to be equalised over the whole area of the panel. To allow the core or the crossbanded core to be surfaced before this has taken place is fatal and is the cause of sunken joints, wavy surfaces and the development of hair checks. A moment’s reflection will show why this should be so. A higher moisture content at the glue line or any other localised area at the time of surfacing will ultimately result in greater shrinkage at these points compared with the main body of the panel - hence the formation of depressions which are accentuated by the highly polished surface of the face veneer.

Conditioning of the stock by stripping out in the factory is satisfactory providing sufficient time is allowed. Whether the panel is uniformly dry is largely a matter of guesswork, however. It is more satisfactory to allow the stock to come to equilibrium in a kiln or drying room under regulated conditions of temperature, humidity and air circulation. This procedure ensures uniformly dry stock.

The services of the Division of Forest Products are available to any manufacturer desiring to modernise his plant by the installation of kilns or drying rooms. By the intelligent use of such facilities the manufacturer is assured that his panels will be uniformly dry and of the correct moisture content. In addition, he need have no fear that a certain proportion of his suites will be returned due to the development of the defects mentioned above.

Well designed drying rooms are thus a sound investment both from the monetary point of view and from the point of view of the manufacturer’s peace of mind. He can rest assured that his product will stand up in service without displaying those outward signs of faulty manufacture.

CO-OPERATION IN THE TIMBER TRADES

Until quite recently there has been no serious attempt in Australia to obtain any form of unity among the various sides of the timber trades. There has been a vague recognition of the obvious fact that all sections have problems in common, the solution of which needs the united action of all parties concerned. This feeling, however, has been entirely swamped by a strong recognition of the lines of cleavage and of opposing interested.

That there are such clashing interests it is useless to deny. Those engaged purely in the merchandising of timber, for example, have ranged themselves in the main on the side of free trade, while those mainly or entirely concerned with the production of timber are as naturally in favour of heavy protective duties. Timber-using interests make every endeavour

to cheapen the article they need to purchase and are opposed by those whose living depends upon the maintenance of reasonable prices.

In spite of these differing viewpoints there remain many points of common interest to millers, merchants and manufacturers of boxes, plywood or other articles made from wood. The lack of recognition, that it is better to unite to fight the common battle than to separate with warring factions has given to the opponents of timber the opportunity they needed and they had not failed to take advantage of this position.

Timber is not an ideal material for all purposes. It has certain faults as well as numerous virtues. The faults have been exaggerated by careless and wasteful manufacture and by disorganised marketing. The result has been the creation of a prejudice against timber and the unnecessarily high prices. In consequence, timber substitutes have been developed and their use has spread at an alarming rate. This has at last resulted in a recognition of the need for unity to oppose the common enemy and all over the world timber interests have been combining in an endeavour to recover their partially lost position. The greatest of these movements is that known as the "International Comité du Bois" which has grown into a very large and influential body within a few years and whose world-wide propaganda for wood is a remarkable exhibition of what can be done by united effort.

In Australia, the recently formed Victorian Timber Development Association is the first body of this kind to be formed and it is already doing fine work in its own State. An Australian movement is now planned and the first step has been taken by various timber bodies in New South Wales, who have united in calling a conference of all timber interests to be held in Sydney at Easter time.

A strong committee has been at work and a most interesting programme of business and social events is being arranged. It is hoped that those interested in developing the use of timber will note this fact and will use every endeavour to attend the conference in person and help to make it a huge success.

Producers, merchants, and users of timber are all affected by this proposal and should recognise that the surest way to advance their own interests is to promote timber utilisation in as wide a sense as possible.

BRICK VENEER CONSTRUCTION

The type of house construction known as brick veneer has much to recommend itself to architects, builders and timber merchants. As the name implies, it consists of a timber framed wall with a 4½" brick veneer external wall. The construction generally corresponds with standard practice. A solid 9" brick wall is carried up from the concrete foundation to plate level or alternatively the plate is supported by a series of 9" x 4½" brick piers spaced at 4'0" centres. The 4½" brick wall is built up so that there is a 1½"-2" cavity between it and the face of the timber framework. It is reinforced by special hoop iron ties; one end of each tie being embedded in the mortar joint and the other nailed to the face of the studs. A double cavity can be formed by fixing building paper to the studs and its use will result in a type of wall construction which has a higher insulating value than the ordinary type of 11" cavity brick wall. Panelling, plywood, moulded timber lining, insulating board and fibrous plaster suggest themselves as materials for internal walls and ceilings.

In countries where the extreme cold requires central heating throughout the winter months, the question of insulation becomes an important economic factor. It is interesting to note that under these conditions timber framing is almost invariably used. Weatherboards, set horizontally or vertically, cement stucco, or brick veneer are used for the external wall surfaces.

It is claimed that the cost of brick veneer construction is intermediate between all-brick and all-timber construction. For the house builder who prefers a brick residence, brick veneer lends itself to any type of design and in addition will result in more comfortable living conditions in both summer and winter.

At the present time, there are very few brick veneer houses in this country. For this reason, the position as regards the acceptance by the Municipal Building Regulations and the rating

for insurance is rather indefinite. Sufficient is it to say that brick veneer houses have been erected in brick areas and that they have been accepted in the same class rating as the all brick residence.

THE INFLUENCE OF RATE OF GROWTH ON THE PROPERTIES OF WOOD

The variability in the properties of wood is well known and for the most efficient utilisation it is often necessary to adopt some means of selection of the strongest pieces. Apart from estimating the weakening effect of any defects present, the best method of selection is on a density basis, the strongest pieces being the densest. However, with pieces of varying size and moisture content it is often difficult to select on this basis and other methods have to be adopted. The most obvious, especially in the non-pored timbers (such as spruce, pine, oregon), and overseas pored timbers (such as oak, hickory, ash) is to select on the basis of rate of growth as measured by the number of rings per inch on the end section.

Tests have shown that, in general, in the non-pored timbers (pine, spruce, etc.) very fast growth is accompanied by a reduction in the strength; within limits the strength tends to increase as the rate of growth falls off. Very slow grown non-pored timbers, however, also show a falling off in strength so that there is an optimum rate of growth at which the strength is a maximum. This varies with different species and with varying conditions of growth, but is usually between 8 and 20 rings per inch.

On the other hand, in the ring porous pored timbers such as oak, hickory and ash, the faster grown timber tends to be the strongest, but here again extreme growth conditions are undesirable as the strength of very fast grown ring porous timbers tend to fall off.

Very little is known about the effect of the rate of growth on the strength of the diffuse porous pored timbers, into which category fall the eucalypts and most other Australian hardwoods. Such information is needed for the most efficient silvicultural treatment of our young forests and the possibilities of making an investigation of this kind are now being considered by the Division of Forest Products in conjunction with the Commonwealth Forestry Bureau.

CSIRO
AUSTRALIA

NEWSLETTER
Forest Products

1937##062

MONTHLY NEWS LETTER NO. 62 FIRST PUBLISHED IN 1 MARCH 1937

A FIELD IDENTIFICATION OF SAPWOOD FROM TRUEWOOD IN DURABLE HARDWOODS

Existing Australian specifications for timber for such purposes as poles, sleepers, bridge timbers, etc., generally specify a definite allowance for sapwood. In some instances, too, as for New Zealand export de-sapped poles, the specification excludes sapwood except on concavities to obtain straightness, the depth of such sapwood allowable being defined.

In freshly-cut material, there is generally a distinct colour change between the sapwood and the truewood, but as soon as the material is stored for some time this colour change becomes less evident, and in many cases it is impossible to determine the actual extent of the sapwood.

Examination of large numbers of samples of the different durable hardwoods has shown that there is a distinct difference between the pores of the sapwood and of the truewood, when the timber is carefully examined on a cleanly cut end-surface. Very often the difference is apparent to the naked eye, but is more obvious if a small hand lens (magnifying glass) is used. The procedure is to make a clean knife cut over an end surface, commencing on the outer edge of the piece being examined and proceeding to what is considered to be the truewood. It will be found that the pores (or minute openings) exposed on the end surface of the sapwood will nearly always be open, that is, one can look down into apparently small clean holes. In the truewood, the holes are not open, these being closed over by ingrowths of the cell wall (tyloses). It should be noted that, in the sapwood, occasional pores may be closed over as the junction to the truewood is approached.

In the truewood, however, all the pores are closed and a sharp line of demarcation between the two is always present. The only precaution is to ensure the use of a very sharp knife so that the ends of the pores are cleanly cut; otherwise, the woody tissue is dragged over the open pores, which, in the case of the sapwood, cannot be clearly seen.

The method has been found to work very satisfactorily with the following species of timber:-

white mahogany
red bloodwood
narrow-leafed ironbark
grey box
yellow gum
jarrah
yellow box
tallowwood
grey ironbark
grey gum
wandoo
red gum
red or broad-leaved ironbark (*E. siderophloia*)
red ironbark (*E. sideroxylon*)
turpentine.

It should be noted that the method is not applicable to the less durable timbers such as mountain ash, tulip oak, etc., in which the pores of the truewood are often open.

This method of identification of sapwood from truewood is intimately related to the fact that with the durable hardwoods it is not possible to obtain penetration of preservatives into the truewood, even using vacuum and high

pressure treatments, because the pores in the truewood are effectively closed by tyloses, whereas the sapwood pores are open.

A WOOD WASTE EXCHANGE

A serious problem in all stages of the conversion of logs into timber and further into final articles of use is that of waste caused by the information of pieces too small for use in the particular stage of conversion in which they are produced.

Numerous efforts have been made from time to time to overcome this wholly or in part and while there is no general solution of the problem, it has been shown that there are at least local methods which can in some cases be successfully adopted.

The ideal solution is a chain of industries linked together in such a way that the waste from one becomes the raw material of the next.

The outstanding example of this is the town of Cloquet in the USA, which was destroyed by a forest fire some years ago together with the forest on which the town depended.

It seemed certain that the whole place would be deserted, but by a splendid co-operative effort by employers and employees, it is today a flourishing town with a series of coordinated industries. Products such as timber, paper, fibre boards, and small wooden articles down to tooth picks are linked in an ideal way.

It is rarely that local circumstances will permit such a solution of the waste problem.

There are, however, other methods. The conversion of shorts at the mill into small dimensioned stock for furniture factories and other consumers of standard sizes has proved successful in places. There are difficulties in this, such as change in the sizes demanded which may render stocks of converted timber quite unsaleable. Nevertheless, it is worth while investigating, and can undoubtedly prove of great value at certain places in Australia, situated favourably as regards manufacturing centres. Another method developed most successfully in and around Chicago is the Wood Waste Exchange. Producing and consuming interests make known their products and needs to one another through the medium of an exchange office. Producers send in lists of the sizes and qualities of off-cuts produced and consumers send in lists of the sizes and qualities they desire to obtain.

The exchange office then puts into contact those producers and consumers who have common interests. In this way, much small timber is usefully and profitably converted instead of being fed to fire chutes and the waste and cost of cutting large boards into small articles is avoided. It should be possible to arrange such an exchange at least in the large manufacturing centres in Australia.

It will need careful organisation and the exercise of patience and good will, but it can and should be done.

SAWDUST BURNERS

As long as timber is sawn, the disposal of sawdust will be an economic problem. Of the uses suggested for sawdust, none seems capable of absorbing more than a very small proportion of the quantity produced and most uses are handicapped in development because of the difficulties of transporting so bulky a material. Consequently, sawdust is considered a nuisance and the incinerator or smouldering sawdust heaps are indispensable attachments to sawmills, resawing plants and wood-using factories. Every means of using sawdust is therefore of interest to sawmillers and wood manufacturers.

The burning of sawdust is practically a universal method for its disposal. For many years, it was just burnt as waste and only in the last twenty years has the idea that it would provide a source of heat for power been steadily growing and furnaces been developed for its efficient combustion. In the great sawmilling regions of the Pacific coast of the USA and Canada, sawmills burning their sawdust beneath boilers, besides generating steam for their own requirements, in addition generate surplus electricity which is sold to municipalities for power and lighting. These types of furnace are also used in some Australian sawmills and manufacturing plants, but their use is by no means as general as it could be.

Most recently, developments have taken place in America and Europe in the application of sawdust combustion to central heating and water heating for domestic purposes.

A wide range of heaters is now available. The simplest type consists of a cylinder packed with sawdust in which a flue is located to ensure a slow, even rate of combustion. This is suited to heating a small room. The larger of these stoves is fitted with a combination flue and grate specially cast and fitted in a cylinder whose capacity makes it suitable for heating halls, garages, shops, and offices. From the simple type, taking one charge of sawdust at a setting, are developed other stoves in which the sawdust in the combustion cylinder is replenished from a storage hopper. These may be fitted with a hot table for drying or warming purposes. A further development comprises a sawdust hopper set above a stepped grate from which the hot gases of combustion are brought through coils or annular water containers, thereby warming the water to temperatures suitable for central heating or for hot water service.

From the range of sawdust burners now developed, it is possible to select one suited to any domestic or industrial heating requirement. They are of special significance in adding to the comforts of modern homes, few of which are at present being constructed without some type of hot water service. They are capable of bringing to the homes near sawmilling centres the standards of service and comfort obtained through the use of electricity, coal gas, coke, briquettes or other fuels which are obtainable at economical rates only at centres of large population.

INFORMATION ON AUSTRALIAN TIMBERS

It is proposed to run in this monthly news letter a series of articles in which general information will be given regarding our important commercial timbers. It is planned to include in such a summary botanical name, standard common name, other common names, occurrence of the tree, characteristics of the tree, physical properties of the timber, general information on the identification, uses, etc. The first of this series given in this news letter deals with the well known mountain ash.

Mountain ash

The botanical name of this species is *Eucalyptus regnans*, and the name, mountain ash, by which it has been known for many years in Victoria has been recently suggested as the standard common name. Other vernacular names used are white ash (Victoria), swamp gum (Tasmania), Tasmanian oak, Australian oak. The name 'oak' is very misleading since the timber shows none of the ray figure of the true oaks (*Quercus* spp.) nor of the Australian silky oak.

This species occurs abundantly in eastern Victoria and Tasmania, and is not found elsewhere. It is a large forest tree and in some cases reaches a height of 300 ft. or more, thus bringing it into the class of the largest trees of the world. The trunk is straight with a long clear bole and the crown is scanty. It is a fast growing tree and in 40 years has given a butt of 2 ft. to 2 ft. 6 in. in diameter.

The timber is usually light or pale brown in colour although sometimes pinkish and it is this light colour which makes it so popular since it may be stained to any desired shade. It may also be fumed to pale walnut colour. Growth rings are often prominent especially in the timber from the higher altitudes. For the highest grade purposes the timber is usually specified quarter-sawn, and this class of material has a pleasing appearance although not a pronounced figure. Back-sawn material has a more striking figure, but owing to the frequent occurrence of surface checking during seasoning is not a standard product.

This timber is one of the most easily worked eucalypts and being light in weight replaces imported woods for many purposes. At 12-15% moisture content seasoned and reconditioned material averages approximately 41 lbs per cubic foot, but naturally there is a considerable range in the weight of commercial timber depending on the nature of the piece whether fast or slow grown and whether collapsed or not.

Collapse is very common in this timber, but fortunately the now widely adopted reconditioning treatment has eliminated a large proportion of the loss that formerly occurred.

The uses for which this timber are well known and specially suitable are flooring,

weatherboards, lining, joinery, interior trimmings, furniture and cabinet work. It has also been used extensively in general house and building construction, and other possible uses are in cooperage, handles of the shovel, broom and rake type, cross-arms, paper pulp. It can be readily obtained through Tasmanian and Victorian timber merchants and it is at the present time finding quite a market overseas for which purpose it is shipped, kiln dried and reconditioned or made up into articles of furniture.

While a very distinctive timber in many ways, it is not always readily distinguished from certain other eucalypts of similar type, for example, messmate (*E. obliqua*) and alpine ash (*E. gigantea*). Microscopic examination is necessary in such cases.

Additional information in this and other timbers may be obtained by writing to the Chief, Division of Forest Products, Yarra Bank Road, South Melbourne, C.S.4.

BREVITIES

Flavouring Extract from Wood

In the News Edition of the Journal of Industrial and Engineering Chemistry, reference is made to a Canadian paper company which proposes to establish a plant at Cornwall, Ontario, for the manufacture of vanillin from sulfite liquor, a by-product of paper manufacturing.

Wood is stated to contain approximately 2% vanillin (vanilla flavouring), which is obtained naturally from the vanilla bean and synthetically from coal tar, and is used widely in the manufacture of perfumes, flavours, and similar products.

The International Nature of Timber Research

The average timber user does not realise the wide fund of knowledge which is at the disposal of the timber industry, and which is continually being augmented to provide more effective timber utilisation. This knowledge has not been developed by any one country or organisation, but is the result of research workers throughout the world pouring the results of their individual efforts into the common fund.

There is an excellent example of how this international co-operation facilitates the collection of information in a problem confronting the Division of Forest Products. Because of the rapidly increasing interest in New Guinea timbers, the Division was frequently asked to identify such woods and to give information on their possible uses.

Unfortunately, the Division found considerable difficulty in obtaining a range of samples of New Guinea timbers which had been authenticated by reference to botanical material taken from the same trees. However, an excellent collection of some hundreds of different species has now been received from the Yale School of Forestry, USA, one of whose collectors had carried out extensive work in the Mandated Territory and surrounded islands.

CSIRO
AUSTRALIA

NEWSLETTER

1937##063

MONTHLY NEWS LETTER NO. 63 **FIRST PUBLISHED IN 1 APRIL 1937**

This month it is proposed to devote the greater part of the News Letter to the reproduction of an article in the February issue of "The Timberman", by Emanual Fritz, Professor of Forestry in the University of California, and one of the outstanding men in his profession in the United States.

This is done because of the extreme importance of the subject matter dealt with, and because of the difficulty in getting the acceptance of the sample facts outlined by Professor Fritz. Many foresters continue to think too much of volume production and neglect quality in their calculations. The also speak still of a timber famine when this can only, if it eventuates, apply to timber of high quality.

The Forest Products Division has consistently urged this point of view, but its acceptance is far from general.

Most important is the fact that had these factors been realised by the public instead of the quoted statements of authorities as to quantities of timber and future high prices due to famine, there would not have been the enormous losses to innocent investors in planting schemes. Even now, it is believed that the acceptance of Professor Fritz's ideas is the only hope for the recovery of some of the money so invested.

QUANTITY OR QUALITY IN AMERICAN FORESTRY
by Emanual Fritz

Not long ago, when I met a young forestry friend, one of his first comments was, "Have you ever seen the young timber on So-and-So Flat?" I assured him I had not, and he was amazed. "Why it's the finest stand of pine in the state, growing at the rate of over one inch in diameter a year, 60 years old and still going strong." A few queries proved the timber to be a rather open grown stand, and, as one might expect, the trees were very limby, almost to the ground. Another forester in Oregon proudly exhibited some cross sections of very rapidly grown Douglas fir, and wondered why, when such growths can be obtained on average forest land, the growing of trees commercially should need any suggestion at all. A number of other instances might be cited.

What the average forester overlooks is that it is not the size of the tree that accounts, so much as the quality of lumber that it is producing. To see only volume is to be blind to quality. I admit that a thrifty stand of 50-year-old pine, Douglas fir or redwood looks beautiful. A forester, however, is not growing a park and must see some utilitarian value in his trees. A forester should have an X-ray eye, because it is not trees, but lumber that should be his goal, and this lumber must be of a readily and profitably merchantable grade. All our yield tables are based on the volume that can be expected in a certain period. Nothing is said of grade. A number of foresters have made the error of basing their predictions for monetary returns from the practice of forestry on the figures given in such yield tables. If a yield table gives no idea of the percentage of each grade yielded it has little actual value, unless it be for pulp or cellulose volume. I believe there are very few yield tables, particularly western ones, that are worth but a small portion of the thousands of dollars that have been spent on their preparation. I have in mind, of course, the use of the trees for lumber, for lumber is still our major forest products and the one which gave birth to forestry philosophy.

Volume, or quantity, of lumber produced is only a part of the story. If the volume is all No. 2 common and poorer, the business aspects of

forest growing begin to look poor. But if, in the volume produced in say 50 years, there is a satisfactory percentage of the well-paying upper grades the story immediately is different.

Large volume production is a relatively simple matter. Quality production is not much less simple, but it requires more intelligent handling of the timber property. Quantity production in high degree can be obtained through planting. Quality production, the kind demanded by American markets, cannot be obtained from plantations unless one is willing to wait an inordinately long period. The resultant product, while very good, will not pay anywhere near the cost of its growing.

The American lumber industry became a great industry not solely because America had a fabulous quantity of timber but because that timber was of exceedingly high quality. How much American lumber would have been shipped to Europe in the past if our grades had been no higher than the commons? Europe does not produce enough lumber for her own needs, of course, but that is not the real reason why Europe came to America for lumber. Had it not been for the fact that our domestic lumber was of very high grade, I have no doubt that Europe would have gotten along with her own relatively low grades and probably would long ago have developed more satisfactory substitutes. The fact that the prosperity of our lumber business, taking the country as a whole, is predicated very largely on the availability of high grades, behoves us to keep quality always in mind.

The old bugaboo of timber famine has been pretty well exploded. That famine theory was based largely on total quantity that was thought to be needed. If only low grades were needed a famine would be inconceivable because they are so easy to grow. Actually, we will some day run out of the exceedingly high-grade lumber that can be produced only under those conditions which evolved our old-growth or virgin forests, conditions which will not be repeated. Those high grades are not reproducible under the best practicable forest management. Wide clears, of course, are not at all necessary; they can always be built up from narrow clears.

I am aware that quality depends not only on "grades" as specified in the grading rules but also on growth characteristics, such as coarseness of grain and amount of summer wood. Coarseness of grain will have to be expected in second-growth lumber. Second-growth trees arise under entirely different circumstances than did the old-growth, except when the latter came up following a fire or other similar occurrence which wiped out the old growth and gave the new growth full control over the site, as has been the case with many present day old-growth stands of Douglas fir. Coarse grain is not really a serious factor if otherwise the wood is of high quality.

What can be done to improve the grade of lumber to be produced by second-growth timbers? The answer is very simple - practice selective logging and protect the trees left uncut from damage by logging equipment and by slash and other fires. All of our important commercial species, fortunately, have the capacity to greatly increase their rates of growth following careful selective logging. The trees reserved from cutting are usually the under-sized ones. They are undersized either because they are still young or because they were crowded by the large trees and may be very old. Usually, they have long, clear, slender trunks. After the logging of the merchantable timber, these immature trees have the opportunity of full light and much greater root space. Their rate of volume growth increases several hundred per cent in some cases, but what is much more important, the wood added from the time release from competition occurs has no old branches to cover. It is laid onto a clean bare trunk. The result: The additional growth is clear of knots. The grain will be coarser, of course, than it was before accelerated growth began, but the lumber will be high grade otherwise.

Quality lumber "Brings home the bacon." It is better business to manage a timber property for a reasonable amount of quality lumber than a much larger volume of low grades. It is particularly fortunate that this is possible by selective logging. The benefits are not in favour of the second crop alone. The old crop, too, benefits, since it is harvested at a higher rate of return than would be the case if all trees, large and small, were cut, logged and milled. Furthermore, the land is left as an asset, and in such far better condition generally that public criticism of logging is effectively stilled, and this, too, is a profit.

CHECKING OF FACE VENEERS

Every manufacturer of panels has come into contact with this problem at some time or other. Many have solved it, many have not, judging by the number of queries which are continually being received.

Two fundamental points which have been neglected or perhaps forgotten by many manufacturers, particularly those producing the cheaper grades of panels, cause trouble in this respect. Firstly, the face veneer should not be laid parallel to the cross-bands, and, secondly, the cross-band must be laid with the "open" side next to the core. Lack of care in this way is inexplicable, as the correct procedure is so simple and easily followed.

Checking due to faulty drying of veneer or finished panels, or to bad gluing practice is not so easily avoided. Herein lies the major cause of this trouble, however. It should be mentioned at this stage that it is practically impossible to lay successfully some varieties of veneer showing large amounts of end grain without the occurrence of checking. Some types of walnut and maple are very bad in this respect, particularly when making a four piece match when two pieces of the face veneer are of necessity laid with the "open" side out. This type of material is best laid using a "dry glue", e.g. Tego film, where there is no introduction of moisture to cause trouble due to swelling and subsequent shrinkage.

By adhering to a fairly simple routine and giving a certain amount of care to each operation, checking of face veneer can be largely avoided. The following remarks apply more particularly to face veneer showing a large amount of end grain, but it is preferable that all veneer be laid according to the recommended procedure.

(a) Reduce the moisture content of the veneer to 4-6%, either in a hot plate re-drier or between heated redwood boards. Buckled stock may be moistened to permit flattening out without cracking. The core-stock should be reduced to 6-8% moisture content.

(b) Apply the glue to the crossbanded core which is of the correct moisture content with the surfaces satisfactorily prepared for the laying of the face and back.

(c) Do not allow the face veneer to remain in contact with the glue for long periods before application of pressure. **This is important**. It is essential that pressure be applied before the face veneer can absorb moisture from the glue line.

(d) After removal from the press or clamps, the stock should be properly stripped out and allowed to condition in a drying room maintained at a dry bulb temperature not exceeding 120°F with a wet bulb depression of 20°. For stock showing a large amount of end grain, 110°F dry bulb and 15° wet bulb depression should be satisfactory. Conditioning periods up to 36 hours may be necessary depending on the class of stock and the amount of water added in the gluing operation. If a drying room is not available, the panels should be allowed to condition under factory conditions until equilibrium is reached and the moisture content of the panel is even throughout.

The aim in the final drying is to reduce the panel to an even moisture content which is its average moisture content when in use. Finishing the panel before this is attained is usually fatal, for subsequent drying causes checks extending into the lacquer finish to open up. These checks may occur a considerable time after article was manufactured and are mute evidence of internal faulty manufacture.

CSIRO
AUSTRALIA

NEWSLETTER
Forest Products
1937##064
MONTHLY NEWS LETTER NO. 64 FIRST PUBLISHED IN 1 MAY 1937

OFFICIAL OPENING OF THE FOREST PRODUCTS LABORATORY

On April 7th, the new laboratories of the Forest Products Division in Yarra Bank Road, South Melbourne were officially opened.

The Postmaster-General, Senator McLachlan, occupied the Chair and there was a large attendance representing every branch of the timber trade, and numerous Government Departments.

The gathering was held in the spacious library of the Division.

Senator McLachlan, in opening the proceedings, traced the growth of the Division from its early start in one room and the steady increase in its work which necessitated many shifts to accommodate the growing staff. He stressed the practical nature of the assistance given to the trade and how this had won the support of the Forestry Departments, large government timber bodies, and members of the trade, who had shown their interest by valuable gifts to the Division. He laid special stress on the splendid gift of £5,000 by Mr Russell Grimwade which had enabled the purchase of special machines. He further referred to the beautiful and well equipped laboratories and expressed the hope that the Division would continue to flourish. He then called on Mrs Grimwade to declare the building open. Mrs Grimwade said that she was happy to have the privilege of opening such a beautiful place and wished the Division every happiness in its new quarters. She then pressed a button which set in motion the various machines. Sir George Julius, Chairman of the Executive of C.S.I.R., in thanking Mrs Grimwade, also referred to the success in which the staff had carried on for years under most adverse conditions. The Council was glad that, at last, owing to the generous gift of the site by the Victorian Government and the provision of funds by the Federal Government for buildings, the Division was well housed. He also referred to the gift of Mr Grimwade, which was such an encouragement to the work of the Division.

Mr A.V. Galbraith, Chairman of the Victorian Forests Commission, who represented the Victorian Government, conveyed the congratulations of the Government on the erection of the fine laboratories and thanks to Mrs Grimwade for opening them. He spoke highly of the close co-operation between the Division and the Forest Services.

Mr I.H. Boas, Chief of the Division, expressed his thanks to the Federal and State Governments, the Forest Service, the various branches of the timber trade and especially to members of his staff, whose loyal support and hard work had made possible the success of the Division.

Visitors were then entertained at afternoon tea and conducted around the various laboratories, where work was proceeding and where special exhibits were shown. The central point of interest was the 600,000 lb testing machine in which a large beam was broken. This aroused considerable interest among the visitors.

Many expressions of congratulations were received on the handsome flooring, and panelling of various Australian timbers and on the general layout of the laboratories. This opening marks the beginning of a new era in the Division's progress and it is expected that

with the facilities provided, there will be an increased service to the timber interests of the Commonwealth.

A NEW FIELD TEST OF POLE TIMBERS AND METHODS OF POLE PRESERVATION

The State Electricity Commission of Victoria, in co-operation with the Division of Forest Products and the Victorian Forests Commission, has initiated a new pole test at Glen Park, Ballarat. The work was commenced last year and completed in March of this year.

The test is a comprehensive one, including four species of timber and ten variations of five main methods of pole preservation.

The principal timber used in the test is silvertop, *Eucalyptus sieberiana*, from the Erica district, Victoria, of which 100 poles are being tested. In addition, 30 grey ironbark, 20 messmate and 15 mountain ash poles have been included. The methods of treatment of the test poles, each 10 ft long, include impregnation of the open tank method with creosote oil, zinc chloride and arsenic solution, "Aseu" solution and "Cuprinol". The last two preservatives are of fairly recent development and strong claims have been made for their preservative properties.

A number of the poles have been treated by oxyacetylene charring process which already has been used to some extent in Victoria, and spray treatments with creosote oil were also carried out. The impregnation treatments were made in the field in an improvised treating plant, consisting of two mild steel tanks and a rough derrick. It is gratifying to note that good penetrations and absorptions were obtained by this method. The best results were obtained with the ironbark poles in which the absorptions were heavy and the penetration of the sapwood was complete and uniform. Of course, the sapwood is the only portion which can be impregnated in any Australian pole timber. The results obtained with the silvertop poles were not as uniform as those obtained with the ironbark, but they were nevertheless fairly satisfactory, and in addition, less "popping" and checking was observed in these poles than in the mountain ash and messmate.

Data on borer attack in poles was gathered during the installation of the test.

Annual inspections of the poles will be made and their condition particularly in relation to decay will be recorded. From this data in comparison with that obtained from similar pole tests already in progress in Australia, methods will be developed to increase the service life of poles, and thereby to reduce the enormous annual expenditure involved in their maintenance.

TIMBER v. STEEL MOTOR BODIES

In view of the recent decision of the largest motor body builders in Australia to cease using timber and revert to the all steel body, an article in the February number of "Wood", an English journal, is of great interest.

The author points out that less than five years ago there was a general impression that the days of the wooden body were numbered and large establishments were created in England to develop the manufacture of steel bodies. This was largely due to the setting up of factories by American firms who for various reasons were on steel production. The cost of dies for pressing out steel bodies is enormous and American companies were able to make use of the dies from parent factories. A further reason is that the motor industries are controlled by engineers who are metal minded.

In England, however, owing to the fact that, except in cheap cars, sufficient bodies of one type to justify the cost of dies and other plant are not sold, and also to the demand for new models of chassis at frequent intervals, there is a definite wave back in favour of timber construction. The objections to wood were largely due to greater weight and noise due to creak at the joints, but advance in the use of bent timber in body construction has overcome these.

Bends are much stronger than joints and avoid the use of cross grained timber, and in this way, great savings can be made in cost of wood and labor.

Steel is cheaper and up to a point, it is stronger, but beyond that point steel alone will bend and crumple under severe stress and this is where hardwoods have the advantage.

In a combination of hardwood and steel, they reinforce one another. The wood absorbs the shock and takes out rattle and rumble. The steel plus hardwood body can withstand concussions that crush a body built of steel alone. For this reason, one of the largest American companies employ this method of construction. This was only done after extensive tests had proved the superiority of this method. Under diagonal stresses the all steel body was so badly wrenched out of shape that it was completely destroyed, whereas the combination body was easily repaired. The doors remained intact.

In spite of the fact that, temporarily, Australian body builders have gone over to all steel, it is believed that experience will show that superiority of the combination body and that timber will once again assert its value in motor body building. As one step towards this desirable end, it will be necessary to study the bending properties of Australian timbers, as good bends are essential for success.

The Division of Forest Products is pushing on with such studies so that when the time comes it will be prepared with no necessary knowledge and experience.

AUSTRALIAN TIMBERS

In the continuation of the descriptions of well known Australian timbers, the Western Australian species, jarrah, is discussed in this month's News Letter.

Jarrah is the standard common name of the tree known botanically as *Eucalyptus marginata*, which species is confined to the south-west of Western Australia. The timber has made a reputation in Australia.

The tree occurs in a compact belt of prime forest 20 miles wide, running parallel to the coast of Western Australia from the latitude of Perth about 200 miles southward. In this forest, it forms practically the only commercial species and the area is probably the most valuable hardwood forest in Australia. The tree itself, while not to be classed among the giants of the forest, shows a uniform development of approximately 100 to 150 feet in height and a diameter ranging from 3-5 ft.

The timber is reddish brown in colour although sometimes varying from a light red to a very dark red when freshly cut. It subsequently darkens somewhat and develops a mahogany-like colour. This fact induced the early pioneers to give it the name mahogany and under this name, it was first shipped to London. It sometimes possesses a remarkable fiddleback figure, and such timber is referred to in the trade as "curly jarrah". Normally growth rings are not well defined; the figure is pleasing, but not prominent when the timber is back-sawn. When dried to 12% moisture content, its average weight is 55 lbs/cu.ft. It can be seasoned relatively easily without danger of collapse. It is well known as a fire resistant timber and as such it has been approved for use by the London County Council in England and also included in Lloyds list of timbers for use in shipbuilding. It has a reputation for durability in the ground, and has been shipped to South Africa, India, Egypt, and the East for use as railway sleepers. Jarrah flooring is also well known in England and other parts of the Empire.

In Western Australia there are few purposes for which the timber is not used. In the form of piles, strainers and decking, it is largely employed in wharves, piles, jetties and bridges. Hewn or sawn it is used in great quantity for sleepers. It is sawn for use as a building timber as stumps, joists, plates, studs, rafters, weatherboards, laths and shingles. Dressed, its main uses are in flooring, doors, windows, interior trim, mantlepieces and other functions.

Supplies can be readily obtained from Western Australian timber merchants and their agents in other Australian states. Modern seasoning kilns are operated to ensure that the timber is marketed in a properly seasoned condition. The quantity of jarrah produced annually exceeds that of any other single species in Australia and steps have been taken to regulate the supply to ensure continuity for all time.

Additional information on this and other timbers may be obtained by writing to the Division.

DEMONSTRATION TRUCK TOUR ARRANGED BY DIVISION OF FOREST PRODUCTS

Fitted with lantern slide projector and screen, blackboard and specimens and all the other requisites of a lecture tour, a half-ton motor truck set out, towards the end of April, from Yarra Bank Road, South Melbourne. Here are situated the new headquarters of the Division of Forest Products of the Council for Scientific and Industrial Research, and the improvised demonstration truck is the partial fulfilment of an idea that has been in mind since the inception of the Division of 1929.

Lacking the elaborate detail and the luxury of the caravans that are used rather commonly, nowadays, for publicity demonstrations, the Division of Forest Products truck provides, nevertheless, an effective means for taking the findings of this Division right to the milling centres where they should be applied.

In charge of the truck is Mr S.A. Clarke, Deputy Chief of the Division. He will call at Sydney and Brisbane and milling centres en route, but the greater part of his three months' tour will be around the milling areas of North Queensland. This is the first time the Division of Forest Products has been able to send an officer to obtain first hand knowledge of sawmilling practice and conditions in this important timber producing area, and the trip is therefore of double importance in the eyes of the Division.

In addition to studying milling methods in the North and lecturing on timber seasoning, utilization, etc., Mr Clarke will make a special point of calling on the various kiln plants with which the Division has contact by correspondence and discussing their problems with them.

The tour has been arranged with the co-operation of the Queensland Forestry Sub-department, one of whose officers will accompany Mr Clarke for part of the time.

BREVITY

Mr G.W. Wright of the Seasoning Section of the Division of Forest Products commenced in April a six weeks' tour of sawmills and wood working plants in Tasmania. Mr Wright will give special attention to plants where seasoning kilns are installed and will be glad to be of service to any one wishing to discuss problems in kiln- or air-drying. The tour has been arranged with the co-operation of the Forestry Department and the Tasmanian Timber Organization. It is some time since the D.F.P. has been able to send an officer on an extensive tour of Tasmania, and it is hoped that the industry will take full advantage of this opportunity to discuss seasoning problems with an expert.

CSIRO
AUSTRALIA

NEWSLETTER
Forest Products

1937##065

MONTHLY NEWS LETTER NO. 65 FIRST PUBLISHED IN 1 JUNE 1937

DON'TS FOR TIMBERMEN

Don't believe that timber, end racked, dries faster because the sap runs down. A piece of timber is something like a wick. If you place a piece of dry timber vertically with its lower end in a bucket of water, the water will rise up the timber. Try this for yourself and convince yourself finally that fluid won't fall down the microscopic tubes of which the wood is largely built.

Don't believe that you can season timber by placing it in running water. This is an old idea based on the belief that seasoning consists in washing out the sap. Seasoning is the removal of water and that is hardly possible in a running stream. There may be slight chemical changes which proceed during drying but these, if they exist at all, are so small that they do not affect the behaviour of the timber.

Don't believe that kiln drying takes the "nature out of the timber". This vague phrase does not mean anything, anyhow. Bad kiln drying can spoil timber, but so can the improper carrying out of any operation in any process do harm. Kiln drying means good drying in a well designed kiln by a competent operator. This does not harm timber even if your grandfather said it did.

Don't believe that there is some mysterious difference in timber which has been felled in the winter "when the sap is down". There is as much truth in this as in the statement by a gentleman from Africa, that white ants won't eat wood if it is felled when the "moon is in the full". The sap is always "up" in a tree, though it moves more in the spring and summer. In any case, what proportion of a log is sapwood?

Don't believe that you have only to fall a log and saw it into sizes for which you can get orders. You need to know all you can about the tree and the timber from it so that you cannot be fooled by any of the commonly held fallacies such as those quoted above.

Don't believe that because you have known a method of handling timber for 40 years or more, there is nothing better. Considering that 40 years ago very little indeed was known of the properties of timber and of the reasons for its good or bad behaviour, it is more than probable that the older a method the more likely it is to be wrong. Almost every industry has moved on from the methods of our forefathers - why should the timber industry lag behind.

Don't forget that timber has to meet increasing competition from modern substitutes which have had a scientific birth and upbringing and that the virtues of these valuable materials have been advertised so loudly and so widely that people accept them as the best for all purposes. There is an old saying that "Good Wine needs no Bush", but like many other old things, this is not true, and even if you realise that timber is the best material for many purposes, you must never cease to tell this to the World as emphatically as you can and at least as emphatically as do your competitors who sing the virtues of their substitute materials.

Don't believe that anything but the most skilfully prepared timber will meet the increasing competition. Only the spending of much time in studying the properties and the best methods of treatment for your product will keep your industry alive. The last two decades have produced a vast amount of

knowledge of timbers. This knowledge is only useful when it is used and you won't use it intelligently unless you try to understand it.

Don't believe that your fellow timber associates are your competitors to be fought. Your most dangerous competitors are those outside your industry and they must be fought fairly by combining within your industry for the common good. When the timber industry is properly organised in this way, and timber given its true place in the scheme of things, there is still room for an inner competition which will supply all the kick you want from your business. That is why you should strongly support those organisations which are working for your good, such as the Timber Development Association.

Finally, don't allow timber to be displaced. You can stop the fall in demand if you study your product, if you use the most scientific methods in production and preparation for the market, and if you join with others in advertising the advantages of your wares and in fighting the arrivals of substitute materials in your legitimate sphere of activity.

AUSTRALIAN TIMBERS

Hoop Pine

The name 'hoop pine' is strictly applicable only to the tree known botanically as *Araucaria cunninghamii*, though in trade practice, hoop pine, or alternatively, Colonial pine, embraces not only the timber of this species, but also that of the similar minor species, *A. bidwilli*, or bunya pine. Other names are Richmond River pine, Dorrigo pine and Queensland pine.

The major species, *A. cunninghamii*, has a commercial range extending along the coastal water sheds from the Dorrigo plateau in northern New South Wales to about Rockhampton in south-eastern Queensland, a distance of 500 miles, though isolated occurrences exist right up into northern Queensland. The bunya pine is much more restricted, being limited to that part of the Queensland coastal watershed lying between Brisbane and Maryborough, within which it is sparsely distributed, and forms only a small proportion of the milling volume.

The trees are characteristically smooth and symmetrical, ranging up to about 4 feet in diameter, with a total height of about 100 feet, of which probably 60 feet is free from branches. The logs are usually free from serious defect, and yield a high percentage of clear material in wide widths.

Hoop pine timber is clear white to light brown in colour, generally straight grained, with an even fine softwood texture, light in weight (approximately 36 lbs per cu.ft.) and similar in strength to Douglas fir. The timber seasons easily without loss, takes a smooth lustrous finish, and is an excellent wood to work.

Uses for hoop pine include not only all forms of interior building timber - flooring, lining, joinery, mouldings, small scantling and battens, but also a wide field of factory or industrial uses as shopfittings, furniture and cabinet making, white wood ware, dowelling, turnery stock, pattern making, etc. It is also used on an extensive scale for boxes and crates, as well as for concrete forms. When sprayed with the casein-formalin spray, hoop pine is suitable for butter boxes, and now furnishes the chief timber used in making these both for the export and the local markets. Hoop pine is also an excellent wood for the making of three ply, and is the staple timber used in the extensive veneer industry of Queensland and northern New South Wales.

STEAM BENDING OF WOOD

Considerable interest in the bending of wood has recently arisen abroad, due largely to the increasing tendency to the use of bent wood in furniture, this tendency being the natural outcome of the transitory fashion of a few years ago to use metal in the construction of furniture. It seems only natural that the curved lines developed there should remain, the harsh effect of metal being overcome by the use of the more mellow and pleasing wood construction.

Whilst many of our own more valuable cabinet timbers are well known both here and abroad, very little is known of their relative bending qualities and capabilities even to the home consumer. In fact, even in the furniture manufactured in England, much has been seen which on close inspection proved to be entirely innocent of all bending processes,

having been built up of pieces cut to a curved shape, and this losing both continuity of grain and the pleasing effect of truth in construction. This last factor is only too well exemplified by the cheap and unnecessary "gingerbread" ornamentation so profusely added to the numerous jerry-built homes that are being erected now in all of our Australian cities; ornamentation quite unrelated to any structural feature whatsoever.

How little is known of the bending capabilities of our Australian timbers is brought home very clearly by the fact that blackwood, known to the trade here as quite a good bending species, has been described in England, apparently on very slight acquaintance as "not at all suitable" for bending purposes.

Whilst one does not question the fact that there are timbers grown in the Northern Hemisphere which may be superior to any available here, it is generally known that blackwood is quite a good bending timber judged by any reasonable standard. In view of these remarks, it is easily seen that it is necessary that a survey of the bending properties of Australian timbers should be undertaken. The Timber Mechanics Section of the Division of Forest Products has recently commenced investigations in this field. A detailed study will be made to determine the relative bending quality of our commercially available species and to find the conditions best adapted to the bending of each.

As this study will be rather lengthy it is intended that a reconnaissance shall be made of about 80 or 90 species. This will include species from the coastal brush forests which are not now utilised to any extent.

To do this it will be necessary to collect a small quantity of each of these species, many of which are not readily obtainable on the market at present. This may prove a little difficult and help in this direction from either the State Forest Services or timber firms interested in any particular species will be greatly appreciated.

Detailed work has already been carried out on red tulip oak and karri, and whilst the study of these species is not yet complete, considerable information both as to their bending qualities and bending processes in general has been collected. Red tulip oak has been found to be a really good bending timber if given suitable treatment. Karri, whilst it will not bend to nearly so small a radius as red tulip oak in a given thickness is very suitable for moderately easy bends and should have considerable application in this direction.

Studies will be undertaken almost immediately on spotted gum, hoop pine and jarrah. The reconnaissance studies will also be commenced within the next few weeks. At a later date, detailed studies will be undertaken on timbers such as blackwood, which are already known in the trade as good bending timbers, in order to enable their bending properties to be utilised to the best advantage.

The equipment which is being used consists of a special experimental machine of the horizontal table type. The table, which has the form bolted to it, is rotated by means of a variable speed meter through worm and bevel gears at speeds ranging from 0.25 to 4.5 revolutions per minute. To prevent tension failures during bending, straps of mild steel are provided with a sliding stop at one end, the end pressure being controlled by an hydraulic ram actuated by means of a ball valve hand operated pump. The specimen is kept against the form by means of a radial arm which is spring loaded.

As a result of numerous inquiries concerning the bending of wood, a trade circular (Trade Circular No. 22 - Timber Bending) was prepared some time ago giving general information on bending problems. Copies of this may be obtained by those interested by application to the Division.

REFERENCE WORKS ON TIMBER

The Division is frequently asked to advise correspondents in regard to their reading, and for this reason the list below has been prepared. It does not pretend to be a comprehensive list by any means, but it will serve as a guide to anyone who wishes to improve his knowledge of some aspects of timber and its treatment.

For General Reading:-

Koehler - Properties and uses of wood. (McGraw-Hill, New York). $3.50.

Holtman - Wood Construction. (McGraw-Hill, New York). 25/-d.

U.S. Department of Agriculture - Wood handbook, prepared by the Forest Products Laboratory, Madison, Wisconsin, (U.S. Govt. Printing Office, Washington). 1935. 25 cents.

British Hardwoods, their Structure and Identification. (H.M. Stationery Office, London). 1929. 5/-d.

Handbook of home-grown timbers. (H.M. Stationery Office, London). 1936. 1/6d.

Canadian Woods, their Properties and Uses. (J.O. Patenaude, Govt. Printer, Ottawa). 1935. $1.50.

Brown and Panshin - Identification of the commercial timbers of the United States. (McGraw-Hill, New York). 1934. $3.00.

Australian Council for Scientific and Industrial Research, Division of Forest Products.

Technical Papers:

No. 5 - Methods for the identifi-cation of the Coloured Woods of the genus *Eucalyptus*

12 - Methods for the Identification of the light-coloured Woods of the genus *Eucalyptus*

16 - Identification of the principal commercial Australian timbers other than Eucalypts

6 - Fibre boards: their uses and possibilities of their manufacture in Australia

13 - Properties of eight timbers of the genus *Eucalyptus* (Ash group)

17 - Selection, Preservation, Distribution and Identifi-cation of Australian Pole Timbers

Trade Circulars:

No. 3 - Growth and structure of wood

13 - Cross, diagonal and spiral grain in Timber

28 - Chemistry in Wood

30 - Chemical Utilisation of Wood

32 - Brittleness of Wood

34 - Sawing Methods, part 1 - Quarter sawing

35 - Faults in Wooden Floors

Reprint No. 12 - Compression wood in hoop and bunya pines

Reprint No. 20 - Brittle heart.

The Technical Papers, Trade Circulars and Reprints referred to may be obtained on application to the Division.

Other references will be included in the next issue of the Monthly news Letter.

BREVITY

It has sometimes been said that officers of the Division, the headquarters of which are in Melbourne, are not sufficiently acquainted with the problems outside Victoria. The absurdity of this is well demonstrated by the fact that in the first week of June, officers of the Division will be in every State of the Commonwealth, as well as in the Federal Capital Territory. These officers are thus discussing problems and carrying out investigational work in very widely separated centres - from the Atherton Tableland to Western Australia.

CSIRO
AUSTRALIA

NEWSLETTER

Forest Products

1937##066

MONTHLY NEWS LETTER NO. 66 FIRST PUBLISHED IN 1 JULY 1937

DEVELOPMENTS IN THE FIELD OF ARTIFICIAL RESIN ADHESIVES

Many years ago the news that Continental manufacturers were successfully fabricating hot pressed, waterproof, plywood aroused American manufacturers to the fact that their rivals had evidently advanced a further step towards the production of the ideal adhesive. Later it was learned that the main ingredients of the glue were blood albumen and casein. Interest soon waned, however, and the big plants on the West Coast were content to increase their production utilising glues made from soya bean or casein.

In 1930, the advent of artificial resin adhesives mainly of the phenolic resin or urea resin types re-aroused interest in the production of hot pressed plywood. Phenolic resins soon outstripped the rival products in popularity, until at the present time, due to improved manufacturing processes and technique, combined with cheapening of the resin itself, resin bonded plywood is competing in many cases with the wet glued product. Its advantages are manifold:- The bond made shows high joint strength and is extremely water resistant; the necessity for re-drying the plywood or panels after gluing is obviated; butty AND highly figured veneer can be laid without danger of checking and with freedom from staining.

The ideal was not attained, however, the main objections to the phenolic resin adhesives being the high platen temperatures ranging from 250° to 280°F and the long pressing periods necessary to make a bond. The resin is also customarily applied in the form of "glue film" comprising a thin paper carrier impregnated with the adhesive. Some manufacturers dislike this method of application, and look for a glue possessing the advantages of the resin type adhesive to be applied by means of a spreader.

The characteristics of "Lauxite", an adhesive produced by the chemical action of zinc chloride, urea, and formaldehyde illustrates the trend of modern research. Lauxite is a powder which is prepared for use by mixing 100 lb. in 60 lbs. of water in the conventional type glue mixer. It is applied in the ordinary manner by a spreader equipped with rubber rolls. In addition, it is spread very thinly so that the amount of water present at the glue line is no more than is needed to plasticise the resin. Plate temperatures of 190°-225°F are required to set the resin. It is claimed that when bonding of $^{3}/_{8}$" 3-ply, a gluing time of 2½ minutes at a plate temperature of 225°F is sufficient. This is less than one-third of the time necessary to make a similar bond using a phenolic resin glue.

It is claimed that after setting of the adhesive the bond is absolutely waterproof, although it will deteriorate if boiled for prolonged periods. The important advantages of this adhesive are, however:- Its quick setting characteristics enabling a speeding up of production; its low heat input requirement tending to obviate danger from blistering or damage to the plies; its toleration of a wide range of moisture in the veneer; and finally the high strength of the joint made.

One should be safe in prophesying that the time is drawing near when an artificial resin glue possessing all the characteristics of the "ideal" adhesive will be on the market.

SHIPPING CONTAINERS

How Good Must They Be?

In a recent number of "Barrel and Box and Packages" occurs an article under the above heading from which the following notes are abstracted.

Primarily, containers must meet the following seven requirements:-

First, the container must have the ability to retain its contents through all the various stages of transportation. The materials out of which the container is constructed must only be strong enough to resist splitting or tearing open, with consequent loss or spillage of the contents, but the container must also be properly assembled and closed so that covers will not loosen and come off, or other parts of the various types of containers become loose or detached with similar results.

Second, the container, together with its interior packing, must have the ability to protect its contents from the outside forces; that is, from the dead stacking loads encountered in storage, the vibrating superimposed loads encountered in moving freight cars and trucks, and the most severe forces of all, the live impact of loads, which occur lengthwise of the car or truck during the normal handling, starting and stopping of the vehicle in the course of its journey.

Third, the container, and, of course, its interior packing, must possess the ability to protect its contents from the shocks and jars incident to handling, such as occur when containers are sent down gravity chutes, are roughly stowed or stacked, or are inadvertently dropped or toppled over.

Fourth, the serviceability of the container must not be adversely affected by contact with water or from moisture vapour in the surrounding air.

Fifth, the container should be of such size, shape and gross weight when these factors can be controlled so as to be easily handled, stowed and braced. To facilitate handling, the weight of the contents should be distributed as evenly as possible within the container, as top or end-heavy containers are difficult to handle, especially if the container is completely closed and uneven distribution of the weight therefore unknown, and containers should be provided with adequate hand holds wherever possible.

Sixth, the cost and the tare weight of the container should be as low as possible, consistent with its proper construction and the efficient protection of its contents as outlined in the first five points.

Seventh, the container should be so constructed that it can easily be assembled and closed and will fit into the production line if necessary. Where the volume is sufficient and there is a uniformity of size and shape, "ready made" containers can usually be used to advantage.

Laboratory Tests are Helpful

While the best and final performance test is the experience record of actual commercial shipments of the commodity in its container, there are certain laboratory tests; namely, the compression test and the revolving drum test, which are valuable in developing the proper container for a given commodity and to a certain extent in pre-determining its efficiency. These tests should be made on the container with its contents and with any or all interior packing in place.

WOODEN v. STEEL BEER BARRELS

Steel has frequently been suggested to replace wood for the manufacture of beer barrels and at first sight seems to offer some advantages. The steel barrel had its first boost owing to shortage of seasoned wooden staves in America following repeal of prohibition. It also offered the advantage of lower liability to leakage and longer life.

"Barrel and Box and Packages" points out in a recent issue that the wooden barrel has definite advantages. It is resilient and absorbs shocks in rough handling, better than steel. Steel when dented rusts rapidly at the point where it is bent and such dented barrels are not satisfactory for re-use owing to decreased volume. The pitch lining in a steel barrel is also more liable to come off.

Another advantage claimed is that steel barrels are often slightly too big and thus cannot be

remedied, whereas a wooden barrel can be reduced to the correct volume.

Again beer should be kept at a uniform temperature. Either overheating or freezing during transportation spoils the flavour. The lower heat conductivity of wood for this reason is definitely an advantage.

A NEW MOISTURE METER

A development of considerable importance to the timber trade is a new electrical moisture meter which has just been brought to a commercial stage at the Forest Products Laboratory, Melbourne. This instrument possesses several unusual features. The principal one is the application to testing timber on the move, for example, flooring boards emerging from a planing machine or boards on a conveyor belt. The timber to be tested simply passes underneath a metal plate and the actual moisture content may be read with fair accuracy from a dial or if preferred, a pointer may be set at any pre-determined maximum moisture content, whereupon any wetter pieces passing under the plate automatically ring a bell, light a warning lamp, or could with modification operate a trip or other device to put the wet boards aside.

The instrument is housed in a wooden case measuring 11" x 10" x 8" overall and weighing 14 lbs. No batteries are required, power being drawn from the mains. Practically all the components are standard commercial products, and the assembly is not particularly complicated, so the instrument should not be expensive.

As implied above, readings may be taken instantaneously, and the timber is not marked in any way so that finished panels may be tested. Timber up to two inches thick and possibly thicker may be tested, the area of the metal plate being changed accordingly. Full constructional details of this instrument will be published in the August issue of the C.S.I.R. Journal.

BREVITIES

Dr L. Chalk of the Imperial Forestry Institute, connected with the Oxford University, recently paid a short visit to the laboratories of the Division of Forest Products. Dr Chalk is well known for his researches in the field of wood anatomy, and was naturally very interested in the work carried out in Australia along these lines.

In addition, he spent some time with the officers of the N.S.W. Forestry Commission, the Victorian Forests commission, and the Commonwealth Forestry Bureau. It was indeed unfortunate that his time was limited and that he could spend only 2½ weeks in Australia before going on to Java, the next stop in his world tour.

Advantage was taken of the presence of Dr Chalk in Australia to hold a conference of the research workers in this field. This conference was held in Sydney on June 22nd and 23rd and was attended by Dr Chalk, Mr C.E. Carter of the Commonwealth Forestry Bureau, Mr M.B. Welch, of the N.S.W. Forestry Commission, Mr C.J.J. Watson, of the Queensland Forestry Sub-department, and Mr H.E. Dadswell, of the Division of Forest Products. This meeting was the first in Australia at which various members of the International Association of Wood Anatomists had assembled. Greetings were sent to Professor S.J. Record, the Secretary-Treasurer of the Association and one of its founders.

The Chief of the Division, Mr I.H. Boas, and the Officer in Charge of the Preservation Section, Mr J.E. Cummins, will leave for Brisbane on July 6th to take part in the conferential tour of forest areas arranged by the Queensland Forestry Sub-department.

Mr F.E. Hutchinson, who has been on the staff of the Division of Forest Products during the past three years, has accepted a position with

the N.S.W. Forestry Commission. Mr Hutchinson was formerly Lecturer in Forestry at the Canterbury University College, Christchurch, New Zealand.

Recently some welcome grants have been made to assist the Division in its work.

Two of the three paper companies in Australia have agreed to make grants of £100 per annum for five years to mark its appreciation of the value of the Division's work in the preservation of timber.

Recent developments in wood utilisation reported in journals from Europe include wood impregnated with metals. The molten metal is forced in by pressure. The treated wood has a metallic sheen and a silky appearance which is said to be most attractive. It is easily worked, is fire resistant and will not split, crack or splinter. It is being used for cabinet making and joinery, such as doors, panellings, etc.

Another novelty is the wooden stopper which is said to be very effective and cheaper than cork, which is at present becoming scarce owing to the conditions in Spain. These stoppers have two annular grooves cut parallel to the grain which enables them to fit tightly to a bottle neck. The wood used is aspen (poplar). It is said that no taint is conveyed to the contents of the bottle. They can be readily withdrawn with a corkscrew and not being so easily broken as cork, and can be used repeatedly.

CSIRO
AUSTRALIA

NEWSLETTER

Forest Products

1937##067

MONTHLY NEWS LETTER NO. 67 FIRST PUBLISHED IN 1 AUGUST 1937

IS IT ADVISABLE TO LAY THE CROSSBANDS, FACE AND BACK VENEERS IN THE ONE OPERATION WHEN BUILDING UP PANEL STOCK?

Judging by the regularity with which this question crops up, the majority of manufacturers in Australia must have at some time or other toyed with the possibility of getting away with such a procedure in actual practice. Generally speaking it is not advisable to do so, particularly in the case of high grade stock. The possibility of dispensing with drying and sanding of the cross-band core, prior to laying of the face and back, has such a dangerous appeal to the manufacturer trying to lower his costs, however, that it has frequently been attempted. The majority of such attempts have been fore-doomed to failure owing to a non-recognition of the essentials for success.

Firstly, the core, cross-bands and face and back veneer must be sanded or cut accurately. Small inaccuracies may mount up so that when the glued-up panel is finally sanded, the face veneer may be cut through on the high spots. Naturally the thickness of the face veneer has a bearing on the problem, for the thinner the veneer the more possibility of trouble. Laying the face and back veneer after the cross-banded core has been scraped or sanded to a level surface should eliminate any possibility of trouble.

Secondly, laying of the cross-banding and face veneers simultaneously necessitates that the tape used on the cross-banding should be laid next to the core. This is a potential source of trouble which may result in the formation of a plane of weakness and blistering of the veneer. The use of perforated tape may obviate this. As before, however, the most satisfactory procedure is to lay the taped side of the cross-band outwards and remove the tapes by sanding or steaming before the face is applied.

Thirdly, and lastly, there is the important effect of the rate of swelling of the cross-bands and the faces which may subsequently result in checking. Glue is applied to the cross-bands and it is thus essential that pressure be applied before appreciable swelling has taken place. If the pressure is applied so that the glue sets with the cross-bands and face in an expanded condition, checking must result when the assembly is dried down to equilibrium moisture conditions. It is the same old story underlying the checking of face veneer under ordinary practical conditions, but accentuated when the components of the panel are laid in the one operation.

To sum up:- Panel stock may be successfully fabricated in the one operation if the individual components are cut, or sanded in the case of the core, with a considerable degree of accuracy; if the face veneer is of sufficient thickness to compensate for any slight inaccuracies in the core and cross-bands without sanding through; if perforated tape is used; and finally, if pressure is applied to the assembly before any appreciable swelling can occur.

THE USE OF X-RAYS IN THE DETECTION OF FAULTY VENEERING

One frequent cause of trouble in the laying of veneers is variation in glue spread leading to localised "starved" areas and the possibility of

blistering. X-rays are now being used overseas to show up this, and similar defects. Barium oxide, a comparatively inert material, is added to the glue and prevents the penetration of the rays without interfering with its adhesive properties. The "starved" areas show up on a screen above the plywood.

It is also claimed that it is possible under commercial conditions to use X-rays to show up other defects such as the presence of gaps, or splits in the core, inequalities in the jointing and knots. Tests have shown that hidden defects in flush doors can be exposed in a similar manner.

The application of X-rays in this way and also for the purposes in the woodworking field seems to offer distinct possibilities.

DRY ROT IN THE HOME

Dry rot in the floors of ordinary suburban homes is much more common than we are prone to think. Discuss the matter with your friends and acquaintances and you will be surprised to find that many of them have actually experienced the trouble or know of cases in which floors have become rotten and required replacement, very often to be further repaired after a few years. The trouble should not exist, and there is no excuse for the architect or builder, as the cause is well known, and simple, relatively inexpensive precautions can be taken during the construction of the building to obviate all possible damage.

The idea that timber is necessarily liable to rot has done a great deal of harm. If wood in a building rots it is always due to carelessness or bad design.

In nearly every case the trouble is due to the inadequate ventilation under the house, generally in association with the floor being too close to the ground. An array of external ventilators looks very impressive and no doubt gives a feeling that adequate ventilation has been provided. But these ventilators must be properly spaced to prevent dead pockets, where no circulation occurs, and what is most important, the internal walls **must** have ventilating spaces provided in them. These must be large and somewhere about 18" x 12" in area and there should be plenty of them. Adopt these two recommendations, provide adequate drains around the house, particularly if on a sloping block, and the possibility of trouble will be negligible, if good methods of construction such as adequate damp courses, etc. are used. The other minor causes of dry rot are easily cured, but adequate ventilation is fundamental. In choosing the type of external ventilation is fundamental. In closing the type of external ventilator take particular notice of the amount of ventilating space provided. If the openings are only small, use more ventilators as the amount of circulation under the house is obviously dependent upon the amount of air that can get through the ventilators. By the same token, shrubs and creepers and other tall flowers should not be grown in front of the ventilators; they should be seen, not hidden.

THE QUALITIES OF A GOOD CORNSTOCK WOOD

The modern developments in the use of plywoods, flush panels and flush doors have permitted economical utilisation of the more beautiful and valuable timbers. They have also introduced new manufacturing problems and resulted in a re-assessment of wood values. Decorative timbers are needed, not in boards of great width, but as their veneers which give the requisite decorative effect in the minimum of material. The search for suitable timbers is confined to those with highly decorative appearance and which slice or peel evenly and finish smoothly. The cross-banding timber is required to glue readily, adhere firmly to the core and restrain its tendency to change in width and also to present a flat surface to which the delicate face veneer can be laid. The desirable properties for the cross band timber are, therefore, an even texture which will permit even penetration of the glue, freedom from defects and smooth surface so that no irregularities show through the finished face veneer.

But what of the core? True as it is that no structure is properly built on a poor foundation, so it is that no good panel should be laid on poor core. But what are the attributes of a good core? The core contributes bulk and strength to the fabricated panel so that its behaviour largely determines the behaviour of the whole panel. It is of paramount importance, therefore, that the core

shall be flat and stay in place. For it to stay in place, the timber must be seasoned to the average moisture content for the site in which the panel is to be installed, and must have low shrinkage and swelling values. If it is a timber which shrinks more tangentially than radially as the majority of timbers do, special advantage will result from quarter-sawing. Perfectly straight grain would also result in reducing any movement to a single one in width, instead of twist or other forms of warp. It is unnecessary to insist on high appearance values since the core is entirely covered by overlaid veneers, but it is important that the timber shall have good gluing characteristics so that these veneers can be readily applied and firmly held. Less essential but, nevertheless, desirable properties, are lightness in weight, uniformity of texture and ability to dress or sand to uniform smoothness.

SOME REFERENCE BOOKS OF GENERAL INTEREST TO THE TRADE

The following books and publications should be consulted by those interested in the seasoning and preservation of timber:-

Seasoning Matters

Tiemann - Kiln Drying of Lumber (J.B. Lippincott, Philadelphia).

Koehler and Thelen - Kiln Drying of Lumber (McGraw-Hill, New York). 25/-d.

U.S. Department of Agriculture, Bulletin 1136 - Kiln Drying Handbook (U.S. Govt Printing Office, Washington). 30 cents.

Australian Council for Scientific and Industrial Research, Division of Forest Products.

Technical Papers:
- No. 7 and 22 - Guide to the Seasoning of Australian Timbers, Parts 1 and 2.

Trade Circulars:
- No. 1 - Air Seasoning of Boards
- 2 - Testing of Timber for Moisture Content
- 7 - Sample Boards
- 9 - Electrical Moisture Meters for measuring the moisture content of timber
- 12 - Combined air and kiln seasoning - Handling by means of the Christensen truck
- 16 - Terms used in Timber Seasoning
- 20 - Collapse and the Reconditioning of Collapsed Timber
- 23 - Shrinkage of Wood during Drying
- 24 - The "Working" of Wood
- 37 - Kiln Instruments.

Preservation of Timber

Weiss - Preservation of Structural Timbers. (McGraw-Hill, New York). $3.50.

Termite Investigation Committee, San Francisco - Termite and termite control. 2nd ed. 1934. (University of California Press). $5.00.

Australian Council for Scientific and Industrial Research, Division of Forest Products.

C.S.I.R. Pamphlet No. 24 - Preservative treatment of Fence Posts, by J.E. Cummins.

Trade Circulars:
- No. 6 - Lyctus, or powder post borer
- 11 - Anobium, or furniture borer
- 25 - Pinhole borers
- 27 - Preservation of timber
- 18 - Prevention of decay in building foundations
- 33 - Deterioration of timber caused by fungi:
  Part 1 - Decay
  Party 2 - Sapstain fungi.

Reprint 14 - Blue stain in *P. radiata* timber.

TIMBER SEASONING GLASS

During the week commencing Monday, September 27th, the Division of Forest Products will conduct a course in timber seasoning similar to those which have been held in past years. It will consist of lectures, practical work and visits to kiln installations and air-drying yards, the lectures and practical work being held at the Division's new headquarters, Yarra Bank Road, South

Melbourne, close to the Spencer Street Bridge. There will be no charge for attendance.

The course will occupy the whole of the week, from 9 a.m. to 5 p.m. on week days and from 9 a.m. to noon on the Saturday. It will be necessary for all who enrol to attend lectures, but those who do not wish to do the practical work or attend visits to plants may enrol for lectures only. In order that any such might have the afternoon free to attend to their normal business, lectures will be restricted to the mornings, with the exception of the first day.

While it is the desire of the Division to make the course available to all who are interested, the accommodation available makes it necessary to limit the number attending. Any desirous of taking advantage of the course, please get in touch with the Chief, Division of Forest Products, Yarra Bank Road, South Melbourne, S.C.4, not later than 31st August. No application for enrolment can be considered after that date.

BREVITIES

In a recent issue of "Science", it is of interest to read that a sum of approximately £120,000 has been provided for Botanical Research at the Harvard University. The purpose of the gift is to investigate methods of increasing the rate of growth of trees, and consequently the rate at which they convert sunlight into cellulose and other vegetable substances.

The Queensland Plywood and Veneer Board has renewed its grant of £100 to the funds of the Division of Forest Products. The Board in sending its donation expressed its satisfaction at the value of the Division's assistance to the plywood industry.

It is interesting to note the rapidly increasing use of hardwoods in Queensland buildings. On a recent inspection of hardwood floors in Brisbane, it was noted that these were being well laid. Especially beautiful were floors of flooded gum. This timber should be used more generally and if well sawn and seasoned, will give great satisfaction.

CSIRO
AUSTRALIA

NEWSLETTER
Forest Products
1937##068
MONTHLY NEWS LETTER NO. 68 FIRST PUBLISHED IN 1 SEPTEMBER 1937

FIREPROOFING OF VENEER AND PLYWOOD

Wood in the past has earned for itself a place in our daily life from which it was imagined it would never be displaced. Inherent characteristics, however, such as the occurrence of dimensional changes under varying atmospheric conditions, lack of durability when used in certain situations, and inflammability, to mention a few of the most outstanding, have restricted its use somewhat. Modern developments in the field of plastics and in the substitution of steel for uses where wood formerly reigned supreme has stimulated research to discover and perfect means whereby such inherent disadvantages may be overcome.

Scientifically controlled kiln drying has largely overcome the drawbacks associated with the use of timber of incorrect moisture content. Attention to building construction and design, together with the judicious use of timber preservatives, can likewise obviate any trouble liable to occur through lack of durability. The inflammability of wood still remains very much of a problem, however, and is a characteristic which affords a talking point for the avid salesman of timber substitutes.

A careful analysis of the statistics dealing with fires in wooden and brick houses in U.S.A. has shown a smaller proportion of fires in the former type, but prejudice against wood is difficult to overcome.

At the present time there are a number of fireproofing compounds available which will render wood extremely fire resistant when present in the requisite concentrations. Such compounds are in common use overseas, particularly for ship construction, and in the State of New York where the Building Regulations demand that all buildings above 100' in height must be constructed of fireproof timber. The problem in Australia is more difficult than that encountered overseas, as our main constructional timbers are extremely difficult to penetrate with the fireproofing solutions. Certain selected timbers can be successfully impregnated in joinery sizes, however, and it would be relatively simple to effectively fireproof veneer used in panelling and in the construction of fireproof doors.

The suggestion has been made that it would be possible to treat the built-up plywood, but it is doubtful whether this would be feasible, as a large proportion of the adhesives used do not possess a sufficient degree of water resistance to prevent disintegration of the assembly. It may be possible to treat laminated stock fabricated with the artificial resin type adhesives, e.g. Tego film, without deterioration of the glue bond. A more satisfactory arrangement would be to treat the veneer before fabrication, and thus ensure thorough impregnation and freedom from degrade. It is possible that this may be carried out by heating the green veneer in concentrated solutions of the fireproofing compounds for varying periods, depending upon the nature of the timber and the absorptions required.

As a rule, it is not satisfactory to apply fireproofing compounds as brush or spray coatings. Such treatment confers only a slight degree of fire resistance. A treatment to make timber properly fire resistant demands that there should be a concentration of the fireproofing salts equivalent to 10-12% of the air dried weight of the timber. This absorption can only be obtained by a thorough impregnation.

A considerable amount of work still remains to be done before definite treatment schedules and processes can be given. It is apparent, however, that, if necessary, certain timbers and laminated stock can be rendered extremely fire resistant by treatment with fireproofing compounds. Such treatment would be of particular benefit, especially in the case of the woodwork in public buildings where the sudden development of a fire might result in a considerable loss of human life.

ELECTROLYSIS IN THE MANUFACTURE OF METAL-FACED PLYWOOD

The use of metal-faced plywood shows an ever increasing popularity for almost all styles of interior decoration. Many difficulties have been encountered, however, in successfully bonding the metal of a plywood backing. Recent advices from abroad indicate the development of an entirely new technique in the manufacture of this class of material. The metal is deposited electrolytically as a fine layer on the surface of the plywood without interference with the physical properties of the wood.

The question immediately arises, "How can a metal be deposited on a non-conductor such as wood?" Wood at equilibrium moisture content offers considerable resistance to the passage of electric current so the first step in the manufacturing process is to transform the wood into a conductor of electricity. This is accomplished by immersion in a suspension containing fine graphite and later supplementing the deposition of the graphite in the wood by passage through graphite covered rolls. Thus, the surfaces of the wood are completely coated with graphite, and there is a certain amount of penetration in the wood itself.

The next step is to suspend the coated wood in a suitable electrolyte. Direct current supplemented by superposed alternating current of low frequency is applied, and the metal can be observed covering the surface of the wood in a matter of seconds. Any desired thickness can be obtained by increasing or decreasing the amount of current. Copper and brass deposits are most popular in colours varying from red to golden, and yellow, in either a bright or dull finish. Some bright finishes are made directly, while others necessitate special polishing.

The product obtained can be cut, bent, or shaped with very little danger of peeling or cracking. It is also claimed that the strength of the plywood as well as the durability and resistance to corrosion is considerably increased. Freedom from damage by the penetration of moisture should also be assured.

SHOULD TIMBER BE FLAT STACKED OR END-RACKED FOR AIR-DRYING?

A comment published recently by the Division of Forest Products, relative to the end-racking of timber for air-drying, brought forth a suggestion that it would be interesting to make a comparison of the rate of air-drying in flat stacks and end-racked stacks.

Such a comparison was made by the Division in 1931, with stacks built in a Melbourne timber yard. In these tests, the timber used with Rimu, 6 inch x 1 inch stock, varying in initial moisture content from 52% to 113%. The stacks were built on August 5th-6th, 1931, and final tests were made on November 11th, 1931, i.e. after approximately 14 weeks air-drying. Intermediate observations were made to compare the rates of drying.

One flat stack and one vertical stack (C) were built under comparable conditions from the point of view of effective air circulation. In addition, two other vertical stacks (A and B) were built, A being completely isolated from all other stacks and B being partly isolated. Other features of the stacks, such as size of stack and thickness of spacing strips, were closely similar.

At the end of a month, the average moisture content of vertical stacks A and B was slightly lower than that of vertical stack C or of the flat stack. The bottoms of vertical stacks B and C, however, tended to be of considerably higher moisture content than any part of the flat stack. This did not apply to the vertical stack A, which was completely isolated and therefore under more favourable conditions than any of the other stacks.

After 14 weeks, drying was still proceeding in all stacks and the variation in moisture content of the several stacks was as follows:-

Flat stack	: 13% - 16%
Vertical Stack A	: 12% - 15%
" " B	: 13% - 15%
" " C	: 13% - 17%

There was, therefore, no appreciable difference in the drying rate of any of the stacks, proving that the rate of drying of timber depends on the adequacy of air circulation and not on the fact that the timber is stacked on end on the flat. It should be noted, however, that the initial cost of the end racks is considerably greater than that of foundations for flat stacks. Also, warping is more likely to occur in end racked than in flat stacked boards.

One method of end-racking sometimes adopted is to criss-cross the boards, singly, along a ridge pole, approximately in the form of a letter X. Boards so stacked will certainly dry more rapidly than in either of the types of stacks mentioned above, because of greater air-circulation - not because "the sap runs out of the boards". Such practice is too wasteful of ground space for adoption in the majority of air-drying yards.

THE TREATMENT OF SAPWOOD TO RENDER IT IMMUNE TO LYCTUS BORER ATTACK, WITH SPECIAL REFERENCE TO THE TREATMENT OF VENEERS

In Queensland and New South Wales there are many timbers such as red tulip oak, cherry birch, yellow bean, etc., which could be more fully used for veneer if it were possible to utilise the wide sapwood which is susceptible to borer attack. As the sapwood may in cases extend to depth of up to 6 inches in a 30-inch diameter log, the loss of veneer is enormous. The Division of Forest Products has carried out numerous investigations aimed at developing practical methods for preventing the attack of borer on the sapwood of such species and it has been established in the laboratory that sapwood when impregnated with sodium fluosilicate is rendered immune to Lyctus borer attack.

Practical tests have now been completed and the results obtained with a small commercial plant in Queensland are extremely satisfactory, since it was demonstrated that green veneer straight from the lathe could be easily treated with the preservative. For example, $^{1}/_{20}$ inch green red tulip oak veneer was treated successfully in 15 minutes.

The treatment is carried out in special tanks, which are constructed of copper sheet, all joints being preferably welded with copper. A suitable size for 6 ft. x 3 ft. veneer is a tank 8 ft. long by 4 ft. wide and 4 ft. 6 ins. deep. The tank is supported in a wooden frame box and provided with copper heating coils.

It is essential that iron or steel fittings are not used as otherwise iron tannin stains develop on the veneers. The sodium fluosilicate is dissolved in water in the tank and the solution heated to boiling. The green veneer is placed in a specially designated crate, in which each sheet is separated from adjoining ones by fingers and the loaded crate is lowered into the hot saturated solution and left therein for a suitable period which depends on the species and the thickness of the timber. After treatment, the crate is removed and the veneer taken out and dried in the usual way. Commercial tests indicated that the treatment did not affect the appearance, the drying properties, the gluing, or the finishing properties of the veneer. Costs of treatment are not excessive and should be approximately 9d. to 1/-d. per 100 sq.ft. of plywood calculated on a $^{3}/_{16}$ inch basis.

These semi-commercial tests were carried out in co-operation with the Queensland Forest Service and the Plywood and Veneer Board, Brisbane. Full details of the experiments, of required plant, and of methods of treatment for various species will be published shortly. In the meantime, inquiries may be addressed the Chief, Division of Forest Products, 69-77 Yarra Bank Road, South Melbourne, S.C.4.

BREVITIES

Mr N.E. Tamblyn, B.Sc. (Agric.), a graduate of the University of Western Australia, who was recently awarded a Research Studentship by the Trustees of the Science and Industry Endowment Fund, is continuing his

investigations on Timber Pathology at the Forest Products Laboratory, South Melbourne.

Mr F. Gregson, Utilisation Officer of the Western Australian Forests Department, is spending several weeks at the laboratories of the Division of Forest Products, South Melbourne.

Mr S.A. Clarke, Deputy Chief of the Division of Forest Products, has returned from an extensive tour of timber mills, and timber production areas in North Queensland and Northern New South Wales. During his trip, Mr Clarke gave numerous lantern lectures on problems associated with the conversion, seasoning and utilisation of timber and brought to the practical timberman a number of suggestions based on the work of the Division of Forest Products.

CSIRO
AUSTRALIA

1937##069

NEWS LETTER NO. 69 1st October, 1937

THE DRYING OF VENEERS,

One of the most important problems facing the plywood manufacturer is the drying of veneers, and there are many instances where difficulties in meeting orders with a satisfactory standard of quality have been directly traceable to trouble in drying As in the case of timber, there are two methods available - air seasoning and kiln seasoning, but in few instances can the requirements of space and the conditions of climate make air seasoning possible. In considering kiln drying the manufacturer is faced with a number of alternatives. Firstly, will he dry his veneer in single or double thicknesses, or will he build up a thickness of half an inch or more and treat the veneer as thin wide sheets of timber. Secondly, will he use an expensive mechanical drier, the cheap but somewhat crude tunnel kiln, or the internal fan kiln somewhat intermediate in price. Naturally, the choice of drier is bound up with the question of drying in single or multiple thicknesses, the class of stock being handled, and the quality demanded in the final product.

Unfortunately, the proper spheres of the different veneer drying equipments have never been worked out and, while it is possible to generalise, in a number of cases more accurate delineation is necessary, For example, it is safe to say that a mechanical drier would be a good investment for a plant producing sliced veneers, and that a tunnel kiln would be satisfactory for a small plant confining its activities to hoop pine three-ply, but beyond such broad statements it is rather difficult to go.

Multiple thickness drying created a large amount of interest when first introduced some years ago, but the results obtained were not always satisfactory. That some of the failures were due to faulty kiln types and some to faulty operation is now evident, since the process is being used with very satisfactory results at several plants.

It will be obvious, therefore, that a comprehensive investigation into veneer drying is long overdue and in order to begin the collection of the requisite information, the Division of Forest products will initiate a series of experiments during the month. For this purpose, Mr. C.S. Elliot, the Officer in charge of the Seasoning Section of the Division, will proceed to New South Wales, and with the assistance of the Division of Wood Technology of the New South Wales Forestry Commission, some preliminary tests will be carried out, Later, Mr. Elliot will spend some time in and around Brisbane.

VENEER BLISTERS.

A proper treatment of this subject would require a very complete exposition of the principles underlying the successful laying of veneer. This is impossible in this news letter, so for the sake of brevity, the following family tree of the causes of veneer blisters has been drawn up, A careful perusal of this is recommended to any manufacturer desirous of tracking down the ancestry of blisters "bred" in his plant. In addition, he should be able to avoid the many pitfalls surrounding the path of the creator of veneered stock.

Causes of Veneer Blisters.

1. Incomplete Contact.

(i) Improper machining of pieces - faulty sanding or planing causing uneven thickness or irregular surfaces.

(ii) Wrong condition of the glue at the time of pressing
- (a) Foamy glue,
- (b) uneven glue spread
- (c) Dried or jellied glue.

(iii) Insufficient pressure.
- (a) Warped stock
- (b) Jellied glue
- (c) Uneven application of pressure

(d) Uneven cauls.
(iv) Use of veneer of varying thickness.

2. Character of glue and glue spread.
(a) Mixed too thin.
(b) Insufficient glue spread.

3. Starved joints.
(a) Glue mix too thin
(b) Pressure applied too quickly
(c) Excessive pressure
(d) Excessive heating of wood

4. Pressing time too short.

5. Oil, wax and other materials on wood.

6. Steam pockets (in hot pressing).

TIMMER BECOMES THE SUBSTITUTE.

Of recent years, it has become fashionable to think that timber will eventually be superseded by other materials. By intensive propaganda, the public has been educated to believe that steel, concrete, brick. and plastics are much superior. For some purposes, this is naturally true, but in other cases it is not. Wood certainly would not make a useful pocket knife, but on the other hand, steel makes a poor axe handle.

Wood has many virtues which should be brought before the public and when properly treated, it is for many purposes superior to other materials. Often all that is required is a demonstration of this to induce people to use it. Recently, representatives of a well known firm inspected the new laboratories of the Division of Forest products seeking ideas to incorporate in a new building. Shortly after their visit a letter was received from them indicating that as a direct result of the visit, they intended to replace metal by timber in quite a number of sections of their new laboratories.

WOOD USED IN AIRCRAFT CONSTRUCTION.

In a recent issue of the "Timberman", there appears a very interesting article describing how timber is being used to an increasing extent in the construction of the huge metal air-liners of today. The information on which the article was based was furnished by the Douglas Aircraft Co. of Santa Monica, California, which company recently delivered 30 giant 12-ton transport planes to United Air Lines.
The Douglas Aircraft Co. purchased 84,000 feet of aeroplane spruce in the first four months of 1937 and the approximate average monthly consumption of various kinds of wood is 76,000 board feet - all used in the construction of so-called all-metal planes. The timbers used include birch for hammer forms and lofting body plans; sugar pine in patterns fop die casting; airplane spruce in batten and fairing strips for lofting and in certain wood wing construction; douglas fir for boxes, shelves and framework; spruce in patterns and in doors and partitions; white pine for general purposes; balsa as a filler for doors and partitions; maple and basswood for doors and partitions, and mahogany in patterns for large die casting. It can be seen that the largest use of wood comes in lofting and in the making of patterns and forms. In the lofting department of the Douglas factory full size permanent drawings are made on wood.

In the new Douglas sleeper, wood is used in the doors to the lounges and baggage compartment; also for partitions between the plane's compartments and its lounges. Side seat panels are made of 1/16"

three-ply spruce plywood; lavatory walls of ½" seven-ply mahogany face plywood; cabin walls of 1/16" three-ply birch plus ⅝" nine-ply mahogany plywood.

AUSTRALIAN TIMBERS - TALLOWWOOD.

The botanical name of this timber is Eucalytus microcorys, and it is widely known throughout Australia as tallowwood, , which name has been adopted as the standard common name of the species.

The tree, which attains a large size; reaching a height of 150 ft. and a diameter breast high up to 6 ft., is a common one in the coastal forests of south-eastern Queensland and north-eastern New South Wales. Its range extends from the Hawkcsbury River district north of Sydney up to the Maryborough district of Queensland and to Fraser Island. The bark of the tree is fibrous, persistent, and more or less corrugated throughout.

The timber varies in colour from light to yellowish brown and possesses a shiny lustre and definite and distinctive greasy nature. From the latter characteristic has arisen the name tallowwood. The grain is usually interlocked, the texture moderately coarse, and growth rings not distinct. The figure is pleasing but not prominent, and is due mainly to the interlocked grain. Dried to 12% moisture content its average density is 59 lbs/cu.ft. It is a hard, strong, tough timber, and one of the main durable hardwoods of Australia. In seasoning, there is little degrade in small and large sections; a fine network of checks on the end section is characteristic. For a hardwood, it is comparatively easy to work, dresses to a smooth greasy surface, turns moderately well, and polishes easily.

It has a very wide variety of uses which range from posts and poles to flooring, and this gives an indication of its value and popularity. Considerable quantities are used in the eastern States and New Zealand for telephone and electric transmission poles, also as cross-arms and turned spindles. Railway departments make use of it for sleepers, sawn or hewn, for crossing timbers and transoms, in bridge construction, and in the framing, sheeting and flooring of carriages, wagons and vans. In the building trade it is greatly valued for stumps, bearers, plates, joists, studs, verandah posts, flooring, weatherboards and window sills. It is regarded as the timber "par excellence" for dancing floors and is reported to make the best possible floors for skating rinks. Municipalities have used it for street paving, mining companies for skids, shipbuilders for planking.
It is available in board, scantling, and structural sizes, as well as poles, and in hewn form. It can be obtained through Queensland and New South Wales timber merchants and for many years has found a ready market overseas.

Additional information on this and ether timbers may be obtained from:
(a) The Chief, Division of Forest Products, Yarra Bank Road, South Melbourne, S.C.4.
(b) The Division of Wood Technology, New South Wales Forestry Commission.
(c) The Queensland Forestry Sub-department.

SEASONING CLASS.

The Division of Forest Products has recently completed a course of lectures and practical work in timber seasoning for the benefit of kiln operators and others interested. This was the eighth such course to be held. Five of these including this one have been held in Melbourne, two in Tasmania, and one in Sydney., The popularity of the classes may be judged by the fact that 230 members of the timber trade and allied industries have now availed themselves of the opportunity to increase their knowledge of the principles involved in timber seasoning. At the first class held in 1931 there was an attendance of 12, but the most recent class held in the new laboratories of the Division had 53 members,

A further seasoning class of a similar nature will be conducted in Sydney early in December, while Mr. C.S. Elliot, the Officer in charge of the Seasoning Section of the Division, is in

that city. He will be, assisted by officers of the New South Wales Forestry Commission. Particulars of this class may be obtained direct from the Division of Forest Products, Melbourne, or the New South Wales Forestry Commission, Sydney.

NEWSLETTER
Forest Products
1937##070
MONTHLY NEWS LETTER NO. 70 FIRST PUBLISHED IN 1 NOVEMBER 1937

SAWDUST UTILISATION

Numerous inquiries have been received by the Division of Forest Products for advice as to possible methods of utilising waste economically. There are, of course, a very great number of uses to which sawdust can be put, but, in all these, the possibility of doing so with profit depends on a number of factors which are mainly local. The cost of collection and transport to some centre where a demand exists is usually the factor upon which proposals break down.

Use as fuel is, of course, the first suggestion and if there is a demand for heat or fuel at the site where the sawdust accumulates, then this is an ideal way to use it. In some mills in the United States, huge sawdust destructors were at one time busy night and day, but today they are standing idle. Waste timber is hogged and mixed with sawdust to be burnt in Dutch ovens and give steam and power. The power supply is sometimes in excess of mill requirements and in such cases it is used in the neighbouring town and in other industries.

In British Columbia, the development of a sawdust burner for domestic purposes has proved a great success and, indeed, it has caused the price of sawdust to rise considerably because of scanty supplies. In all such cases, however, a potential market exists close to the source of supply.

Recently, in response to a request for information as to the possibilities of a special type of sawdust burner, the Division made a survey of available sawdust supplies in Melbourne, and it was found that there was so little available that it was not worth while proceeding with the idea. Local supplies, it was found, were mainly absorbed by industrial plants equipped with furnaces for burning it as fuel; small quantities were used for packing, cleaning, polishing, in butchers' shops, etc.

Where the problem of utilisation is more difficult, as in districts far from centres of population, it is important to realise that it is not just a matter of finding a suitable outlet, but that it is essentially a matter of economics dependent upon the local circumstances.

WOOD GAS AS FUEL FOR MOTOR VEHICLES

All countries dependent on imports for supplies of petrol, oil and other fuels for internal combustion engines are directly concerned in the development of substitute fuels that can be manufactured within their own territories. The potentialities of producer gas have occupied the attention of combustion engineers in several European countries and, in the last 20 years, considerable progress has been made in substituting this gas for petrol as a fuel for mechanical vehicles. In Belgium, France, Germany and Italy the use of producer gas in motor trucks and motor cars can be regarded as having passed the experimental stage and many private, commercial and military vehicles operate full time on the locally produced fuel.

In the efforts to decrease importations of fuel each of the Governments in question at first offered tax remissions on vehicles operating on fuel produced within their own borders and subsidised the production of producer gas equipment. Recently, the practice has been changed by compulsory measures. Italy in September, 1935, decreed that by the end of 1937, every lorry and omnibus had to be

converted to use substitute fuels. France has now followed this lead and has passed a law requiring that public and private concerns having at least ten mechanically operated vehicles in service must convert 10% or even 20% to them to wood gas or some other locally produced fuel.

STANDARDISATION IN THE TIMBER INDUSTRY

World wide acknowledgement has been given to the benefits which have accrued to the manufacturer, retailer and consumer following the introduction of standardisation into methods of production and these principles have been recognised as being an important fundamental requirement of industrial progress. Before any great industry can reach its highest development, unification of methods and products always occurs.

It is perhaps an exaggeration to say that standardisation is being actively pursued in the timber industry today, but at least a start has been made. There exists ample opportunity and a very real need for standardisation of timber products. The importance of this work to the timber industry was realised by the Division of Forest Products, C.S.I.R., and for several years now this Division has actively co-operated with the Standards Association of Australia. The Chief of the Division, Mr I.H. Boas, has been Chairman of the Timber Sectional Committee since its inception, and several members of the staff of the Division, in addition to attending to the secretarial work, have contributed very materially to the work of this Committee. State Sub-committees have been formed to discuss draft specifications and their comments are considered by the Timber Sectional Committee before being issued by the Standards Association. The Forestry Departments throughout Australia co-operate with this work.

A few moments' reflection on the subject of timber utilisation and marketing will be sufficient to convince most people that lack of standardisation with the resulting confusion is very apparent. Several cases suggest themselves. The names of many Australian timbers vary from one State to another and this may have serious consequences, not the least important of which is confusion when tendering for large orders. The same situation exists with regard to sizes, especially of dressed timber - flooring having a different profile and thickness and joinery stock dressed to a slightly varying thickness. Much dissatisfaction with wood in general, resulting in increased substitution of other materials can be traced to confusion resulting from a lack of standard grades. The development and adoption of such grades should be of great value to architects and engineers as well as to sawmillers and timber merchants.

It can be seen, therefore, that the work being done by the Standards Association through its Timber Sectional Committee is very important. Specifications are being prepared for joinery stock, milled products, building, scantling, and heavy construction work. Standard specifications and profiles for milled flooring, lining and weatherboard of a number of timbers have already been issued, and a list of standard common names of Australian timbers will be published in the near future.

SILKY OAK

This name has been applied to several Australian timbers, which have the typical large rayed appearance of the European and American Oaks (*Quercus* spp.). The Australian species, however, are not botanically related to these oaks, but are derived from a very different family, the members of which are almost exclusive to Australia and Africa. Originally, the Australian silky oak of commerce was the product of two species common in South-eastern Queensland, namely, *Grevillea robusta* and *Orites excelsa*, but the silky oak of today is for the most part the product of the North Queensland species *Cardwellia sublimis*. This latter species develops a large and massive trunked tree which reaches some 100-120 feet in height and up to 4 feet in diameter. The logs are usually symmetrical and free from serious defects.

The timber is pinkish to light reddish brown in colour with a silvery, silky lustre attributable in some degree to the colour and nature of the broad rays. The development of these has given a large flaky figure to the quarter-sawn timber, and a more subdued mottled figure to that back-sawn. An almost infinite variety of shades and differences in graining can be obtained by varying the degree of quarter and back-sawing, and special sawing methods have

been adopted for producing the choicest figure. The wood is light and soft to work, straight grained, and averages 34 lbs/cu.ft. when air dried to 12% moisture content. It reasons readily without degrade, back-sawn boards drying much more readily than quarter-sawn, while the shrinkage obtained when drying from the green state to a moisture content of 12% is only 5% in back-sawn boards, and 2% in quarter-sawn boards. It is very easy to work with hands or machine tools and in this respect, superior to the imported oaks (*Quercus* spp.). It is reported to bend well and is favoured for carving and all kinds of veneer work. It holds nails well, has little tendency to split, and can be easily glued, stained or polished.

The wide variety of figure obtainable and the development of staining technique have combined to produce a distinctive series of artistic effects in panelling and furniture. Overseas it is highly regarded as a decorative timber and has been chosen for use by London firms which specialise in high class interior decoration. In Queensland, it is a wood of wide utility finding outlets in panelling, all types of furniture, interior trim, coach and motor body construction, railway carriage construction, the manufacture of small turned novelties, fishing reels, etc. In localities where it is milled it is favoured for general building purposes, and is used for studs, plates, floorings, linings, etc. It is also extensively used for the production of veneers, plywood and laminated panels.

This must be considered as one of the more important Australian woods, and is of special value because of its ease of working and its adaptability to so many uses.

TESTS ON JARRAH

At the request of Messrs Millars Timber & Trading Co., who are supplying the necessary timber, the Division of Forest Products is carrying out in co-operation with the Western Australian Forests Department an extensive series of tests on the properties of jarrah. Twenty-six logs each 10 feet long from eighteen trees taken from four of the principal milling centres in Western Australia have been received at the laboratory. The total amount of timber is approximately 12,000 super feet.

It is proposed to carry out complete mechanical and physical tests according to the methods standardised in English speaking countries, thus enabling the properties of the timber to be compared directly with those of overseas and other Australian species.

At the same time, it will be possible to carry out extensive investigations on the fundamental shrinkage of this species, on the occurrence, extent and detection of brittle heart, and on the weakening effect of certain defects.

BREVITIES

(a) The Queensland Department of Forestry has extensive areas of young forests under silvicultural treatment, one of the prime objects of which is to maintain the maximum rate of growth consistent with satisfactory quality of the wood. Some very striking results have already been obtained, the rate of growth being very much greater than that of trees growing in virgin forests. This applies not only to exotic pines, but also to the native hoop pine, kauri, blackbutt, spotted gum, tallowwood, ironbark, silky oak and cypress pine. Arrangements have been made for the Division of Forest Products to co-operate with the Queensland Forestry Sub-department in carrying out systematic tests on the quality of the wood so produced. Recently, an officer of the Division visited Queensland to consult with officers of the Queensland Department on the design of the proposed experiments which will necessarily be very long dated, and also to obtain first-hand knowledge of the young forests. It was decided to take representative sample trees at periodic intervals and to test the properties of the wood from these trees as thoroughly as possible. In this way, any undesirable trees as thoroughly as possible. In this way, any undesirable characteristic that tends to develop can be corrected by suitable silvicultural treatment before it is too late.

(b) Recently issued is Technical Paper No. 23 of the Division of Forest Products. This publication deals with the properties of *Eucalyptus astringens* (brown mallet), a Western Australian species more known

for its bark which is one of the richest sources of tan extract than for its wood. The Western Australian Forests Department have, however, planted this species extensively to insure continuity of supplies of its valuable bark; at the same time they are desirous of finding an outlet for the timber itself. Material from twelve representative trees was forwarded to the Division of Forest Products for mechanical and physical tests. These revealed that this timber has outstanding properties which make it nearly the equal of American hickory in toughness and superior to it in static strength. Thus, brown mallet may prove a satisfactory substitute for hickory for all but the most exacting purposes.

A copy of this interesting publication may be obtained on application to the Chief, Division of Forest Products, 60-77 Yarra Bank Road, South Melbourne, S.C.4, or the Conservator, Western Australian Forests Department, Perth.

(c) Mr A.M. Munro, M.A. (Oxon.), A.I.C., has been recently appointed to investigate methods for the satisfactory retting of Australian grown flax. Mr Munro will be carrying out his preliminary experiments in the laboratories of the Division of Forest Products.

COUNCIL FOR SCIENTIFIC AND INDUSTRIAL RESEARCH.

DIVISION OF FOREST PRODUCTS.

MONTHLY NEWS LETTER No.71

1937##071 1st December, 1937.

SETTING OF GLUES.

Of recent years several new types of glue have appeared on the market. They were developed in response to a demand for better and quicker gluing. Modern mass production and new methods such as hot pressing with artificial resin glues, or the use of the vacuum bag, call for new types of glues, one general characteristic of which is a greatly accelerated setting time when compared with the old types. Many manufacturers, however, have been chary of adopting these new types of glues, but there is a growing opinion in favour of their use. One cannot help thinking that this reluctance to adopt these new glues is due partially to a lack of knowledge regarding the constitution and properties of glues in general.

How many manufacturers understand exactly what happens when a glue sets? A clear understanding of this question is essential both in the selection of the best glue to use and in the proper use of such glue. The following is a classification of the main glues used in the woodworking industry according to the manner in which setting is brought about. It must be understood, however, that in some cases the lines of demarcation between the various classes are not very distinct and one class may merge into another.

(a) Glues which set by the cooling of a colloidal solution.
Animal glues are typical of this class. They swell in cold water, and melt on warming. When the temperature falls again they form a jelly which increases in strength as it dries out. The temperature effect is of primary importance, but the evaporation of moisture also contributes largely to the setting of the glue. This class of glue thus merges into Class (c).

(b) Glues which set by the heating of a colloidal solution.
Blood albumin glues are representative of this class. Temperatures in the vicinity of 100°C. are necessary to bring about jellying.

(c) Glues which set by evaporation of the solvent.
This class can be further sub-divided into glues using water as a solvent and glues using non-aqueous solvents. Examples of the former type are some casein glues, starch glues, liquid glues, and sodium silicate.

(d) Glues which set without temperature change as a result of a chemical reaction taking place in the solution.
The majority of casein glues are examples of this class. Calcium caseinate is formed and the glue slowly forms a jelly.

Both animal glues and blood albumin glues of this type can be prepared by the addition of compounds which liberate formaldehyde to combine with the protein to form a compound which is capable of forming a jelly.

(e) Glues which set by chemical reaction, a solvent being unnecessary.
Artificial resin glues, e.g., Tego film, are of this type. Setting is the result of a chemical reaction not dependent upon the presence of a solvent. Heat accelerates the reaction. Phenolic resin glues, however, may be applied as a solution in suitable solvents which are customarily allowed to evaporate before the surfaces are united under heat and pressure.

Water resistant glues are found either in classes (b), (d) or (e). Class (e) glues are the most water resistant. Aqueous glues, e.g., Classes (a) and (c), possess practically no water resistance

as the action is reversible and the glue solution can be formed again if sufficient water is present.

The rate of setting of casein glues in Class (d) is important. Dry mix glues which set in a remarkably short time can be purchased, and it is also possible by varying the ingredients added in wet mix glues to reduce the setting time considerably.

PROGRESS AT THE DIVISION OF FOREST PRODUCTS. THE ESTABLISHMENT OF A GLUING AND VENEERING SECTION.

It has been felt for some time that insufficient attention is being paid to the demands of the veneering industry by the Division of Forest Products. Up till the present, the growth of research along other lines, combined with a shortage of staff, has permitted only a limited amount of work on some of the problems associated with the industry. However, arrangements have now been made to form a new section which will deal solely with this phase of the work. This new section will be under the charge of Mr. S.F. Rust, M.Sc.

For a start, an endeavour will be made to establish close contact with the industry, to find out in what direction the preliminary work can best be directed, and finally, to render practical assistance in the solution of problems requiring immediate attention.

A number of Trade Circulars dealing with the various types of glues used in the woodworking industry has already been issued. It is intended to supplement this series with further publications dealing with gluing, veneering and the manufacture of laminated stock. In addition, a fund of information garnered from studies overseas and local observation has accumulated, and remains to be brought more directly to the notice of interested manufacturers. It is hoped that this will be accomplished through the medium of articles in trade journals, by personal contact, and as outlined above.

It will be necessary to carry out a series of investigations on various problems in the laboratory. Mention might be made of the following projects:-

(a) A study of gluing technique using casein and animal glues.
(b) Gluing characteristics of Australian timbers.
(c) A study of the artificial resin type adhesives.
(d) The development of satisfactory methods and adhesives for the veneering of curved surfaces.

Progress will naturally be slow, but the results obtained will be of practical importance to the industry in general. The co-operation of manufacturers is invited with the assurance that it is the aim of the Division at all times to assist them in the solution of their individual problems, as well as to raise the status of the industry as a whole.

KARRI.

Karri is the standard common name of the tree known botanically as Eucalyptus diversicolor, which species occurs naturally only in Western Australia.

The tree grows in a fairly restricted area in the extreme South-west corner of Western Australia, and occurs in stands containing no other species of commercial value. The tree itself is one of the giants of Australian forests, some specimens reaching a height of 250 feet, and butt diameters often exceed 9 feet. It is a handsome tree with smooth, clean, gum-type bark carried the full height of its straight, shapely trunk.

The timber is reddish-brown, closely resembling jarrah in appearance, although generally lighter in colour. Growth rings are not well defined, but a wavy or striped figure is often revealed due to interlocked grain. When dried to 12% moisture content, its average weight is 58 lbs/cub.ft. Seasoning requires some care to reduce checking in back-sawn material. It dies from the green condition to 12% moisture content with a shrinkage of 6.2% across back-sawn widths and 3.9% across quarter-sawn. It is a hard, stiff and tough timber, and is considerably stronger in cross bending than Douglas fir and English oak. It is fairly difficult to work but can be finished well and highly polished.

Karri is well-known in Australian and overseas timber markets. On account of its high strength as a beam and its availability in large sizes and long lengths singularly free from defects, it is popular for superstructural work. It finds considerable use in wharf and bridge superstructures. In railway workshops, it is extensively used for wagon, van and carriage construction. It is largely used in agricultural implements, especially for bent parts, to which its favourable bending qualities make it eminently suitable. As a ship-building timber, it is approved by LLoyds and it is in active demand for mine-lift guides in South Africa, and for pole cross-arms in Great Britain. It makes a most suitable scantling timber for rafters, studs and joists in dwelling construction. It makes an excellent floor on account of its strength and wearing properties and is also used for interior trim, furniture and furnishings. It is one of the main timbers used for apple export cases from Western Australia.

Supplies can be obtained from Western Australian timber merchants and their agents in other Australian States and overseas. It is one of the most important of the eucalypts, and is available in large quantities for domestic use and export.

An exhaustive examination of the mechanical properties of karri has been carried out by the Division of Forest Products, and a summary of the results of the tests on small clear specimens of green timber has already been published.

WOODEN VATS AND TANKS.

A recent article in the English Journal, "Wood", by R.J. Henderson under the above heading is one of great general interest and the following brief resume of it has been prepared:-

Wood storage vessels have been found to last much longer than metal ones because one of their essential advantages is their proof against rust and corrosion of all kinds. No painting nor proofing of the inside is required and the upkeep costs are practically nil. The wood can also stand up to liquids of acid and alkaline nature and there are in use at the present wooden tanks for the storage of 10% boiling sulphuric acid.

Wooden vessels are now employed in a surprisingly large number of industries, and the following are a few of the uses: vats for storing spirits, for fermenting beer, for cider, vinegar, oils and colours, acids and other chemicals for dyes and dyeing purposes, tumbler drums for tannery work, paddle tanks for fur and skin dressers, for brine, and for hot and cold water storage, for developing tanks in the photographic industry. They can be made to withstand hydraulic pressures of 80 lbs. and more to the square inch.

The choice of timber is the most important problem in the manufacture of vats or tanks, both as regards suitability for the job and as regards quality of material.

New Zealand kauri pine of the best quality has become world famous for vat making, especially for brewery work and foodstuffs. Oak has been used for many purposes, and is especially prized for spirit vats and vats for the maturing of wines. Pitch pine and longleaf yellow pine are only suitable for certain classes of vats, but their resinous nature makes them ideal for chemical vats, owing to its acid resistance. Other species used widely are cypress, Russian red fir (loosely known as red deal). California redwood is a particular favourite in the United States, owing to its freedom from any tendency to shrink and its resistance to fire, acids, and insect attack. Burma teak is also used for vat making.

It is easy to realise the necessity for using only the best quality timber for one faulty stave may be disastrous, and all sapwood must be rigidly rejected since it will allow flow of the liquid contents.

It will be noted that Mr. Henderson refers to the outstanding qualities of New Zealand kauri for various purposes. For vat making, Queensland kauri should be as good as the New Zealand providing care is taken to eliminate all sapwood, as is done in New Zealand.

For beer casks, blackwood is the outstanding Australian stavewood, while kauri, she-oak and satinay are used for heads. For wine casks, selected mountain ash has proved entirely suitable, but as yet, for spirit casks, no substitute has been found for white oak.

For chemical vats, celery top pine, huon pine, Queensland kauri, and hoop pine have been entirely satisfactory. For tallow casks, mountain ash has in the southern states proved a successful substitute for oregon, and blackbutt and Sydney blue gum suggest themselves as good substitutes in Queensland and New South Wales.

Other Australian timbers are being investigated as possibilities for staves and heads by the industry in co-operation with the Division of Forest Products and the Queensland Forest Service.

BREVITIES.

During November, the laboratories of the Division of Forest Products were visited by Professor A.J. Eames, Professor of Plant Anatomy at Cornell University, Ithaca, New York State. Professor Eames, who had only a short time in Melbourne, is interested particularly in the anatomy and morphology of the conifers of the Southern Hemisphere.

Dr. W. E. Cohen, Senior Chemist of the Division of Forest Products, who has been abroad for two years, holding a Commonwealth Fund Fellowship, is expected to reach Melbourne on December 13th. Dr. Cohen studied for eighteen months at the U.S. Forest Products Laboratory, Madison, Wisconsin, and during the past few months, has been visiting the Forest Products Research Laboratories in Canada and in England.

.....