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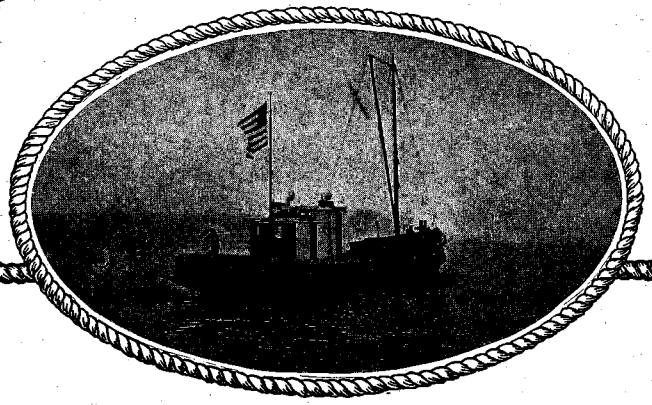
PACIFIC MOTOR BOAT

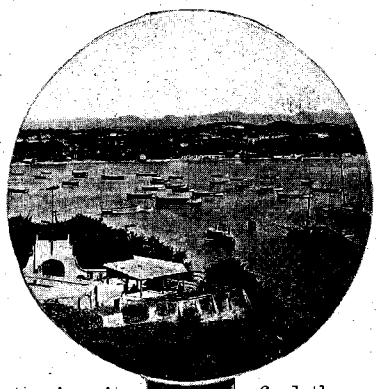
SEATTLE, U.S.A. DECEMBER, 1914



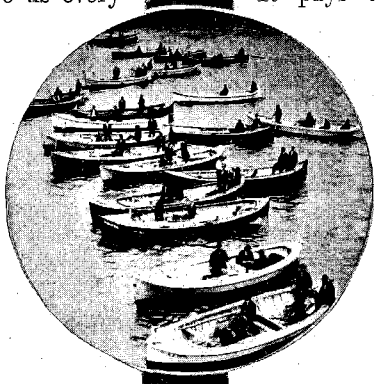
BUILDING THE GOOD BOAT AND THE BAD

A Foreword by the Editor

THE old saying that it is only a step from the sublime to the ridiculous is especially trite when applied to the subject of water craft, for in boats more than in most other things do the slightest elements in one way or another determine their success or their failure. The actual difference in design and expense between a good boat and a bad one is so small as to be almost negligible. These differences, however, are irrevocable once the boat is built. No improvement or alteration, extensive or expensive, will make a good boat out of a bad one, short of tearing it to pieces and building it anew from stem to stern.



We see examples of poor boats before us every day—boats that are freakish in appearance, boats that are unsafe and unseaworthy, boats that are hard to steer and hard to drive—and the same money that has been spent on any one of them might have built a boat that would have been efficient, reliable, economical and good looking.



There is no excuse for a man owning or building a poor boat today. Even if he does not care to retain the services of a naval architect, he has too many examples of good boats and too much available in the way of boat plans and scientific data to warrant him in either building a poor boat himself or letting a poor boat-builder construct one upon his order.

If you are going to have a new boat, it is just as easy and just as inexpensive to have a boat that for its type, size, power, etc., is the very best boat that you can get. It does not need to be built of the most expensive woods or according to the most expensive methods. But it should be built according to established practice in design and construction. In other words don't try any freak experiments, or don't let any one else try them for you. You may have some very original ideas which you think will revolutionize boat design, but unless you are enough of a scientist to know that those ideas are sound, you will prove your wisdom greater by not trying to apply them. There have been many generations of original men before you and if those ideas of yours were practical, you would find them embodied in the approved types of boats of today—the result of ages of development. It pays to have an architect because expense, time, study and experience have taught him many things that you can never know unless you follow his vocation. But if you are determined not to go to this expense, at least take the time to figure out for yourself the elements which will make your craft as nearly perfect for its type as possible.

In this number of Pacific Motor Boat are technical articles on every phase of boat design and construction as well as plans of different sizes and types of pleasure and commercial motor boats built on the Pacific Coast. A careful study of the plans and text in a journal of this sort will give you a comprehensive idea of what constitutes a good and successful boat, and with such information as this and a wealth of other available material, there is no reason why the boat you build, even though of moderate cost, should not be attractive, wholesome and efficient from the standpoint of the virtues that make a boat worth while.

THE BEST WOODS FOR PACIFIC BOAT BUILDING

By GEORGE BULKELEY, A. M. I. Mech. E.

THE subject of suitable boat-building woods is a wide one and the selection of what is best depends a good deal upon what part of the world the builder lives in. Each country has its own indigenous timber some of which is suitable for one thing and some for another; but there is never a country that has been left so destitute by nature as to be devoid of some wood which is par excellence for some particular portion of a ship. And so it comes about that the man who has the mind to build his wood-constructed craft of nothing but the best materials has to go all round the world and back for his timber, culling one kind of wood for this part here and another kind for that part there—all of which costs money. The ordinary man has to be content to build his boat out of such woods as suit his pocket, and these are nearly always those which are indigenous to that part of the world in which he resides. He can only send abroad for a few pieces of rarer material with which to please his fancy in the decoration of the more intimate parts of the ship's interior.

Perhaps it may be well in this brief review to investigate what woods would contribute to the building of a high class wooden vessel regardless of cost, and after that to see what we have in a more economical line in the way of shipbuilding woods on this Pacific Coast itself and what woods are directly obtainable by shipment to this Coast from surrounding countries.

We built her hull of British Oak,
We shaped her spars of Spruce,
Her decks we laid with Moulmein Teak
(We wanted her for use.)

Her decks were scorched by tropic skies;
Alternate drenched with dew:
On freezing nights 'neath Northern Lights
The Bering Sea she knew.

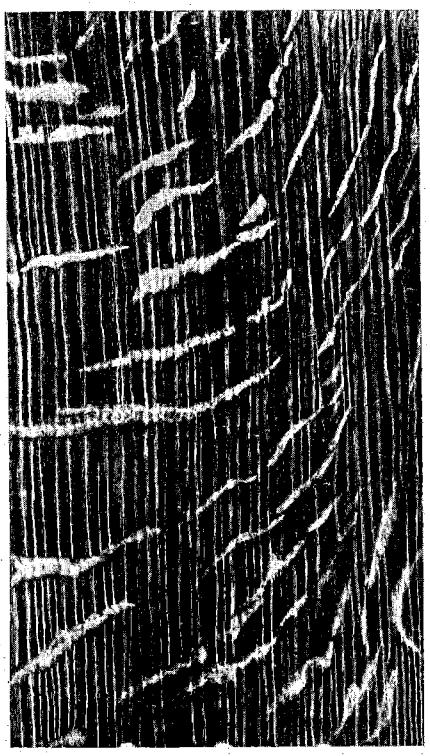
Her work was rough, her woodwork tough
Was hammered like the deuce!
'Round world and back there's ne'er a crack
And still she stands her use.

If we turn to Lloyd's for information we find that an All-Teak vessel is assigned four more years under Lloyd's Survey than one constructed of any other wood. It is well known that teak is the wood par excellence for resisting both the action of the salt water and also the invasion of that species of sea-worm which carries a milling-cutter in the top of its head and whose burrowings mean ultimate death to a non-teak-built ship unless she be metal sheathed. The oil in teak serves the double purpose of keeping out both the sea water and its wormy denizens. By reason of its hardness and oily texture, however, teak is not an ideally easy wood to work from the ship-builder's point of view apart from its undoubted general superiority, while, in the writer's opinion, one may go far and fare worse than to plank his ship with oak, a peculiarity of which is that it grows harder with age until it becomes almost iron-like. In olden days ships were of oak from stem to stern and what vessels of today could grapple side by side, pour shot into each other for hours and then still float? Yet Nelson's flagship *Victory* floats today in Portsmouth harbor, a "heart of oak" still.

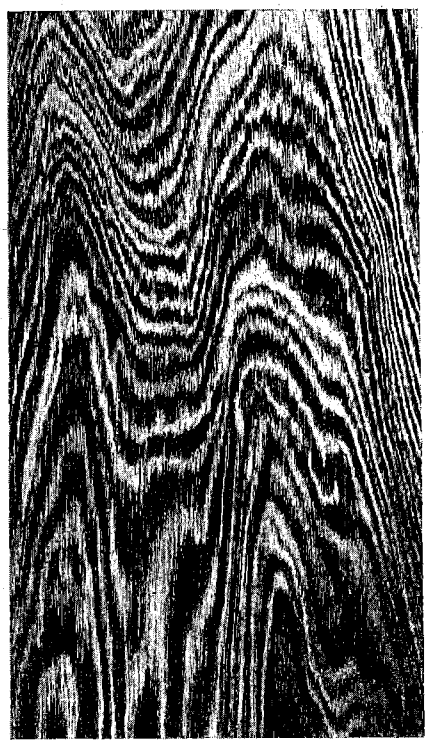
Should an owner desire his boat to be very smart he may plank her from the boot-top to the decks with hard texture mahogany, which, if copper-fastened, will last side by side with oak, while nothing can look better than a yacht having varnished mahogany topsides. A boat may also well be planked entirely of American pine and last very satisfactorily, but this wood will not stand so well between wind and water as teak or oak, while its general shipbuilding strength is about 5% less than these.

For keel and deadwood, the discriminating owner would have these of oak preferably; the alternatives being East India teak and East American maple, the last-named being especially excellent where the boat is to be in the water most of her time.

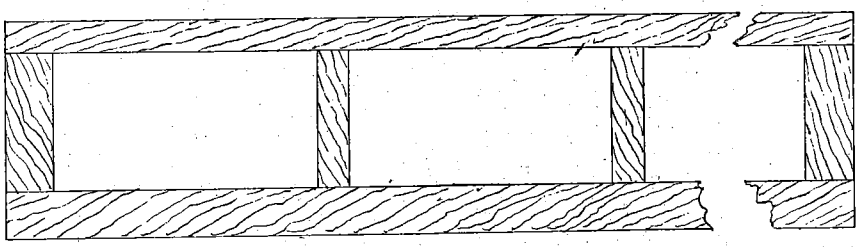
Stempiece and sternpost cannot be made of better material than Australian red gum; this wood has no rivals for these portions of a ship and will stand hard knocks and strains without noticing them. Being extremely hard and heavy it is not a bad plan to use it for the deep deadwood on those sailing yachts which have metal keels, as it tends to keep their center of gravity low and saves a little in the bulk of the metal keel by this means.



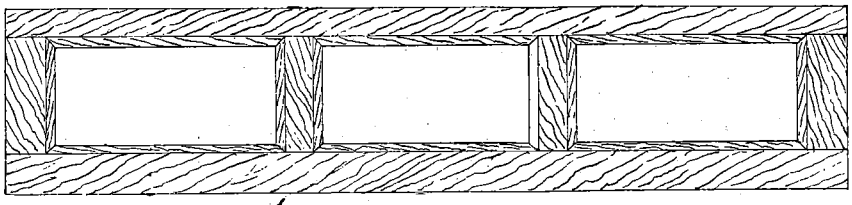
Curly Grained Oak



An Elm Panel

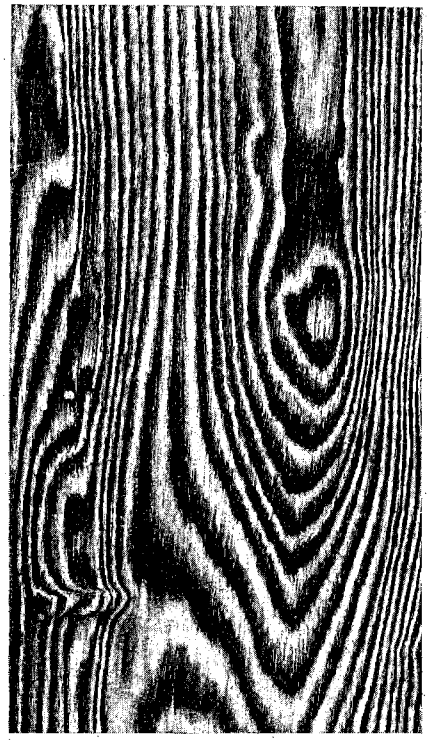


A Transom With a Plain Slash Grain Fir Front



How Fir Transom Shown on Opposite Page Looks Moulded

The shaft log should be of oak; horn timbers also of oak. Natural crooks for stem and stern braces and also for hanging and lodging knees throughout the ship are probably best of Chinese camphor wood,



Plain Oak

which grows in a great variety of shapes and is in texture not dissimilar to Australian hardwood.

For engine bed, oak is again the best as it will stand the bolts being taken in and out of their holes with least wear to the material in the operation. Any wood at all inclined to be soft should never be used for either engine bed or shaft log as alignment will probably suffer after bolts have been withdrawn for periodic repair to machinery.

For decks we have a choice of "bests." The writer believes in East India teak as the wood for this purpose, but many swear that Kauri pine is its equal; while, for the owner who wants decks that he can holystone into snowy whiteness, pine gives him the opportunity to indulge himself (or his crew) in this fine exercise.

Masts and spars should be of silver spruce which combines lightness with strength. Riga, Dantzic and North American pine are heavier and not always quite such dependable woods for these purposes.

Frames are usually made of oak, though a man in pursuit of picked woods for his vessel might well use one or other of the Eastern Asiatic varieties—either Ipol for steamed frames or Yacal for sawn ones. American elm and Hackmatack are good for the steamed frames of small craft, though the former is very liable to decay from alternate wetting and drying or from poor general ventilation.

For deck beams, oak is the very best wood and will carry its load without sagging as long as the boat lasts.

Stringers and clamps are well made in what is known as Borneo hardwood; oak, Japanese Keyaki and American yellow pine are also very suitable.

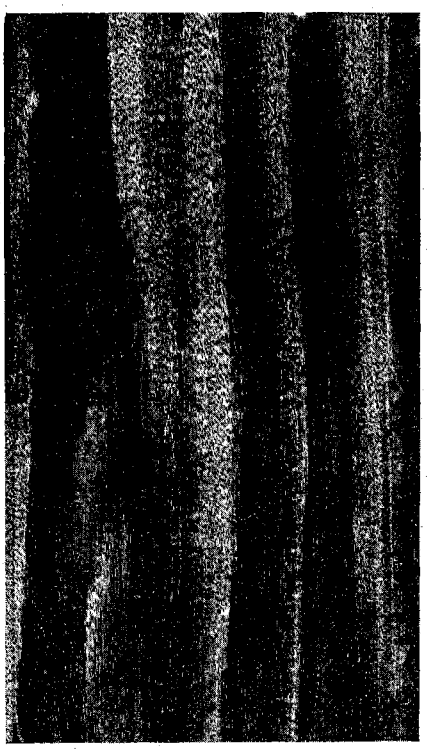
In the case of skylights, sliding hatches; accommodation ladders and the like, East India teak is the only material which can be guaranteed not to warp, and, therefore, in the case of the first two named, not to leak. This wood, in fact, is indispensable for these purposes.

Deck houses, cabin trunk sides, booby hatches, etc., must be made of some wood which is impervious to the weather, and teak is generally considered the best material for these; if other hardwoods are used, the doors and window frames should still be made of teak for the same reasons as skylights and hatches are made of it exclusively.

If the rudder is to be of wood it should be teak and doweled.

For ornamental work below decks a plain white enamel finish picked out with oak, teak or mahogany panels and facings cannot be improved upon in the writer's opinion. Nothing shows worse taste or a more vulgar ostentation of "what the boat cost" than an incongruous mixture of different polished hardwoods below decks. The sea has ever made for simplicity in the characters of those who live on it and this is always reflected in the simple ornamentation of all vessels owned by true seamen.

Now as to shipbuilding woods indigenous to this Pacific Coast and suitable for the man who must build

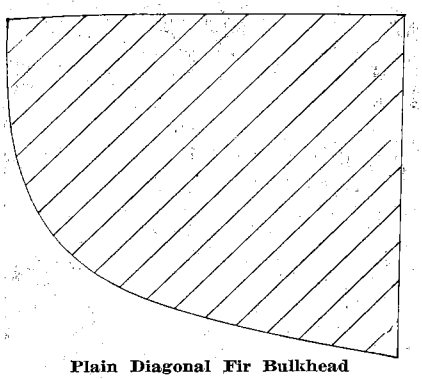


Honduras Mahogany

within more reasonable limits of cost, it may surprise many who are not old-timers to know that what is commonly called yellow cedar (and which grows in Northern Canadian latitudes and in Alaska), is considered by many old shipbuilders and seasoned sailormen to be the very best shipbuilding wood to be had on this coast. This applies not only to planking but to steamed frames; not for decks alone (where many declare it the equal of Kauri pine), but also for wheelhouses and cabin trunks. The writer himself has sufficient faith in this wood to be about to construct throughout of it a heavy seagoing ketch which he is now designing and which will be built this winter. She will be yellow cedar from truck to keel with the exceptions of stempiece, sternpost, keel, shaft log, masts and spars. One of the most interesting facts about this tree is that it seldom grows upright immediately from the roots, but usually gives a primary short bend near the ground and then shoots up erect for the rest of its height. This peculiarity provides the shipbuilder with an endless variety of natural crooks of all bends, lengths and curvatures which are little short of invaluable both from designer's and constructor's viewpoints.

The most widely used shipbuilding wood on this Pacific Coast is undoubtedly Oregon pine or Douglas fir (which is the same thing). Many craft are wholly constructed of this wood with the exception of steamed

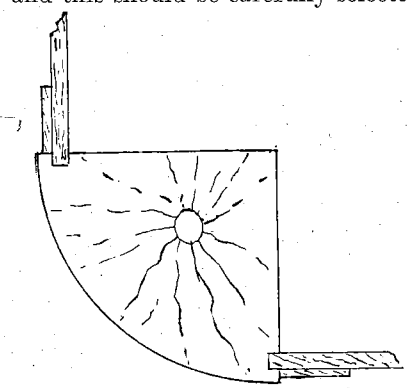
oak frames and, while its performance must be judged from the point of view that it is the principal indigenous wood on this coast which is suitable for shipbuilding purposes (and is therefore the most tempting to use from the point of view of



Plain Diagonal Fir Bulkhead

cost), it generally gives a pretty good account of itself, though for decks it is a very poor wood and expands and contracts under weather conditions as naturally as though it were in its native forests and with the regularity of tides following the moon, to the ultimate despair of the owner who wants his decks reasonably tight. Of course it is better if properly seasoned, but the Pacific Coast lumber mills are far too busy to trouble to season any wood for shipbuilding purposes. So we take what we can get and if fir decks be well payed with pitch, and the overlapping pitch be not planed off, a fairly watertight deck may result at the expense of a messy appearance only tolerable on work boats; so that for yachts and kindred craft having fir decks, canvassing is usually the best in the end though it is not at all smart looking.

For frames, oak is generally used, and this should be carefully selected,



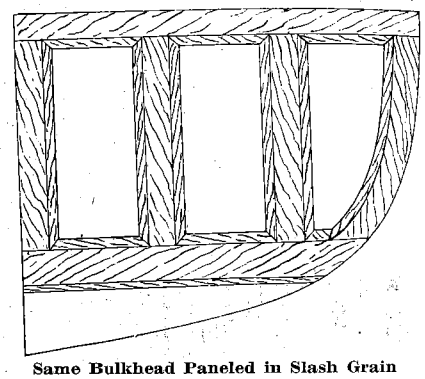
Section of an Oak Transom Corner

as too often the oak served out to us here has "ower many shakes" in it. The writer recommends that naval architects and shipbuilders try North American Yellow Cedar for the steamed frames of their next boat, making them in the following proportion to steamed oak frames,

PACIFIC MOTOR BOAT'S CHART SHOWING SUITABLE SHIPBUILDING WOODS TO WHOSE COUNTRIES OF ORIGIN THE PACIFIC COAST OF NORTH AMERICA IS CENTRAL

Keels and Deadwood	Steamed Frames	Outside Planking	Keelsons, Stringers and Clamps	Sawn Floors	Shaft Logs and Engine Beds	Inside Ceiling	Natural Crooks and Knees	Decks	Deck Beams	Deck Houses	Skylights, Hatches, Window Frames and Outside Doors	Masts and Spars	Bulkheads and Cabin Flats	Stems and Sternposts
East India Teak	Eastern Asiatic Ipol	East India Teak	East India Teak	Selected Oak	Selected Oak	Red Cedar	Chinese Camphor Wood	East India Teak	Selected Oak	East India Teak	East India Teak	Silver Spruce	American Yellow Pine	Australian Red Gum
Borneo Hardwood	Japanese Keyaki	Hard Texture Philippine Mahogany	Borneo Hardwood	Oregon Pine or Douglas Fir		Japanese Matsu	Selected Oak	Kauri Pine	East India Teak	Hard Texture Philippine Mahogany		Vancouver Pine	Oregon Pine or Douglas Fir	Selected Oak
East American Maple	N. American Yellow Cedar	Selected Oak American Yellow Pine	Japanese Keyaki American Yellow Pine				N. American Yellow Cedar	American Yellow Pine		Spanish Cedar (Mexican Mahogany)				East India Teak
Selected Oak	Selected Oak	N. American Yellow Cedar	Oregon Pine or Douglas Fir					N. American Yellow Cedar		N. American Yellow Cedar				Oregon Pine or Douglas Fir
Oregon Pine or Douglas Fir	American Hackmatack	Oregon Pine or Douglas Fir	N. American Yellow Cedar											
	American Elm	Japanese Red Sugi												

namely: If one dimension of a steamed oak frame be $1\frac{1}{4}$ in. then the same dimension in yellow cedar should be about $1\frac{7}{8}$ in.; also bearing in mind that yellow cedar is about 1/3 less heavy than fir. Planking

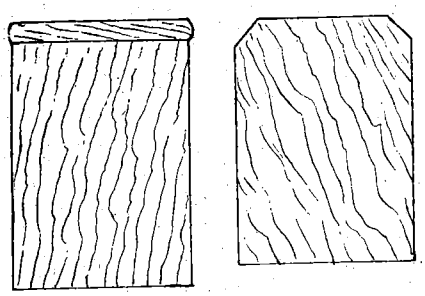


Same Bulkhead Paneled in Slash Grain

in this wood may be the same as in fir and the same for decks, and it will be found to have excellent non-soaking properties and will last as long as the boat.

Deck houses on Pacific Coast craft are often made of a Mexican wood known as Spanish cedar. This is easily obtained and will stand the weather satisfactorily if properly treated and varnished. If this is not used suitable wood for these purposes must be obtained away from the Pacific Coast.

It is noticeable that very little importing of Eastern Asiatic, Australian, Chinese or Japanese woods is done on this Coast. These woods are most excellent for shipbuilding purposes and especially for special parts of vessels, while the importation of such as may be required for any vessel (the order for which has been placed in time), should not be a difficult matter for any who may be so minded.



A Faced and Chamfered Beam Section

The accompanying table gives what are, in the writer's opinion, the most suitable woods for the construction of the various parts of a vessel to be built on this Coast; the materials named are given in the order of their actual suitability and are all either indigenous to the North American continent or to that part of Asia immediately opposite to this coast.