Earthquake-proof Buildings.

THAT is what American architects and engineers are in search of just now Their technical press has been full of discussions lately on the best type of building to employ in the rebuilding of San Francisco, in order that there may be no possibility of a repetition of such a terrible calamity as lately befell the city. No one, of course, can guard against earthquake, but the Americans think it is quite possible to build a city which shall be, at any rate to a very great extent, earthquake proof. The *Scientific American*, for instance, declares that it will be within the power of the engineer and architect to build a second San Francisco, which, if called upon to do so, could pass through such another seismic disturbance without being completely overturned or utterly ravaged by fire.

The most hopeful promise for the future (the writer goes on to say) is found in the admirable manner in which the steel skeleton of the modern steel and masonry building has passed through the terrific shock and wrenching of the earthquake. Although this result has been a matter of surprise to the average layman, it is not so to the engineer. Modern structural steel is possessed of such elasticity and toughness that it will submit to the most severe and complicated stresses before it can be brought to the point of rupture

According to information at present available, it would seem that in buildings of this type at San Francisco the wreckage directly due to the earthquake was confined to the loosening, and in some cases throwing down, of the brick or stone facades with which the buildings were covered in. Probably, also, it will be found that the interior partitions and floors have in many cases suffered a similar fate. The loss of the walls or panelling, was due to the fact that they were not homogeneous with the steel frame, but were merely attached to it by methods which were never intended to resist the enormous inertia stresses that were set up when the old building was rocked by the earthquake. Evidently, if this disruption of the walls is to be prevented, they must either be bonded in more completely with the steel frame, or, better yet, they must be made homogeneous with the frame. Now, the last-named conditions are ideally present in the new form of concrete steel or armoured concrete construction, which has made such rapid strides of late years in structures of the larger and more important class. As the results of most elaborate engineering tests, concrete steel has been proved to possess in the highest degrees those qualities of elasticity, toughness, and homogeneous strength which, when combined in a monolithic mass present a structure as nearly earthquake-proof as our present methods and materials can make it.

Building Boom in America.

There is quite a building boom in the United States, as is shown in a report issued by the Government Geological Survey In forty-seven principal cities of the country 184,416 building permits were granted in 1905. The value of the structures erected was £128,111,000. This shows a large gain of nearly forty per cent. over the record of the prevous year.

The New Tyne Bridge.

The magnificent new bridge across the Tyne between Gateshead and Newcastle, which was lately opened by the King is looked upon as one of the greatest engineering triumphs of the day and as the finest specimen of bridge building in North Britain since the Forth bridge was constructed some fifteen years ago It takes the place of a bridge erected some fifty years ago by Robert Stephenson. There is a wide difference in the methods under which the two bridges have been constructed. Especially is this true of the foundations. The old bridge was built on simply piled foundations, for in Stephenson's time the Tyne was comparatively shallow, but the new structure has had to be erected in deep water, and the modern caisson system has been employed, the concrete filled supports being firmly fixed in the river bed. Three piers have been erected in this way, and with the approach from each bank there are thus four spans composed of steel girders The total length of these girders is over 300 yards, while the height of the underside of the centre of the bridge above high-water mark is 87ft sufficient to allow the passage of the largest steamers sailing on the Tyne.

... Correspondence ...

[*Readers are directed to the rules set out in "Business Notices" on page 7*]

Our Railways.

To the Editor

SIR,—I have read with interest your article in this month's paper on the Main Trunk Railway, and am waiting anxiously for the following number to complete it

In your maps etc, would you kindly show the Stratford-Toko branch and its proposed extension route in relation to the Main Trunk?

I would also be pleased to see you take up the Midland and Otago Central railways, as it is only by articles like these that we can understand what is going on around us—I am, etc,

Ashburton, 10/10/06. HERBERT GRESHAM

[The Stratford-Toko branch will be discussed, together with the Midland and Otago Central railways, in a future issue—ED]

Union Co.'s Fleet.

To the Editor.

SIR—In your very interesting account of the Union Steam Ship Company's fleet, its origin, etc., I notice you do not mention the S.S. Alhambra (McMeckan, Blackwood, I think), a very interesting boat which was at one time in the P. & O. service, and one of the last ocean-going steamers with Mortice spur gear in connection with trunk engines which drove the propeller. An account of the above boat and what became of it will be of great interest. Apologising for troubling you—I am, etc,

Wellington, 1/10/06. JOHN WELSBY.

[Mr. Welsby's information is welcome, but no doubt he will readily understand that it is impossible, within the confines of a newspaper article such as that to which he alludes to treat of every ship or every steamer that has played a part in the history of our mercantile marine—ED.]

The Whaler Chance.

To the Editor.

SIR,—I noticed in your very interesting article on the New Zealand Mercantile Marine that you made only a brief mention of the old whaler Chance This vessel was built at Salem, date not exactly known, but long before her New Zealand skipper was born in 1818. She was launched as a full-rigged ship, and was christened the Bengal. Her dimensions were 100 ft. long, 24 ft 6in. beam, and having a capacity of 285 tons While sailing as the Bengal she was ice-bound in the Sea of Okhotsk, along with some other whalers While the latter was crushed, she escaped and carried all her crew, some hundred men, to Honolulu. In 1874 the Chance, as she was called at that time, passed into the hands of Messrs. Nicol Bros., of the Bluff, who fitted her with all the necessary requirements for coast whaling Whales were very plentiful at this time about Foveaux strait, Solander island and the West Coast. The Otago provincial government offered a bonus for a vessel first fitted out and despatched from any port in the province The Chance received the bonus, and sailed under the command of Captain P Gilroy She was exceedingly successful, and it was at this stage that Mr F T Bullen made the acquaintance of Captain Paddy Gilroy and his wonderful barque. Mr. Bullen speaks of her as being vilely unkempt and dirty as to the hull and gear, but he could not pay too high a tribute to Paddy's wonderful seamanship, and that of his polyglot Maori, half-caste and white crew on the rugged southern coast—I am etc,

Wellington, 5/10/06 F G LAYTON.

High-speed v. Low-speed Engines.

To the Editor.

SIR,—I write to you on the above subject feeling sure that there are many people whom your paper will reach who are interested in it There is an immense amount of loss entailed by purchasers of different kinds of machinery simply because they are inadequately informed and accept without reserve every word in the catalogue of an engine which has taken their fancy. It is, of course, an understood thing that experience is the best teacher, but it charges the highest wages.

A marine engine is usually classed as high speed when its revolutions exceed 600 r.p.m., and as a low speed when below that amount, although the power of the engine has a good deal to do with this For instance, an engine developing 5 b h p. and running at, say, 550 r.p.m. would be a low-speed engine, although at the top of the low-speed rating; while an engine of 50 b.h.p. would be a decidedly high-speed engine if running at that speed, i.e. 550 r.p.m., provided it was constructed with no more than, say, four cylinders, otherwise the engine might be made up of 10 5-h p engines coupled up; in that case it would be within the low-speed limit. This is largely gauged however, by the piston speed per minute. Take an engine of 500 r p.m. and 15″ stroke: this engine's piston will travel at 500 x 15″ = 7500″ per minute = 625 ft. per minute, this is high speed, especially for a heavy engine. Then again, take an engine at 500 r p.m. and stroke 7″ = 3500 inches per minute = 291.8 ft. per minute, which is a fairly low speed This matter, however can be gauged at a glance at the makers catalogue by the revolutions and the weight. Now, what is the result when the different engines are put in commission? This, like the former, depends as to results, largely on conditions.

Take an engine of 20 h.p. and 800 r.p.m., and fit it into a light boat of narrow beam and little draught and the speed will be good because the small craft can move through the water and make way for the quick-revolving propeller, giving it plenty of clear unbroken water in which to do effectual work. Again, let us fit this engine in a serviceable sea-boat of say 50 ft. in length and 10 ft. beam and the result will be very poor—practically the same as putting a race-horse into a dray. The consequence is the boat cannot get away from the light quick-moving propeller and does little more than churn water, as the boat would be only moving at approximately from 6 to 7 miles per hour, and this only in calm water. Now, let us fit a 20 h.p. low-speed engine of, say, 325 r.p.m. with propeller, say, 30 in. diameter, into the light narrow-beam boat as before described, and it will sink it. This would be the table reversed—the draught-horse in the racing sulky. But let us fit this engine in the 50 ft. serviceable sea-boat 10 ft. beam, and we will find that on the first revolution of the propeller the boat will literally jump from its moorings, and instead of the miserable 6 or 7 miles an hour, we will have approximately 10 miles an hour. This speed will also be fairly well maintained in rough water, but why? Because of the slow-revolving propeller in which the amount of slip is reduced to a minimum. The propeller getting hold of the water does satisfactory service, owing to its large diameter and slow movement during which it does not get a chance to churn the water; this being a great deterrent to the successful propulsion of a boat, through the water. "But,' says the novice, "we can increase the diameter of our high-speed propeller and so make it more efficient" This has been tried many times before and is a useless performance. The power of the high-speed engine is in its number of r.p.m., and if that is reduced to any appreciable extent, the power of the motor is thereby reduced and the engine is also working beyond its normal strain. In other words, if you want an efficient and serviceable propeller for a useful and serviceable boat you must buy a low-speed engine.

Then we come to durability · the unmechanical eye has only got to look to some of these light high-speed engines, to see that they are not designed for long-life service, and that their up-keep must, of necessity, be greater than an engine of the same weight moving at half the speed, the internal explosions of these engines also plays havoc with their cylinders and piston rings, to which the aforesaid applies.

In conclusion, the value of an engine is its first cost, plus its efficiency, plus its economy, plus its up-keep, plus its length of life, which is its durability The purchaser of an engine, if he wants to make a good bargain, must fully consider these items of which the second one, i e., efficiency, is an easy first—I am, etc,

San Francisco, 1/9/06 H C CHRISTIAN.

New Colonial Industry.

A new industry which promises to benefit the island greatly, has just been started in Barbadoes. A syndicate has been formed to make paper of the megass—sugar cane from which the juice has been pressed—which has hitherto been used as fuel. The syndicate is offering planters £1 per ton for the megass.